

AVIYANTAA'18

Yearbook of Department of Mechanical Engineering| Volume 5| Issue I



Interdisciplinary
Mechanical Engineering

Glimpses of
Aviyantaa'17

Yearly
Project Abstract

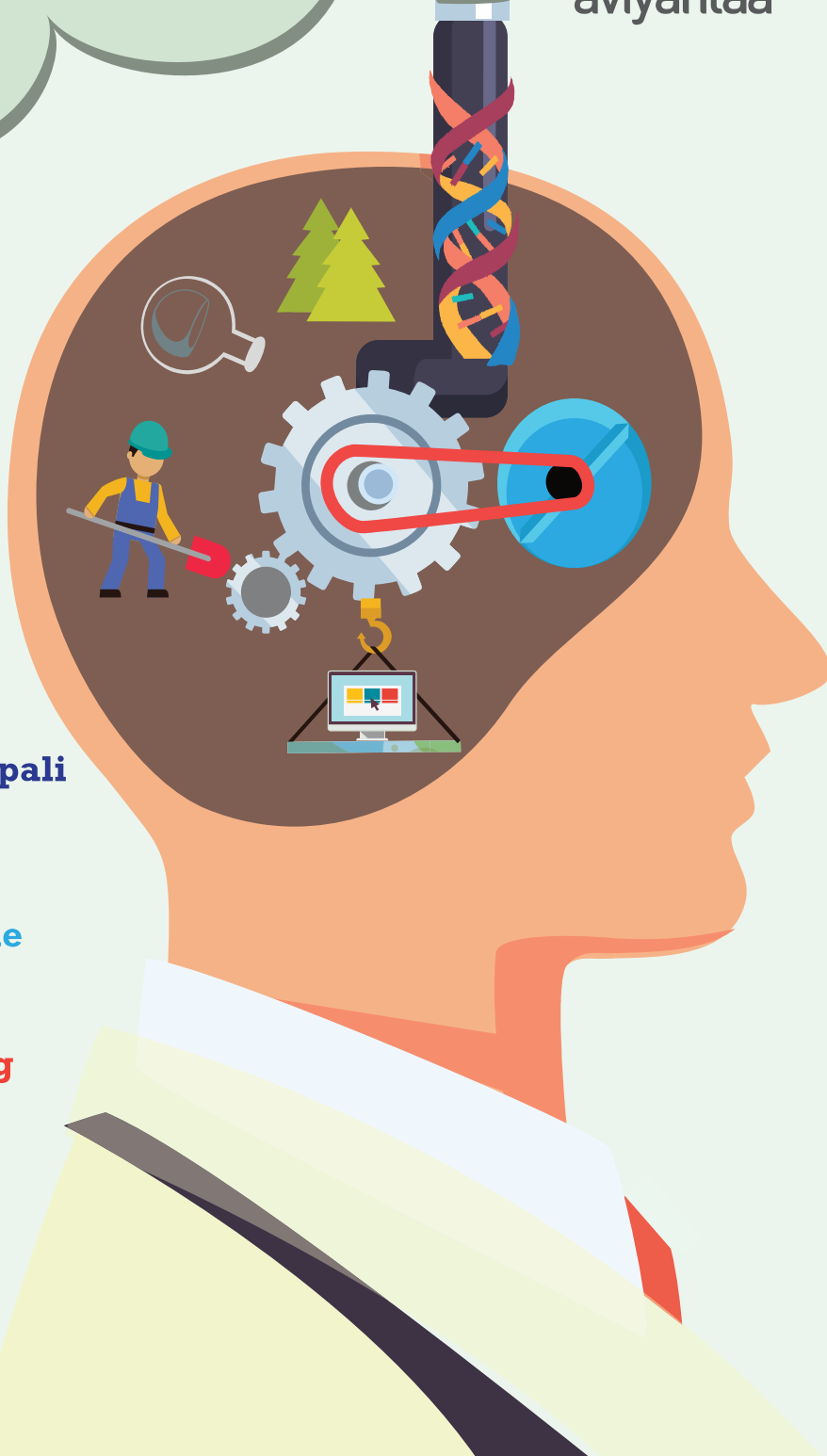
Shell Eco-Marathon
Team Junkiri

Interview with
Dr. Damber Bahadur Nepali

Interview with
Pioneer of Robotics in Nepal
Ganesh Bikram Singh Ale

‘Journey after this’
**Mechanical Engineering
Graduates**

Pre-events of
Aviyantaa'18



Association of Mechanical Engineering Students (AMES)
In association with Department of Mechanical Engineering, Kathmandu University

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YEARBOOK OF DEPARTMENT OF MECHANICAL ENGINEERING

Editorial

Aviyantaa 18' is a legacy that has been carried by the students of Mechanical engineering as their own property. All the members of the Team Aviyantaa work in coordination carrying out all the roles and plans in an organized manner. This year's Aviyantaa publication is built with the theme 'Interdisciplinary Mechanical Engineering'. The publication not only describes the inter-relationship of mechanical engineering with other subjects but also depicts the importance of Mechanical Engineering in all fields.

After four successful publications, Aviyantaa has been trying to spread its branches to touch various sectors. It is not limited to projects description as it is a platform for everybody where they can share their knowledge, get to learn about various technical activities related to mechanical engineering and also a source of database. Every year, the team Aviyantaa works at their best to bring new ideas and a new level of success in the magazine.

With the addition of 60 extra students in the batch 2017', Aviyantaa 18' consist a total of 70 project abstracts related to four sub-divisions: Automobile, Design & Manufacturing, Hydro Power and Energy Technology. Projects of this year's publication are related to design and analysis of vehicle structures, calculation of energy of different flows of fluids, design and fabrication of Automatic vehicles, and many more. The abstract has been playing a vital role as a database for all the future projects and researches to be done and generation of new ideas.

The interview part of this years' publication is knowledge based. In a way, it gives a path and motivation for all the readers to do great things. We have included interviews of such persona who have done their part for the sake of development of Nepal and also have given their wise words to encourage us to do our part. They have shared their stories, some of which are very fortifying and strengthening and give us the enforcement to believe in ourselves.

Finally Aviyantaa 18' includes great articles from the mechanical student themselves. It has always been a platform for the winners of the projects, photography competition and glimpses of all the events organized by AMES. In a nutshell, Aviyantaa 18' is a story of the Department of Mechanical Engineering family. A story that tries to become wiser and better every year trying to touch all lives to make it better.

SHORT NOTE FROM AVIYANTAA'18 CO-ORDINATOR



It is really an honor for me to be a part of Department of Mechanical Engineering, AMES and finally Aviyantaa. The department along with AMES has always been positive in planning and organizing various activities and programs for the improvement and betterment of the students. Aviyantaa, a Mechanical Exhibition or a Mechanical Fest has helped students to showcase their talents in terms of their academic projects, skills in photography, arts, design, editing, marketing and many more. From the first issue of Aviyntaa'14, AMES has been yearly organizing Aviyantaa with different themes of the magazine along with the event. The theme for the 2018' Aviyantaa is 'Interdisciplinary Mechanical Engineering'. With this theme, the Aviyantaa team collaborated with different schools and organizations by organizing a Junk Art Competition with School of Arts, KU and vocational DIY training for school students at different schools of Kavre. Besides the regular classes, working in a team for a magazine and organizing an event has been a great learning experience. As a Coordinator, I would like to express my gratitude towards the Department, AMES, Kathmandu University, my Team members for their meticulous support, sponsors and all those who have directly or indirectly contributed for the program. I assure that Aviyantaa, an integral part of the AMES and the Department, will always support the students and provide them the platform for their exposure.

Team Aviyantaa



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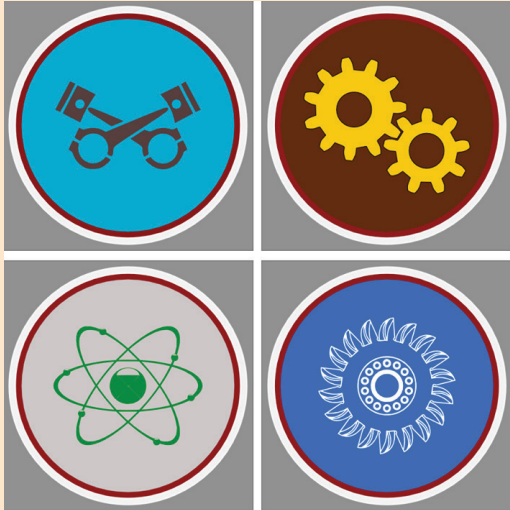
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DEPARTMENT OF MECHANICAL ENGINEERING



Bachelor of Engineering in Mechanical Engineering is one of the oldest programs at the Kathmandu University and the first of its kind in the Republic of Nepal offered by the Department of Mechanical Engineering (DoME) located at Kathmandu University, Dhulikhel. Situated in the beautiful environment of Dhulikhel, DoME boasts the team of highly qualified teachers and expatriate faculties. It strives to offer the most and exposes the students to the cutting edge technology in Mechanical Engineering discipline. Updating its laboratories with the mainstream of the technical advancement is one of the strong factors, Turbine Testing Laboratory (TTL), sophisticated CAD/CAM Lab, Solid Works, ANSYS simulation, Rapid prototyping, highly equipped automobile and mechanical workshop which are on the run are the stronger side of the department.

Mechanical Engineering is essential to a wide range of activities that includes research, design, development, manufacturing, management, and control of engineering systems, subsystems, and their components. Department of Mechanical Engineering is handling various fields of research viz. Turbine technology, Biomass gasification, improved cooking stove, Biogas generation etc. which will be beneficial for the nation in long run.



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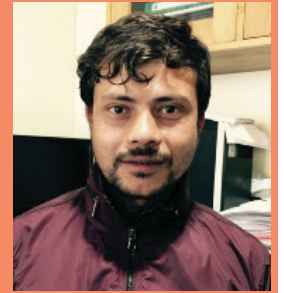


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Short Message from the Head of Department



I, on behalf of Department of Mechanical Engineering, would like to congratulate all students, faculty members, Association of Mechanical Engineering Students (AMES) and specially to team Aviyantaa'18 for Aviyantaa'18 Volume V issue I in 2018. I am confident that this year Aviyantaa'18 will be a successful one, and 18 would be a lucky number.

Department of Mechanical Engineering in association with Association of Mechanical Engineering Student (AMES) is continuously working for Aviyantaa from last four year, recognizing its inherent value. We are proud to announce that it is now one of the yearly program for department where students, researchers and faculties can express their latent talent in the form of project exhibition, research articles, about the life and experience within and outside Kathmandu University. I am most fortunate that my department is filled with so many motivated faculties and students who make positive choices, which ultimately lead to so many meaningful and productive actions like Aviyantaa'18. I believe that Aviyantaa would be the first of the series of steps to showcase research activities to the industry for industry academia interaction process for contribution to the wealth creation of the nation. Lastly, I would like to offer my sincere thank you to our sponsors and well wishers for having such a caring and given heart, without whom Aviyantaa'18 would not have been possible.

Message from the Coordinators Desk

Aviyantaa was conceived as a revival of KUPLEX, an exhibition event for the School of Engineering, Kathmandu University and on ideal circumstances will reach its pinnacle with similar heights. This exhibition has



always aimed to provide the final push through exposure to our graduate who have always been symbol of resourcefulness.

Retrospectively, through this edition of Aviyantaa, I want to express my boundless gratitude to all the pioneers of Aviyantaa who dreamed this venture together. The panorama of all the contributors till date runs through my mind whenever I have to think of Aviyantaa.

I am thankful to all the sponsors of past and present for the life support provided to this event. My appreciation for the support provided by all the Faculties, School Authority, Research Teams, supportive units like TTC and TTL.

For the current executive team, the sub-committees, I cannot express my pride for these people in words. The dedication, impetus, resourcefulness, chivalry and integrity you people have demonstrated is reflective of our proud pristine culture. I wish the team for all the success for the event and your future expeditions.

Message from the AMES President (2017/18)

AMES the departmental club of DoME, organizes many events academic as well as nonacademic events throughout the year; it has provided platform for the students of Mechanical Engineering to express their skills, knowledge and their potential. It has been an honor to



be part of DoME and AMES organizing different events for all the students.

Over the past few years AMES has successfully organized Aviyantaa where the project abstract of students were compiled and published in departmental year book along with project exhibition. These projects are raw and small, but it is the smallest machines and discoveries that will make a difference to the lives of people.

"THE ENGINEER HAS BEEN, AND IS, A MAKER OF HISTORY." - JAMES KIP FINCH

As the AMES President, I would like to thank each and every person associated with the department, my colleagues and my junior's, department faculties and staffs for the valuable support and participation provided during the organization of the event. I am very thankful to AMES executive members and Aviyantaa team for their hard work and dedication for the upcoming event of Aviyantaa'18.

Association of Mechanical Engineering Students



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Vice-President

Prabin Dhakal

Secretary

Samita Rimal

Vice-Secretary

Nishan Sapkota

Treasurer

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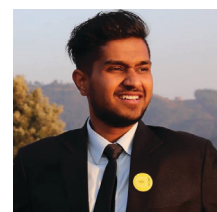
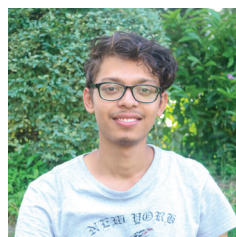
Sagar Thapa

Shrayash Pradhan

Prabesh Ojha

Puraskar Aryal

Samjhana Karki



Association of Mechanical Engineering Students (AMES) is the departmental club of Department Of Mechanical Engineering (DoME) at Kathmandu University, established in 2002. It aims to promote academic, social and extracurricular activities of students through the provision of information, education, networking, and a range of publications. AMES has been dedicated in creating a congenial environment for the students, acting as a mediator between students and the department ever since its inception.

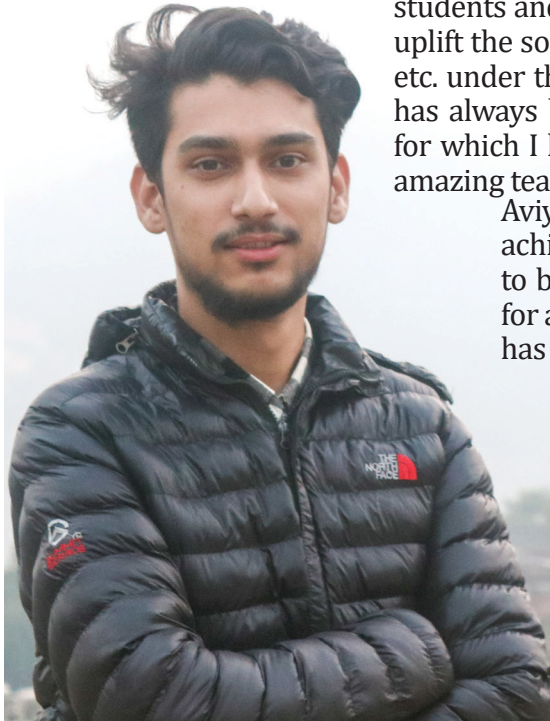
AMES builds and promotes the exchange of ideas through correspondence and by encouraging full dissemination of scientific and professional knowledge. Besides encouraging bilateral cooperation among Mechanical Engineering students, AMES organizes various programs in collaboration with different engineering associations in and outside the University and Nepal Government as well. AMES Bulletin board is devised in order to create productive environment for literature lovers. AMES facilitates the initiation of various prestigious competitions like Shell Eco Marathon. AMES organizes AMES Cup which includes sporting events like football, cricket, basketball, table tennis, badminton, chess and the like. Trainings, seminars, workshops and counseling programs are conducted on a yearly basis based on the need of students.

AVIYANTAA is one of the highlighted events organized by AMES which has proven to be an excellent opportunity for the students to showcase their yearly projects. Departmental yearbook AVIYANTAA is released on the event day that comprises students and departmental activities carried throughout the year.

With the formation of new Agenda and Tenure of AMES 2017-18, Aviyantaa 18' welcomes the new President, Mr. Prabin Dhakal, Batch 2015

Message from the New President

Association of Mechanical Engineering Students is the biggest, the oldest and the most active club in Kathmandu University. AMES has been grateful to be an integral part of Department of Mechanical Engineering.



AMES has been conducting events and working in different ways for the students and alumni of mechanical engineering. It has done its part trying to uplift the society's environmental aspects, education aspects, service aspects etc. under the slogan, "AMES FOR SOCIETY". Being a part of it as a President has always been prestigious for me filled with many major responsibilities for which I have done my best to maintain its honor with the support of an amazing team one could ever get.

Aviyantaa, the biggest annual event organized by AMES, has already achieved great height in the past four years and this year is also going to be a Mega Event. Aviyantaa is an international platform in Nepal for all mechanical enthusiasts. Working as a part of Aviyantaa'18 team has earned me the most valuable and amazing experience I could get.

The effort Aviyantaa'18 team has shown for this is magnificent. I hope this event will be remembered in the history of AMES to be a significant turning point of Aviyantaa such that in future it will be constantly growing bigger than ever.

I would like to thank the faculties, staffs and students of Department of Mechanical Engineering for their support. I would like to express my special appreciation for the contribution made by AMES and Aviyantaa'18 team to make this day possible. I am grateful for the support provided by the sponsors, well-wishers and all the delegates involved directly and indirectly.



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2017 BATCH (ENERGY TECHNOLOGY & HYDROPOWER)



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2018 BATCH (ENERGY TECHNOLOGY & HYDROPOWER)

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(अरनिको राजमार्ग, मध्यपुर थिमी, भक्तपुर, नेपाल)



Yearbook Release



Project Exhibition





Photographic Exhibition & Competition



aviyantaa'17



Face Painting



Acoustic Evening

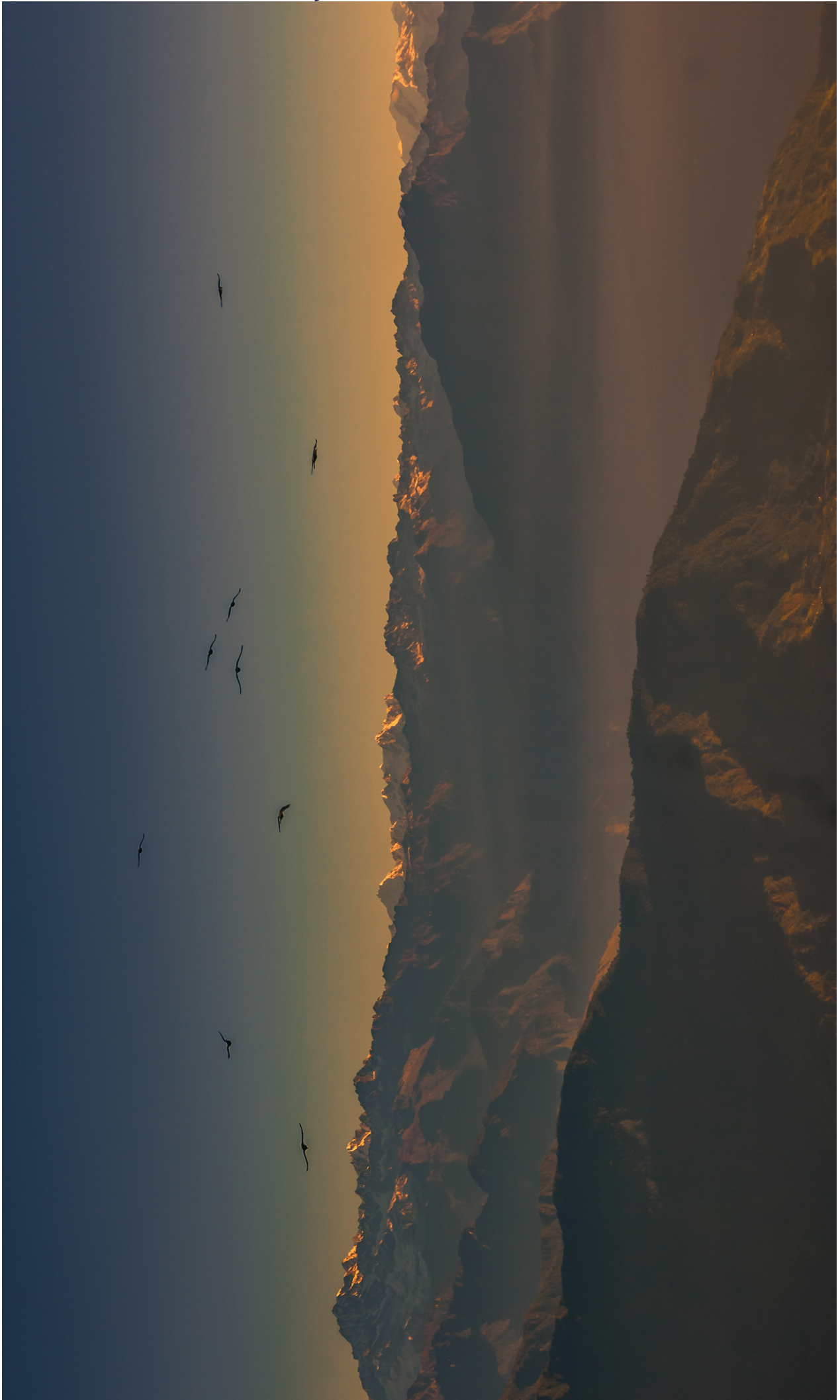


Public Voting Winner Photo



*"20-thousand lake :looking out over the lake, I felt enveloped in the most peaceful loving utopia."
Shot by Robin Koirala*

Judge Call's Winner Photo



"Glow to the Himalayas early dews"

Shot by Rijan Shrestha

“Design And Fabrication of Automatic Braking System For Four-Wheeler”

Bibek Yadav; Keshav Verma; Sagar Thapa; Sanjip Pokheral

Supervisor's Name: Dr. Daniel Tuladhar (Associate Professor and Head of Department)

Cost: NRs. 18000.00

EXPERIENCE

Working on this project has been really great, we came to learn many things regarding Automobile and its development.

We were delighted to present our project on Aviyantaa and able to receive many appreciations for our project. The idea about this project was carefully selected and was taken after discussion with the Supervisor. Working for 2-3 days a week and collecting the components for this project was the most difficult and enjoyable period. Gathering knowledge from seniors and supervisor and receiving support from TTC, specially Mr. Suman Karki and Mr. Kapil Thapa Chhetri played a major role in completing our project. We divided our work and faced many tests, modification and failures and at the end we won the competition and we thank our team for the support.



“Design and Fabrication of Solar Food Dryer”

Shreya Acharya , Abhar Bhattarai , Surath Mahat , Erica Tamang

Supervisor's Name: Dr. Sunil Prasad Lohani (Associate Professor)

Cost: NRs. 5500.00



EXPERIENCE

With the world's consent with shifting the paradigm from fossil fuels to renewable energy , we planned to go for utilizing clean energy to contribute to solve one of the global major problem; food wastage .The motivation behind doing this project was that we wanted to design a product that would make a positive economical impact to Nepalese farmers . We believe our project is successful only because of our hard work, determination and enthusiasm towards our project. It was a sublime experience to work on a new project and cope with the challenges encountered , but despite all these hardwork, we had fun.

“Fabrication of Demonstrative Model of V-Twin Engine”*Ayush Shrestha; Nitu Shrestha; Prabin Ngakhusi; Santosh Adhikari*

Supervisor's Name: Mr. Malesh Shah

Cost: NRs. 2510.00

EXPERIENCE

The simplicity and practicability of the demonstrative model helped us win the project of the year from our batch. The demonstrative model of the V-twin engine was made up of wood which turned out to be quite convenient and cheap. There was less complexity in our project as we didn't use any kind of advanced materials. Our project's win is solely based on the design that we came up with and the way we managed to use that design to make a workable demonstrative model of the v-twin engine.

Yearly project provides us with the opportunity to use the bookish knowledge to a practical use. The project as a whole helped us to learn more about the basic principles of engines and its working mechanism. We did gain tremendous amount of knowledge not only in our technical areas but also in our managerial techniques. So, in the future when we come across similar problems, we would have the right experience to deal with those kinds of problems. We did consult every bit of progress and problems with our supervisor. This eventually helped us deal with the problems more easily as we were under the surveillance of a professional. The simple yet detailed design of our demonstrative model made it stand out among other projects.

**“Fabrication of Water Powered Tesla Turbine”***Pawan Lal Bijukchhe; Prabesh Ojha; Prashrit Sapkota; Pratik Shrestha; Salim Maharjan*

Supervisor's Name: Mr. Nirmal Acharya (Former Project Coordinator, KUTTL)

Cost: NRs. 4225.00

EXPERIENCE

It was a great journey we had with Tesla turbine where we got to experience and learn many things. Despite this, we did not expect our project to be winner at all. So, after observing the results we were filled with amazement and serene happiness. While most turbines are usually reaction or impulse type,



Tesla turbine is a drag-based turbine which means that it operates using the drag or frictional property of water. This enables Tesla turbine to have maximum theoretical efficiency and suitable for Pico hydro projects. This uniqueness along with its successful testing is what we think made our project better than others.

Healthy competition brings the best out of all without disheartening anyone. There were many great projects and we feel great to be among the winners. A project also represents hard work and perseverance of students, support of supervisor and help of other personnel. So, its because of those helping and guiding hands that we were able to bring our knowledge and understanding into action. Finally, we also owe a debt of gratitude to DOME and team Aviyantaa for providing us such platform and opportunity.

Pre-events of AVIYANTAA'18

Clean Cooking in Nepal and Developing Improved Solutions for Cooking (DISC) Initiative

The talk program held on “Clean Cooking in Nepal and Developing Improved Solutions for Cooking (DISC) Initiative” by Mr. Shekhar Sharma was an hour full of interaction and knowledge flow. The participation of students was profound, so was the interaction between the spokesman and the students. The overall programme seems to have enlightened a lot of students about ‘cooking stove’ in the present context of Nepal. Several topics were covered such as, the ill-effects of traditional cooking stove, solution measures, etc. The information seems to have broadened the knowledge of students regarding this field as well.

Topics Covered:

- 1) Effects of Traditional Cooking Stoves
- 2) The Present Status
- 3) Tiers in Cooking Stove
- 4) Sustainable Development Goals
- 5) Safety Factors
- 6) PPP (Public Private Partnership)
- 7) Energy Levels



General Maintenance and Troubleshooting of Four Wheeler



One day workshop on “General Maintenance and Troubleshooting of Four Wheeler” was successfully organized by AMES in association with TTC, DoME, KU and the District Police Office, Banepa, Kavrepalanchok on 14th June 2018, Thursday.

The Workshop was completed with interaction and technical sessions.

Session 1:

General Traffic Rules and Regulations related with the four Wheeler by Sub-inspector Rajesh Kumar Dahal and Assistant Sub-inspector Bhimsen Bikram Thapa from District Police Office, Kavrepalanchok, Banepa.

Session 2:

Maintenance and Troubleshooting of four Wheeler by Mr. Roshan Ranjit, Mr. Bir Sundar Thapa and Mr. Shyam Mahaju, Technicians from Technical Training Center Kathmandu University.

Session 3:

Knowing the problem and the steps to tackle the problem by Asst. Prof. Dr. Krishna Prasad Shrestha, Department of Mechanical Engineering.



Training & Workshop of Mechanical Softwares



An event named Auto CAD Training & Workshop was organized by AMES from 17th June to 22nd June 2018. The workshop was conducted with motto that "Want To Learn Modeling? Start With Auto CAD" and was intended to make sure that all the students

make not only familiar but very quite expert with the most common and easy software used for modeling that is Auto CAD.

More than 35 students participated the training, declaring the event a grand success.

The training was held for six days. First day was the introduction of Auto CAD, its uses and advantages while making the model over the glove which was discussed by the Mr. Sanjip Pokhrel, the event coordinator of Auto CAD Training & Workshop. Second day was spent discussing the tools, dimension edit, and using those tools discussed again by Mr. Sanjip Pokhrel. The third day was to learn how to draw orthographic projection in Auto CAD discussed by Ms. Nashla Shakya. The fourth day, participants learned how to draw isographic projection of drawing which was covered by Mr. Jitesh Kalwar. The day five and day six were discussed by Mr. Sanjip Pokhrel who covered the 3D drawing in Auto CAD. Other trainers in the Auto CAD Training and Workshop were Mr. Nayan Acharya and Mr. Prabin Dhakal.

"Solid Works Training and 3D Printing



Workshop" was jointly organized by Association of Mechanical Engineering Students (AMES) and Kathmandu University Robotics Club (KURC) from 24th June to 29th June 2018. The event was considered a pre-event of Aavishkar'18, an annual event of KURC and Aviyantaa'18, an annual event of AMES. The workshop consisted of contents ranging from designing in detail using SolidWorks and introduction to 3D printer, its types, structure and operation.

More than 35 students participated the training, declaring the event a grand success.

The 6-day workshop was divided into two phase designing and 3D printing. During the first phase which lasted for first 4 days participants were introduced and familiarized on different available functions and workings of the Solid Works. They were also taught to design a three-dimensional object and mate in assembly drawing. The second phase consisted of introducing and familiarizing them on the principles and logic of 3D printing and how they could make a 3D printed object on their own. They were also introduced the types and major components of 3D printer.

"Workshop on PTC Creo" was organized by AMES from 8th to 12th of July 2018.



creo®

The workshop focused on introduction of Creo parametric software to mechanical engineering students and using its parametric features to design in detail.

The first day of the training was initiated by Mr. Shrayas Pradhan, the coordinator and trainer for Creo workshop, by introducing the meaning of parametric designing and its useful applications in rapid designing while familiarizing with its layouts and tools. The second day started with Mr. Abhishek Subedi, introducing the trainees on making a shaft using common features like extrude, sketch, chamfering etc., followed by Mr. Rasbin Sharma and Mr. Shrayas Pradhan introducing the basics of making a screw using helical sweep. The third day included an exercise on making a gear followed by Mr. Sanjip Pokharel demonstrating use of advanced tools to design a piston. The designing of piston was continued till the fourth day. On the final day, Mr. Ajay Prabin demonstrated the use of the CAD software for advanced kinematic analysis as well as the assembly of two or more parts to for a mechanism. Ms. Nashla Shakya was also the trainer of the workshop.



AMES organized a 6-days ANSYS Training and Workshop from

28th September to 10th October 2018. The training was provided by Dr. Sailesh Chitrakar, Er. Atmaram Kayastha and Er. Dadiram Dahal from Turbine Testing Lab, Kathmandu University.

Training started from 30th September Sunday at 2:00 PM. The first session was provided by Dr. Chitrakar who gave participants the introduction, and basic knowledge of ANSYS. Then session was continued by Er. Atmaram Kayastha who provided the basic knowledge of CFD and meshing. The next day, Er. Kayastha completed CFD and showed the participants to make the pre and post CFX.

Similarly, Tuesday, the session was taken by Er. Dadiram Dahal who started FEM and same session was continued and completed by Er. Dahal the next day. Now, the FES session was given by Dr. Chitrakar on Thursday. For the formal ending of the program, AMES Coordinator Er. Shah and Prof. Dr. Hari Pd. Neopane, Associate Dean of SOE were invited who provided token of love and certificate of appreciation on behalf of AMES.

Energy Management Awareness Talk Program in association with Ministry of Industry

Association of Mechanical Engineering Students (AMES) in association with Ministry of Industry, Commerce & Supplies have successfully completed a two day talk program on “Energy Management Awareness” from 22nd to 23rd June, 2018 conducted by GIEF Consultancy Pvt. Ltd.



One Day Photography Workshop organized by AMES in association with Canon Imaging Academy

AMES in association with Canon Imaging Academy successfully conducted “One Day Photography Workshop” on 6th October, 2018. Mr. Aishu Mathema, the coordinator of Canon Imaging School – Nepal was the chief trainer while other two were his assistants. 13 participants were present on that day and 11 of them were members of AMES while one of them was from KUSMS and one of them was from Pharmacy 4th year, KUSoS.

Mr. Aishu Mathema began the workshop session with his introduction and his involvement in the field of photography and graphic designs. He gave wonderful tips and techniques about photography and its possible significance in student's life. He introduced the photography enthusiasts with photography tips which were quite useful for all and talked about the common mistakes that general photographers do while framing the camera. He shared his view on important things that a good photograph needs to have such as a theme, focus point and simplification of the picture. Practical session was taken by participants like Maulik Man Maharjan, Prabidhi Adhikari and Bibek Gautam.



Science Meeting Creativity

Association of Mechanical Engineering Students (AMES) organized a school welfare program on November 20 in two schools, Shree Chandika Madhyamik Vidhyalaya and Shreekhandapur Madhyamik Vidhyalaya. The program was held as a pre-event to the upcoming event Aviyantaa 18' with an intention of providing the students a practical knowledge about the science theories taught in class. With the help of simple experiments and DIY projects, they were given a head start to high school education and what the field of engineering entails.

Mentored by Prabin Dhakal, the President of AMES along with Samita Rimal, at early six A.M., the rest of the team from first to fourth year members gathered with all the necessary equipments.

The event was organized with one simple purpose; to provide a platform for students of those respective government schools with applicable techniques on science projects. Since it was organized completely by the students of mechanical department, the objective was clear, to demonstrate the work of engineers to young minds and rekindle their interest for science related fields countering the monotony. "The kids are happy that they got to witness what they learnt in class," said Mr. Jai Ram Shrestha, the principle of Shreekhandapur.

The program started at the first school at about one hour from the central campus from 10 to 12 in the morning and the second school from 2 to 4 in the afternoon. The students from grade eight, nine and ten were divided into three groups and given three projects each: a mouse trap, a periscope and a hydraulic lift. While they were showcased all of each and given clear instructions on how to make them, they were also provided with the tools and equipment to make them. There were mentors in

each group to guide the students and to provide them with necessary precautions.

Throughout the entire program, the teachers were supportive of our plans for them and the students made the job easy with their interactive nature. At the end while the students when asked who wanted to be an engineer in future, most of them looked quite skeptic but quite few of them were there who raised their hands and seemed pretty confident about their choices. This guaranteed the success of today's program to some extent.

The students were invited to the university premises to observe the exhibition of Aviyantaa 18' on November 28 and 29.



Photograph, The New Fascination?



Maulik Man Maharjan ME-ET (2016 batch)

Needless to say, the development in science and technology has really made our lives much easier and sophisticated. Things that our forefathers used to do took days of manual work which could now be done in a simple push of a button. Our forefathers would surely find this amazing but they would be left with an open mouth if we could somehow tell them that they could now capture a moment, process it inside a device and save it for eternal ages in digital form. As I said, "Somehow". This process involves a term called 'Photography'.

If you ask what photography is to me, I'd simply explain it to you in three words. I.e. "Capturing the moments" but if you wish to have detailed definition of it, then Wikipedia says, "Photography is the art, application and practice of creating durable images by recording light or other electromagnetic radiation, either electronically by means of an image sensor, or chemically by means of a light-sensitive material such as photographic film." I remember early days of my childhood when we shot photographs in studio with reel camera and had to wait few days for the negatives to be developed. Thinking about the moment how we shifted from reel camera to phone cameras having various filters that make you look more pretty and hide your facial flaws, I find it as a magnificent advancement in photography.

Photographs are now part of our lifelong memories. Think about it yourself, almost all of us have our childhood photographs safely with us hidden somewhere in the closet. We still have class photographs of every academic year, photographs of our parents in our wallet and photographs from any event, be it sibling's marriage ceremony or dance party or even the photos from trekking in Himalaya which one will cherish till his last breath. Human mind has some sort of obsession with the photographs. Human mind doesn't want any of their good events to get missed out in digital format. All of us want our event's photograph to be clicked in good manner with proper care. The subject is not important when

it comes to this matter but the moment is. All of us click selfies whenever we're in new places and we frame our mobile shot perfectly if we're having a new pizza in a cool restaurant. Let's not forget that our hand slides right into the pocket where the cellphone is whenever we see a celebrity walking towards us. It's quite amazing how digital photography has been such an integral part of our lives these days.

Talking about the fascination of photographs, students regardless of their respective fields have been very much passionate to learn about photography. If you were in Indra jatra then you must have found almost every youth that you could see with your eyes in the crowd had a camera in their hand and they were either capturing or recording the moment. Similarly, if you are on top of Poon Hill, then at times it gets interesting to see youth posing in front of the camera than witnessing the beautiful mountains. The skill of capturing the moment could be an important additional skill in one's CV as well in near future which cannot be denied. In fact, this field is oxygen to most of the people who wish to capture beautiful landscapes and macro objects. In my understanding, photography is simple but it is the thing which needs to be done simply, which is the most difficult.

It is not wrong to have photographs about almost every good events of life clicked but it actually gets wrong when it involves photography enthusiasts while making them do so. In course of excitement about the photographs, we forget our moral codes at times. The photography enthusiasts become the victim amidst such excitements unknowingly. It is undeniable that everyone wants good photographs of themselves. This process involves the years of worked out skills of someone who has passionately been in this field for a long time. The works produced by them at times do not get credits that they deserve or say their works don't get recognized. This has already been a delicate matter at present and it could be much more serious issue in upcoming days. Looking at the time frame from the time when we shot our passport size photograph in studio to the time where we click selfie with our favorite filter and instantly upload it in Instagram, we seem to have lost our patience and appreciation towards the photography. I, myself have been in such situation many times before but like I said earlier, it's all about capturing the moment. Sometimes, ignorance is a bliss. What I truly believe is that, it's alright to have such fascinations but it is equally important to have gratitude towards the photographers who capture your moment for a lifetime.



Academic Projects of Kathmandu University in Himalayan Hydro-Expo 2018

Happy as a runner up, Gloomy not to be the winner

Mixed emotions thrived within me to hear that our project had been awarded second prize in a national level competition. Happy because we are the Runner ups and a little bit gloomy by the fact that now we cannot be the winners. This is exactly the enthusiasm that had driven us through the competition.

IPPAN (Independent Power Production Association of Nepal) in collaboration with many national energy developers, organized a three day exhibition at Bhrikutimandap, Kathmandu along with a platform for students to demonstrate the ongoing researchers and works on hydropower.

Our project was registered as Kathmandu University- B, thanks to the staffs at TTL especially Mr. Nirmal Acharya for providing us with this opportunity. Numerous talk programs on the ongoing development and upcoming strategies for sustainable hydropower development were carried out every day. There were around 10 projects selected for the competition. We were each given a stall where we had to demonstrate and present our work for the visitors. There were several projects with each having a unique solution or idea.

Our project stall was between two large models which made us little bit nervous at the beginning as we weren't able to attract more visitors to our stall. However both the projects were hydropower dams and the set up on it were large but our project was the heart "The Turbine".

Many entrepreneurs, developers, industrialists, researchers visited with all having different queries. Every time we answered a question of visitor we



Runner up project group

learnt a new thing. Alumni from KU were the most interactive visitors sharing their time at KU and applauding the work we did.

As it was a competition, the judgement of winners was to be done through expert panel who were there at every stall with their questions. During our experience, we learnt that as our project was mainly focused on the technical aspect we were somehow lagging in the economic viability of the project. Also different aspects of the project such as technical, social, economic, need to be optimized for business's point of view. As a whole, participation in an exhibition as grand as that was always an opportunity to explore and evolve through the academics and public exposure. I urge every single upcoming students from relevant field to participate and grab the opportunity to broaden the understanding and if lucky and brave enough then to grab some prizes too.

Remarks From Other Participants

"Himalayan Hydro Expo 2018 was the foremost step in professional hydropower sector promoting to commercialize my academic project ideas for the community. Programs like this are imperative for hydropower rich country like ours." - Samita Rimal, 2015 Batch

"The bridge from academic knowledge to professional knowledge, Himlayan Hydro Expo gave us an opportunity to know the market of all that related to hydropower" – Ram Mananadhar, 2015 Batch

"The Himalayan Hydro Expo was not only a platform to discuss on different agenda of Independent Power Producers Association (IPPAN) such as innovation, and generation of fund for newer potential hydropower but also competition among students involving on project related on hydropower enkindled energy & motivation on their task they performed." - Shyamhari Acharya 2015 batch

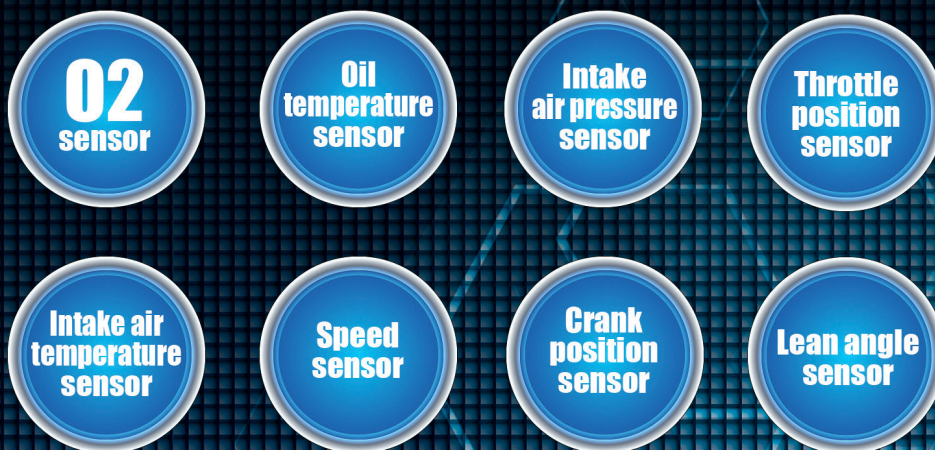
"A knowledge sharing platform for interested parties like hydro power developers, manufacturers and engineers. Extolled by the general public ,when we explained about our project and its prospects , ending up fourth in the competition was like icing in the cake for us" – Salim Maharjan , 2014 batch

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FZS-FI

The Yamaha FZ Series set a new benchmark for biking. The FZS-FI takes it to the next level. It brings the most advanced Yamaha Blue Core concept to offer bikers an unmatched experience of performance and efficiency.

At its heart is the all new Yamaha Fuel Injection (FI) engine. It uses advanced sensors and actuators to calculate and deliver the optimum amount of fuel to the engine – enhancing both performance and mileage.

It is powered by a 149cc FI engine which develops maximum power of 13.1 PS @8000 rpm and maximum torque of 12.8 Nm @6000 rpm, kerb weight of 132 KG and minimum ground clearance is 160mm. FZS Fi is only the lightest 150 cc motorcycle available in the market. The all new chassis is more robust and strong while enhancing the cornering and stability of the motorcycle.

Yamaha FZS Fi gets a new compound tire with improved grip pattern adding to the stickiness of this bike to tarmac and ensuring a safe ride in muddy and wet roads.

The Blue Core is the Yamaha's new engine development concept. The technology is designed to extract maximum performance and mileage. According to Yamaha this is achieved with optimum combustion, power-loss reduction, precise control of fuel supply and ignition timing. Partnered by Yamaha fuel injection system with advanced sensor, actuators and engine control system that promises high efficiency combustion by providing right amount of fuel depending on riding condition contributes to increased mileage, smoother acceleration and clean emissions. All the above promises that this new FZS Fi will have incredible pick up while delivering better mileage.

Details about Sensors



Control fuel volume & burning time as per engine requirement



Accurate fuel Supply as per engine temperature and signal for engine overheat

Manage driving performance at mountain area and plane area



Manage easy starting & performance in different climatic conditions



Stop fuel supply to engine, if vehicle tilts in



Display vehicle speed and ECO light

Precise Control on Fuel quantity & burning time



Monitor fuel burning efficiency through exhaust gases



Details about Actuators



Fast Idle Device

Maintain engine idle speed in cold condition



Injector

Deliver pressurized fuel at proper time for proper burning

Manage Regular & pressurized fuel supply



Fuel pump

Efficient fuel burning



Ignition coil

CONGRATULATION MESSAGE !!!

Congratulation to the

Team Aviyantaa

Association of Mechanical Engineering Students

for launching the 5th version of Yearbook of Mechanical Engineering Department

Aviyantaa'18

Best Wishes for the Future Endeavour.



FACT:

Most of the cars fake engine noise through speakers. These modern engines are quite silent and do not make any noise.

In conversation with

Dean of School of Engineering

Dr. Damber Bahadur Nepali

A person determined from the age of 5. Despite all the bad things happened in his life, he decided only to carry the positive parts and move on to become better and more successful. Always eager to work hard and study harder. Utilize every opportunity in life.



Conversation with Dr. Damber Bahadur Nepali about his journey not only gave us insights about his life but also gave us motivation and inspiration to do our part as an engineer for the country.

You were the 2024 year's board topper and you were raised in Dayabir Singh Kansakar's Paropakar Kendra. Could you please share us about your childhood ?

I was born in Jagati. My father passed away when I was a juvenile. My grandparents decided to marry her again because of her young age;18-19. My mother had taken me with her in her new house in Panauti but my grandmother decided to raise me on her own. My Kaka passed away while I was at the age of 5. I had my Jetha baa, they used to live in enachu but we did not coop with them very well. My grandmother used to sell the utensils of the house hold and feed me with the money she got from the selling because my Jetha Baa and his wife didn't care much about me. She started to worry about who will look after me after she passes away. Coincidentally, Dayabir Singh Sau, we used to call him that during those days, used to sell clothes. In 2004 he established Paropakar Sanstha as an Ausadhalaya. It was getting better the after he decided to take care of the street children. In the beginning there were 25 children. Schooling till class 5 was available. Then later it was converted to middle school and extended to class 7. My Fupaju and Dayabir singh knew each other so I was decided to be sent to Paropakar. My grandmother admitted me in the Paropakar and she left.

At those time there was a Pathi in Hanumanti where we were sent to study. I was more educated than the rest. They used to teach the nursery rhymes. I had already learned how to read and write. And there were seniors who used to rag us. But if we see it positively they used to test us for our capabilities and they gave us problems to teach us. I solved all those questions given to us and I learned a lot from them too. At those times we 12-13 people in class 1. Since I was better than the others I came first. When people used to ask who was the first student; my name came up and I was happy and I didn't want to become second. That was my beginning to come on the top so I continued being at the top. Also what I realized was that if you are disciplined and good learners, everybody has a positive attitude towards you and they like you. I was disciplined and clean, used to do all my duties on time so my supervisors also loved me. It was going good. In 2019 B.S. Paropakar was converted from the middle school to high school so many students were sent back after the vocational training terminating for further education. I was also worried that I will be sent too but I was in the radar of the teachers

as a good student so they didn't sent me off. Still I was worried so after I passed class 7 I requested to the headmaster to directly promote me to class 9 instead of 8. The headmaster was concerned that the double promotion might hamper my study and was trying not to grant the permission but couldn't say a direct no. So he said that if Dayabir baa gave the permission he will promote me. So I went to talk to him. Dayabir Singh baa made a clause that if I couldn't become first in class 9, I will be demoted to class 8. Then I thought to myself, I was the best in class because I used to teach them the maths while I was at 5 and they were at 6. I used to ask the seniors to teach me their book course and they used to do it too. I saw that it wasn't hard for me to become first. So I accepted the clause given to me by Dayabir Singh baa and eventually I became first in both half yearly and yearly examination. After I became first in that, what came to my mind is that if I had to bring my name in the boards, what my marksheet should look like. So I began to see things comparatively. What I felt that I wanted to bargain with the teachers. I went to them and asked them if they gave us more than we deserve to show the others that our school has good marking. But I was proved wrong when they showed me the marks obtained by students in Paropakar and in the boards. There weren't different. My numbers were better than the numbers obtained by the student who was board first. So I saw that I was eligible to be the board first. After that I started to work extremely hard. There was a varanda with a street light which lighted all night outside Paropakar. In Paropakar all the lights were turned off after 10 pm and everyone went to bed. So I used to slowly crawl outside and go under that street light to study. I used to go to sleep at 12-1 am. Our supervisor used to come out of his chambers sometimes and he used to see me study there but didn't bother me. Later he used to question for my well-being. Later teachers, seeing our hard work called us in his house to teach. There were 4 of us during that time. I was worried if the questions that we left would be the questions that appear in the examination. So I used to search for question that are not done. I used to examine myself. Teachers saw me as a possible board candidate so they also put their extra effort on me. One morning we were discussing our possibility to make up to the boards, coincidentally, Dayabir Sighn Baa was there in Paropakar came to check on everything. After I saw him it came to me that if I work a little harder, the Paropakar will really be very proud. I used to write study hard in my desk to always keep

myself reminded that I have to do something. I took the SLC examination in Shankar Dev Campus, while I was at it I was having a feeling that my calculations were wrong. But I didn't cheat. When there was a discussion everybody had the same answer except me. So I thought that I spoiled my examination but I have a character to not to be stuck about the bad things in life and to move on and work for the next challenge. For that day my next challenge was my upcoming examination so I went home and studied for that. At those time the board first and board second student differed with only 2 marks and I said to myself that I have to study for that 2 marks. That 2 marks mattered the most. I used to go for running as we had competition. We used to have groups and the ones who came first and second among the groups went for next running challenge. In the first and second running challenge I came first and I got through the third challenge. And in the final challenge I came second. What strike me was that what if the same happens in the final boards examination. What if all these years that I have done to be first just make me second in the finals. So that was a kind of a wakeup call so I studied really hard. During the result times, our heart beat really fast. At those time results used to be published in the newspapers and our head sir visited us at 2 am in the morning that day. He called my friend but my friend didn't wake up. I was listening to his calls. The he called my name so I rushed down quickly. He congratulated me because I became the board first. After I became board first I again started to worry that what is to happen in the future. Maintaining the status is even harder than to become first. But I went to sleep after that and I was very happy and thrilled as well.

What happened after your journey through SLC?

I got to study ISc in Amrit science college. Paropakar requested the American embassy to provide us with scholarships for ISc. They granted us the scholarship, so that's how we were able to complete our ISc in Amrit science college. There were four of us in the Paropakar Anathalaya. Two of us were in first division and two in second. The two of us in first division got scholarship. I lived at my Fupu's house and I had not decided on what to study. So I went to talk to my supervisor in Paropakar. In my point of view in order to develop the state of Paropakar I should have chosen a career in health sector but I wanted to become an engineer as I was good with machines. So I told him about this and he persuaded me in a blissful

way saying that if a person really wants to help from the depth of his heart the profession does not come in the way. Dayabir baa was not a doctor, he had studied till class 7, but still he has done his part for the society. So I need not to be a doctor to develop Paropakar. This statement made me choose engineering. So when we got any kinds of scholarship we were admitted in public colleges so we were admitted to Delhi College of Engineering in Delhi College of engineering. There were 5 of us. We didn't know what our roles will be in the future. But we knew how to use our tools. After the completion of our study we had to return and search for jobs. I had a teacher who had a good impression about me since the very childhood. She was a very dedicated teacher, I used to call her Didi. She used to teach us English. She suggested me to apply for the bidhut pradhikaran and search for a job. She had a brother who worked in Nepal bidhut Pradhikaran. She told him that I have completed my engineering and was looking for a job. He knew my board marks. So After I got my provisional certificate I started to work on daily wages. Many engineers from Russia didn't give the jobs. So the government had decided to give jobs to all the engineers anywhere in the daily wages and luckily even I got selected in that and started working on daily wages. In the working days, what surprised me was that all of my seniors passed their days without working much. So I used to study whatever I got to put my hands on. I never had the habit to run away before the actual time to leave. I used to respect my seniors a lot and was always seeking to learn something from them.

Time passed and it was time to become permanent worker and give the lok sewa examination. They asked for 4 mechanical engineers and I was wondering how to fit in in that list. I had a friend and he suggested me to leave daily wages and to go to give the asthai examination in khane paani. So I agreed to him and I applied. They accepted my application very easily, saying they were searching people like me. I was sent to Tansen, as an asthai worker as a Hakeem. While I was in the interview for it, coincidentally the interviewer was my Didi's Kaila baa so he knew me before hand and asked me that I was the board first in my batch. I was surprised that people still remembered my history and my luck was also pretty good. I was selected as an temporary in Tansen in bidhut bibhag.

I was sent to Kankai after being select as an asthai worker, in Kankai there was a proposal to build a high dam. I had to learn and watch and know. Every

body else used to visit once in a while but I always was present in the grounds of work. To reach the site I had to run 5-6 km. So I decided to live there instead. After that I cooperated with all the workers. While I was working there the workers used to check on me by disassembling a vehicle and asking me to reassemble it. I had a teacher who had always taught us that what makes a person an engineer is that s/he should know about particular function of each parts and who knows what's wrong with the system is an engineer. I had that in my mind so when they asked me to reassemble it I asked them to give me a day I studied all the functions and then I reassembled the engine along with its parts. I was also good with the tools so it was not a big deal for me. These incidents seem like a small matter but it can hamper a

person mind in deep level. One of my friends went through the same scenario and was unable to do the asked task, so he lost control of his sanity and got insane. So you need to be very careful with what you are dealing with in your life big or small. I became so good at that site that I knew about everything and we didn't need any experts from abroad to check on the system. When a german expert came there he sat idle because I covered most of the works. It was about in year 2036. So while working like it, I felt more like a mechanic than an engineer while working at it. Because whenever I was involved in a project they sent me first to establish the project and talk with the expertise and whenever time came to deal about the financial issues they used to replace me with someone else. So one day a friend suggested me apply in hydrological field and they were also asking engineers to work on it. So I agreed to him and went for it. So I applied for it. I was accepted. It was a little hard for me because at that time my wife was pregnant. So I was a little worried about that myself. But they told me that there was a good experienced doctor and I didn't have

to take much stress about it. I love my wife very much and I had told myself that I would take care of her and even if she loses her life she will die in my lap. So time was a little hard for me as I had to continue my study and to take care of her as well. There was another threat for me there because it was a hard path; mechanical to hydrology. Civil engineers had their easy way but the path was a little rough for us. But I tried a lot. So my first son was born on October 10. As I was busy, due to the child birth so I came second in my graduate. I had to study Masters' degree, I was in a delima

on what to study for it. So I consult a brother of mine and I continued my masters in hydrology. After the completion of my master degree, I felt like a real engineer. I thought of myself eligible to sit with other great



people. I'm not trying to say that mechanical is not good because time has changed a lot. And every sector is good. But at the time I was happy. I felt all in one type of person.

I was involved in the Budhi Gandaki project as a mechanical engineer as well as a hydrologist. While making the reservoir, we had to face the sedimentation problem. So a person had to be sent to America to learn about the sedimentation. Since I was the expert they chose me so I went to America. I still didn't have my own house to live. I went to America and I worked extra hard. I started to save a lot of money, ate chowchow too to save food money. My friends used to tell me that I was there just for training so I should have had fun but I was there to learn so I wasn't there just to have fun. I had a family to whom I had to provide a home so I had to work twice as hard. It was do or die kind of a situation for me. I took credit course there because we had to pass the credit course any. It was hard enough even to take 9 credits but I took 15 credits in a year. My wife always encouraged me to have a doctorate. But as a typical nepali babu, I used to ignore what

she used to say. She even requested my friends to talk me into it. And I thought to myself, what could go wrong if I took a course so I applied for a Phd. In those times in America, it was not a big deal to do a doctorate. So I was enrolled in Phd. So I added some time to my stay. My wife supported me a lot.

There I went to my assigned supervisor, I went to him he said that he was moving and he wasn't sure if he could help me. Coincidentally one of my seniors recommended me a professor with respect to my work. So I went to him. I told him about the topic that I wanted to do my research on and he was really satisfied with the topic after I showed a sketch about it. He also offered me to be my advisor. That was a cherry on top for me. You won't believe, with him as a supervisor, I finished my doctorate within 6 months as it was experimental. And everything needed could be done by me, myself. After my supervisor saw me work in the lab, he wanted to put me in the fields, the forest. I went there in the forest and I used to live with the supervisor. As my work was completed in 6 months and I had to write a thesis on it. My professor had seen me work, so even before the completion of my thesis he recommended me as a good doctorate candidate.

Right after the completion of the phd, I told my professor that I want to return to Nepal. They asked me if I wanted to still work to make money but I denied it. I said now that I am eligible, I should not waste my time instead to use my skill in my fields. They were really surprised to hear my answer. They even suggested me to stay there and still help Nepal in a way. I said that I'll look into it. One thing came to my mind while I was there, during our stay at the USA whether or not to remember the country Nepal. Should I forget how I was raised for a reason and start to have fun, or should I use the knowledge that I have learned all these years to add some meaning to my life. The choice was clear. I remembered my Dayabir Singh Baa. He used to ask chanda in the cigarette box piercing it in the top. He used to ask for a hand full of rice in houses to feed us. So I had a question, should I forget that all and have a good life now. My wife used to suggest me to stay just a little longer as we had no money but I knew if we did we would get used to it as that was the case of most of the others.

So I decided better to leave when I could, because I wanted to help people like Dayabir baa as they helped me once as soon as possible. So I returned and started to work on projects. When I returned, I started wondering who will start the first project. I explored a lot and then I finally decided to start a

project myself. If somebody needs to do anything it should be me. So I started my work. And I'll tell you, if it is a good positive development work, everybody will support. And I mobilized it. I found a group of engineers who were wondering for work. I went places to places to search for engineers even begged to work on the site. In Budhi Gandaki, there were dry rivers and I wondered how to bring the water up. I used to share everything with everybody because the other person might have better knowledge about it. When I used to be working at the sites in America I used to look at the pillars and wonder if I could make dams as long as that I was looking at, and now the dam of the Chilime Hydro power that I am working has the same height. It gives me a great amount of satisfaction to be here in my own country and see the work going on and I did it.

In your point of view, what is that is lacking in Kathmandu University to the students?

First of all the student should make an own good environment to study because in my point of view, the environment is not enough. A lot has to be done. But as Rome was not built in a day, it will take time. So I just became the dean, I have to take some time. I have to manage the required finance for it. And in the other hand, education and practical knowledge should go parallel. I don't see it going in that way. I don't blame the student because they do what they are told to do. It's the university's work to have some researches done. It should publish researches. The student should be made work ready, not only for researches or project, but for the field. Because even in the field I have seen, the engineers have not even seen the hydropower before. So I took them for tour myself. Students should not be scared of failures. I am ready to take risk with my team. I will sign everything go everywhere I could. I will take risk even if I have to go to jail I will. But I will not back off. If it fails, we will work for the betterment. But it is on us to build up our own country. Foreigners will not come here to develop our country. So I will say theoretical and practical knowledge should go hand in hand. The main reason that I came here as a dean is that I want to make a hydropower as a training center. So that all faculty can be involved in it, study it and develop it. There will be a lot to learn like the topics of education, finance, management etc. about civil, mechanical, electronics through out the process. In addition, if that hydropower will belong to Kathmandu university, the fund can be used for researches.

*Translated from Nepali

Turbine Testing Lab



Over 7 years of journey of TTL, it has established itself as the center for research, development, training and education within the university, country and abroad. With several national and international funded projects, commercial, academic and research projects, TTL has carved its niche in the hydropower sector of the country. TTL is currently undertaking a project under Energize Nepal, which is aimed at establishing an IEC standard test rig for hydro turbines. Under the same project, TTL received pressure tanks to withstand the maximum pressure of 20 bars last year. The high pressure tank will be used to conduct performance testing of Francis turbines to be installed on the rig. TTL is also undertaking a project called SEDIPASS, through which, a first 3 guide vane cascade rig was installed as an outlet from the high pressure tank. The guide vanes inside the cascade consist of actual scale vanes corresponding to Jhimruk HPP. The main aim of the rig is to study the flow field around guide vanes and clearance gaps using Particle Image Velocimetry (PIV) techniques. Under the same project, TTL also completed the first Joint PhD between Kathmandu University and Norwegian University of Science and Technology (NTNU). The title of the PhD thesis was Secondary flow and sediment erosion in Francis turbines. As a continuation to SEDIPASS, TTL is also starting a new project called FranSed in co-operation with NTNU and IIT-Roorkee. This project will focus on minimizing the problems of sediment laden hydropower projects by introducing variable speed turbines. The project was kicked-off on October 2018 and will last for 4 years. A joint PhD study between KU and NTNU is currently running under the same project.

Last year, TTL also received a UGC grant under collaborative research for Experimental Investigation of sediment erosion in cross-flow

and Francis turbines. This project will aim for developing a rig suitable for sediment erosion testing of hydro turbines. TTL is also facilitating a project in collaboration with PEEDA for testing of a Turgo turbine.

An MoU was signed between KU and Nepal Electricity Authority (NEA) on May 2018 for utilizing the infrastructures and land present in Panauti HPP for research and academic purpose. The MoU is aimed at creating a research hub for sharing knowledge between academicians and industries. The agreement has opened plenty of opportunity for researchers of TTL to conduct efficiency measurement and perform design optimizations of the turbines present in the site. In the context of Panauti HPP, a grant from KOICA under IRDP (Integrated Rural Development Project) was approved on September 2018. The project is entitled Development of river water pump for drinking and irrigation purposes in rural areas.

Apart from the research projects, TTL is also supporting the academic excellence by constantly engaging Bachelor's, Master's and PhD level students in every project activities. Apart from the last joint PhD in SEDIPASS project, TTL is currently hosting/supervising 3 PhD and 2 MS by research students. From this year, TTL is also responsible for supervising 120 Bachelor's level students every year (30 from each year) for their project works. Like every year, TTL also organized the International Symposium on Current Research in Hydraulic Turbines (CRHT) VIII in April 2018. The top papers presented during the symposium were also published in IOP-Journal of Physics: Conference Series.

With these major activities, TTL is gaining its momentum in building competence and knowledge, motivating research culture in the university, collaborating with the local industries to solve the problems of Nepalese hydropower sector and is being directed towards the Centre of Excellence for turbine manufacturing and testing facilities. TTL aims to set forth its pleasant journey in the future with the experiences gained, collaboration made and lessons learnt.



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Ganesh Bikram Singh



Ganesh Bikram Singh is the first engineer who made bomb disposal robot for Nepal Army which is used by EOD unit of Nepal Army and has already handed 3 of his successful bomb disposing robots to the Nepal Army.

With 14 years of hardship in the field, the founder of GBS team serves as an enthusiastic youth for the development of robotics in Nepal. He also uploads informative videos about Robotics in his YouTube channel.

How did you start or decide your career in the field of Robotics? Was there any inspiration?

When I was young, I liked building things. When I was in my high school, which was the time of the civil war, I used to see army operating robots in television. Then I wondered if I could also build these robots so we started trying to build such robots. Though they were not fully automatic and could not be listed in robotics, we built some by connecting and disconnecting wires. After coming in engineering is when I realized I really wanted to pursue in the field of robotics. I applied for mechanical engineering in Pulchowk Engineering campus and managed to get my name in waiting list. In those times, name in waiting list for mechanical engineering was almost equivalent of not being able to get the name listed at all. Then I joined electronics and communication engineering in NCIT. But what I did was completely different from what I pursued. I realized I should not fully depend on college only. Then when I was in

second semester of the college that is in 2013, I established a lab and built robots on my own. Actually when I was in eighth grade, I built a robot that got featured in first page of Kantipur newspaper. I surely don't know the exact day or time but I knew it was robotics simply in my blood. In my college days, I was more inclined to practical subjects than theory. While talking about the inspiration it was not a human being, I had access to television thus it could be discovery channel, geographic channel.

The GBS team was formed and Bomb disposal Robot was made. How was the journey of it like?

I never had imagined that I would reach to a level of building robots that could be applied for military purpose. We used to go for various competitions. At that time if somebody asked 'What did you do in the field of robotics?' then the answer would have been of how many competitions have we participated and won. We started winning in national level competitions. One time Nepal Army had organized a national level competition. It was called National Science and Military competitions and 80 teams had participated. GBS team was one of the team. There we won the first prize and consolation prize. Nepal army had a mentality of building something inside country itself. We have to import machinery from other countries but the repair, maintenance and servicing has to be done within Nepal. Here we talk in Rupees, there they talk in dollars. Then they have minimum pay per hour. These things will make the maintenance expensive than the robot itself. Then meeting was called up for the same purpose. 8 teams were selected. Initially Nepal Army did not fund, that made the teams drop their name from the campaign. But we funded ourselves, did research for two years and developed a robot that was worth Rs. 14 lakhs. The toughest part was making the army sure about our work. It took us 2 years to add on the features as per the necessity. Later, Nepal Army could buy that at 7 lakhs only since it was only way to display our work, though in loss. I sold the robot to the Army. Later, we made second robot which was high in technology than the existing one. Though there had been a lot of obstacles, there were moments of appreciation and achievement as well. One thing that helped me after joining the military robotics is the knowledge regarding robotics commercialization. Had I been involved

in competition only, I would not have achieved such skills. At present I supervise entire repair, maintenance of robots in Nepal Army.

Robotics in case of Nepal, in which field can we get the most out of it?

When we go back ten years ago, Nokia was the most advanced mobile phone. At present it can be found in history. Robotics cannot be tied only to some specific fields. Robotics can be implemented anywhere. Robots will be implemented on hospitality, military purposes, agriculture, industry, manufacturing. Thus it is time to find out ways and reasons. For example we hire people to clean the dust in roadways, in our houses. But we don't realize the fact that dust may cause so much damage to his/her health that it will cost them more money to cure it in the future in comparison to their salary. In military we cannot send human inspection in field at first. Thus it is important to build robots for this. We need to accelerate robotics. It may be robots fighting in the arena or some advanced robots. For example, we have many mountain lakes/snow lakes in Nepal, due to which we cannot go deeper than few meters. Let's say we need to study the aquatic organism found in these lakes. Robotics can be implemented here. Moreover we can implement Robotics to attract foreigners too. Thus Robotics can be used in almost every sector from every angle. All we have to do is find out ways and research.

How did you cope up with the problems (financial, legal) that you faced?

Investing in Robotics in Nepal could be a win situation but the result may come after longest time exposure only. Expecting to get the money back in shortest time in robotics is not the case. In my case, the robot I have built has me in loss at present but I am sure that in future it will increase in value because Robots will be inevitable in future. They are root of technological development.

I am an average person in the field of engineering. If not in robotics, I would be a regular person searching for jobs. If I had not invested in robotics I would not have the opportunity of giving lectures in colleges regarding robotics. I have direct and indirect profits. This interview is also my outcome in some way.

In your point of view how can robotics help to reduce crime rates and social security problems?

Robotics in Nepal is similar to just born child. Later when we bring the concept of Artificial intelligence

(AI) we can analyze the situation to identify the problem. We can identify the possibility of an individual to be performing the crime in the scene. An individual's past and present can be analyzed to determine what crime he/she can possibly performed. When human being judges or analyzes, the decision may be biased or developed in presence of sentimental values which can be corrected by using AI and robotics. We have started working in AI. We have developed cluster computer and are headed to development of multiprocessing computers.

What are your future plans? Will you be working in military sector for more time?

I have interest in military sector. Military sector does not only mean making weapons, bomb disposal robots. It involves drones and other things. One thing I want to see is Nepal Army being independent and capable technically as well. Internet was built in DARPA which is organization inside American Army. If they are capable of developing this intense technology, why cannot we? To increase the awareness, at present I am taking Robotics classes and supplying robotics equipment in village areas and will be continuing to do so. I am also renting a room where every Saturday I will be giving free lectures on robotics. I believe this will help learners to get knowledge and ideas and also help me to increase my social

identity. We cannot give the overall knowledge to build the robots. What I can do is ignite the interest of robotics in them. Thus my first priority is army and second is to give people platform to know about robotics in short. We are also trying to develop Robotics as a part of syllabus in school level if not practical lectures. Due to advancement of technology and precision engineering, several branches of a single subject is evolving. Moreover, I have my personal projects on which I work every day.

I am thinking to pursue my further studies on Bomb disposal robot.

What is your advice for those who want to get their hands on Robotics?

First you should form a group of two to four people and participate in local competitions. That will make you aware and develop the curiosity. For an example fighter planes like f-35 and f-22 were initiated from competitions. Internet can help to generate the ideas and apply them. Moreover, there are various robotics groups that might help for equipment to ideas to precision and accuracy work. Humanoid robots are also initiated from competitions. They are important because infrastructures that are present around as is suited for average human being and in case of disaster management and rescue, humanoid robots can play vital role.

*Translated from Nepali



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AMES BULLETIN BOARD

AMES Bulletin was not only another extra activities in the calendar of AMES in 2016 A.D. Rather it was a dream. A dream where students from all around the KU from different schools, departments and faculties could share, express and improve their creativity through means of writing their wonderful and extra-ordinary ideas, thoughts and stories every month where students has all the power and freedom to make decisions about its activities with very less influence from outside. On the other hand much more supports, encouragements and assistances from teachers, AMES and the departments to solve irregular and slow pace of publications of creativities of students at the same time encouraging new writers to excel in their writing. As through writing and publication we could know each other's pain, sorrow, happiness, struggle, dislikes and likes more than we could ever learn from each others in long period of time.

Journey from 2016 A.D. to 2018 A.D. at Ames Bulletin is full of many beautiful memories. Hard work, dedication, understanding, learning, passion

and discipline could be few words that might describe those wonderful memories. Apart from these, even in hardest time and toughest decisions making period neither we ever missed any lecture for our works nor we ever received any complaints from friends, writers, teachers, our departments or other departments. On the other hand, we always had meeting each week at our lunch break for five to ten minutes and divide our works. At the last of my days in Ames Bulletin, we inaugurated Ames Bulletin Notice Board in our department through the hand of HOD Prof. Dr. Hari Parsad Neopane. That was the most wonderful time for all of us as after so much hard work, we could finally feel some kind of sense of achievement in it and it was just a beginning of Ames Bulletin.

We are hearty thankful to Prof. Dr. Hari Parsad Neopane, Asst. Prof. Mr. Eak Parsad Duwadi, Assc. Prof. Dr. Hemraj Kafle, Er. Malesh Shah, Er. Dadiram Dahal and AMES for supporting, believing and encouraging us. We would also like to thank all the writers who had trusted us and without whom it could not have been possible.



Prof. Hari Pd. Neopane inaugurating AMES Bulletin Board in 23rd November, 2017 on the day of Aviyantaa'17

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AMES Bulletin Article:

The Basement

It had been raining the entire day. Monsoon in the capital for me has never been a relaxing sight. My mom sat in the couch sipping her chiya—the best way to tackle the gruesome weather while my dad and I just relished the smell. We have never been a tea person anyway. What this weather did however, was bring my family together. I loved it because it happened quite rarely considering our busy lives.

Skipping the moment, I sometimes get away to the basement of my house where I would remain unbothered with the chaos of my surrounding. I have continued to treasure it since my dad tore down the cellar and handed it over for me to create my studio. It has never had the best interiors but that part was more welcoming than the other rooms. Even the spider webs sparkled when a gleam of ray passed through the rusty ventilator or the hardened acrylic palettes. Yet, I loved to be amidst the fragrance of the freshly opened paint containers. Dancing along to John Mayer holding my brushes as my counterparts, and the music reverberating through the wooden walls would make it my acoustic dream. All these formed an aesthetic environment for creating a masterpiece. There are things in life that needs to be done to stay alive and the others that we stay alive for. Art was somewhat similar to me. It sustained my sanity. While I was studying those bulky physics books, I needed to doodle on the pages, or draw cartoons on the edges. Art meeting engineering was important for me. I have encountered people who tell me those subjects were never meant to go hand in hand. In the basement amongst all the chaos, I wondered if there always needs to be a never fulfilling gap between the two most intriguing aspects of my life.

I thought people were scared of having fun while



Upama Pant (ME, Batch: 2018)

doing something so intricate. Why was this sort of academic packaging sold to me? Was it because the solemnity of the subject would fade away if I enjoyed it? Well maybe it was never meant to easier. Anyway, the concept ridiculed me. As a science student, I struggled gaining insights, especially due to such orthodox thoughts. As an artist, I struggled to communicate, partly because art was never considered a noble pursuit.

Nonetheless, I found both of them equally aesthetic. However, the question still remains. The hand so elegant with the strokes, would it ever get used to those adamant machinery? The answer as I have felt is yes. Smeared paint or grease, it was just the same. It was all and just about the essence. The fact that I enjoyed while I was at it. I found my significance. I found my purpose. Probably.

Even now, the hinges here squeaks and the canvases hang at jaunty angles. Besides, what also remains the same is the brush strokes that tries to match the pace of that John Mayer song. Or the people who tell me studio art and engineering can never meet. But instead of sitting them over for a debate, I smile and go back down to my basement where I try to prove them wrong. Holding the same old brushes, playing the same John Mayer songs.

A conversation with the *EXTREMELY OPTIMISTIC* *Shiva Kumar Sharma*

Mr Shiva Kumar Sharma is the founding member of PEEDA (People, Energy & Environment Development Association). He completed his Masters Degree in Engineering in Moscow(1981 A.D.) returned to Nepal to join Himal Hydro and General Construction Ltd. He completed one year post graduation diploma course in hydro power development from Trondheim University Norway (1985-86). Mr Sharma presently works as Managing Director of South Asian Infrastructure Pvt Ltd, a company devoted to hydro power construction and development. He is former president of Nepal Norway Alumni Association and past vice president of Nepal Hydro Power Association. He has been serving as Board Director in various organizations. He has presented and published many papers related to Hydro Power and Tunneling both nationally and internationally.

“luck comes only to those who work hard”

Could you share with us a little about your educational background?

I completed my schooling from a government school in Lalitpur at the age of 15. After that, I joined Patan Campus to continue with my education (I.Sc). My scholarship application to the government for further education was being processed. I was admitted to Tri-Chandra College, where I chose Statistics for my B.Sc course. After about a year of attending classes in Tri-Chandra College, I got a reply from the government that my scholarship application had been accepted and that I had been selected to continue my study in Russia. There, I vested six years of my educational career with major in ‘Mining Engineering’. I received an opportunity to study Hydropower Development course in Norway as a part of my postgraduate course, a few years after I completed engineering in Russia and returned to Nepal.

After your return from Russia, where did you apply yourself for the first employment?

With the motivation to do something on my own



land, I returned to Nepal after my span at Russia. It's often said that 'luck comes only to those who work hard', and it was applicable in my scenario as well. I was extremely work-devoted and optimistic person, I decided to apply to be a part of 'Himal Hydro' which was established in 1978. In the early stage of my career, I was the first engineer from Nepal to work in 'Himal Hydro'. There I was appointed as a general manager for 18 Years. During those times, I worked in numerous projects from irrigation to tunneling to building many hydropower plants. I ended my career at 'Himal Hydro' in 2013 and took a break for some times. During my break, I was approached by South Asian Infrastructure (SAI), we had an agreement and since then, I have been working here henceforth.

Could you tell us a little about the 'Mining Engineering' in Russia? What is the scope of mining in Nepal?

Mining, as a course is like a blend of mechanical engineering and geology, leaning a lot more towards mechanical engineering. Mining can simply be

defined as “exploitation of mineral deposits” which deals extensively with heavy equipment. The machines used for mining are studied along with the geology, soil profile, topology etc.

I studied ‘exploitation of natural resources’ in mining. During my study period, we dig out the resources found by geologists. Mining is concerned with heavy equipment and devices. There are various methods of mining based on where the deposit lies. If the deposit is underground, deep down, then underground technique is used and if the deposit is slightly below the earth's surface, open pit method is used. There are various challenges regarding mining in the context of Nepal such as transportation difficulty, economic disparities, etc. Nepal has magnesium deposits in Dolakha but the technology is scarce to refine those materials. Mining is capital intensive. So, mining can develop in Nepal but will take time.

What is the scope of Hydropower in Nepal for present and future context?

In the present scenario, Hydropower is no less than a “boon” for Nepal. The construction of about 3000 MW of projects in total is undergoing right away. There is a great need of hydropower engineers, as can be seen by the number of hydropower plants that are being constructed.

Although there is a possibility of development of alternative sources of energy such as solar, wind, etc., Hydropower, I believe, will remain persistent for the next 10 years to come.

In your views, what are the possible threats that follow for constructing a hydropower plant?

As soon as the idea of building a hydropower plant germinates for an area, the local people become aware of it and try to capture maximum benefits from it. This results in a sharp hike in land pricing. It is feasible to some extent but in some places, there is an absolute bias regarding this issue.

There's an issue of “give and take” regarding the job opportunities for local people as an incentive. Elucidating on problems, manpower problem is also a major issue, as a lot of intellectual and fresh engineers are going abroad for studies. There's a need for engineers with good management skills in addition to good knowledge, both theoretical and practical about the field.

Since the development of hydropower plants in India is reaching a downhill after a sharp

growth, many engineers from India are seeking opportunities in Nepal.

Could you tell us about the projects you have been involved in?

I have worked in a number of projects, of which, the first project was Baitadi irrigation project. In the project, we built a tunnel of 2m×2m that was later used for generating electricity as well. After that, I worked in Adhikhola and Jhimruk hydropower project. My first project as a project manager was “Tatopani Sano JalBidhyut Ayojana” of 2MW, which was a difficult task to accomplish because of the geographical restraints. We had to manually carry a lot of materials, even basic ones like cement to the site. I was also involved in Khimti hydropower project and SaniMa Mai hydropower project. I can't remember all of it now though.

Recently, we are building a hydropower in Parbat called “Modi khola” hydropower which is yet to generate electricity. We have built a hydropower in Bagmati river in Sisneri of 22 MW which is soon going to deliver electricity. We also have some ongoing projects like “Likhukhor hydropower project” of 52 MW. We are looking forward to receiving other projects in near future as well.

Bridging the gap from academics to internship seems to be a difficult task for students. What advice would you give us before joining internship?

Being a mechanical engineer, it's essential for you to have good technical and practical knowledge. You have to get your hands dirty! Your field calls for it. You can gain knowledge about some core parts of a hydropower plant by being a part of mechanical workshops like the ones in Nepal Hydroelectric, where you will be guided by a team with expertise of fabrication of gates, turbines and other components. But, internship is the bridge, between your college borderline and the challenges overhead that you are about to face. So, as long as your knowledge base is sound, you're likely to have fewer problems.

Instead of searching for bigger projects, you have to opt for medium scale projects which will help you achieve knowledge of wider areas and make you competent.

Looking back at your life and looking ahead, is there anything you would like to say?

I consider myself lucky for all the opportunities I

got in my life. Looking back, I can see that certain coincidences in my life happened in such manner, that they catapulted my success to whole new level. Life isn't always about hitting the exact mark. Sometime it's a blessing when you don't hit it, because then, you start to explore and make the most out of what you get. It's not necessary that you must always be on top of the board for a better future and a better life. You must keep trying and never be doomed by failures. Future is uncertain. My own aim in life was to be a pilot but you can see where I am today. You have to be very optimistic in each step of life. Prepare yourself for the best and the worst. Mining wasn't considered a subject of scope in Nepal during those days, but had I studied Civil engineering I would have ended up in road construction, drinking water offices, etc., but

I searched for alternatives despite my academics, and took course on hydropower which has made me capable of standing here today.

How optimistic are you for the future?

I am an extremely optimistic person. I just hope on being healthy all my life and have a life span of 100-150 years. I always hope for a better tomorrow. One could say that the past was much better in the sense of environment and health but that is just not the case. We are developing, and we will reach a lot better future with time. With the advancement of technology and science every day, the future will definitely have something much better to show.

*Translated from Nepali

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- रु. ५,०००/- सम्मको औषधी खर्च
- रु. १ लाख सम्मको अस्पताल भर्ना खर्च
- रु. ५००,०००/- वा खातामा रहेको मासिक औसत मौज्दातको ५ गुणासम्मको (जुन कम हुन्छ) दुर्घटना बीमा



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बनेपा, काभ्रे, नेपाल, फोन: ०११-६६१६८१

DESIGN AND PERFORMANCE ANALYSIS OF BACKWARD RADIAL FAN

Group Member: Anish Shrestha, Kritika Bhandari

Supervisor's Name: Dr. Krishna Prasad Shrestha, Assistant Professor

Email Address: kbhandari522@gmail.com

Abstract:

Centrifugal fans are the turbo machines widely used in present industrial and domestic life. Typical backward radial centrifugal fans provide peak efficiency in the range of 65-70%. However, optimization in blade geometry can result in improved efficiency. Design of backward radial fan in this research has been carried out using a proven methodology derived by Austin Church and the modeling of the design has been carried out using ANSYS BladeGen. In order to carry out the simulations, mesh has been generated using ANSYS Turbogrid. Computational Fluid Dynamics Analysis of the model has been carried out by using ANSYS CFX.

First, optimization of blade angle of the design under operating conditions was carried out. CFD Analysis was carried out for each blades designed at an angle of 25 degrees, 30 degree, 45 degrees and 60 degrees. The most efficient design was the design with blade angle 25 degrees with an efficiency of 91.81%.

The most efficient design was then checked for performance at design and off design conditions. The design mass flow rate was 0.52859 kg/s. The design was checked for performance at the mass flow rates of 0.3495, 0.466, 0.5825 and 0.699 kg/s. Maximum efficiency of fan was found to be of 94.42% when it is operated at a part load of 0.466 kg/s.

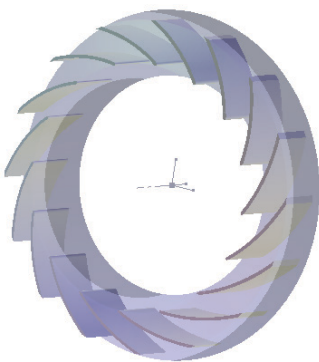


Fig: 3D Model Generated using ANSYS BladeGen

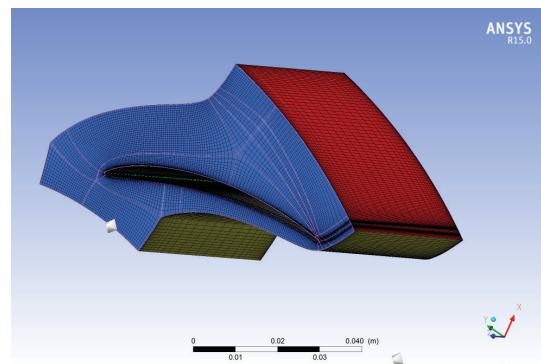


Fig: Mesh Generated by using ANSYS TurboGrid

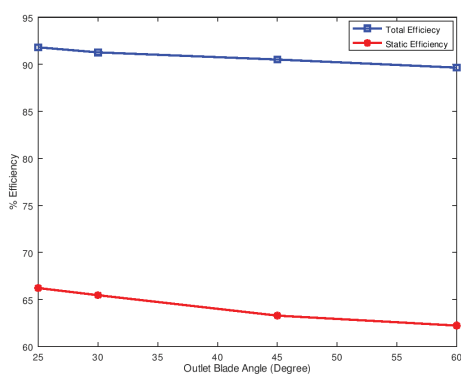


Fig: Outlet Blade Angle vs Efficiency

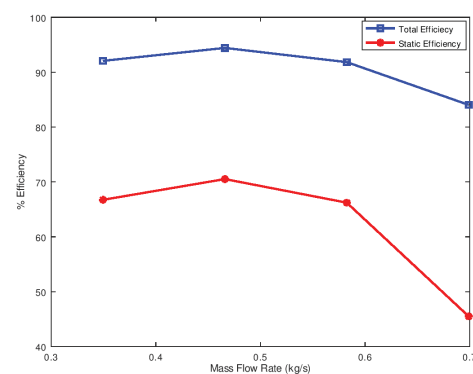


Fig: Mass Flow Rate vs Efficiency

DESIGN OPTIMIZATION OF 600 W WIND TURBINE MANUFACTURED AT KATHMANDU UNIVERSITY AND INSTALLED AT PALPA

Group Member: Prashanna Bajracharya, Saurav Adhikari, Siddhartha Baral

Supervisor's Name: Dr. Hari Prasad Neopane, Professor

Dr. Sailesh Chitrakar, Senior Researcher, KUTTL

Email Address: saurav.adh00@gmail.com

Abstract:

This study is an analysis and design optimization of a wind turbine blade which was manufactured at Kathmandu University and installed at Palpa. A 600W wind turbine was manufactured at KUTTC and was installed at Palpa the efficiency was calculated to be around 28%. This efficiency was calculated using ANSYS in which CFX was chosen to be a suitable for fluid flow calculation. A domain for the fluid flow was designed using a CAD software which was extracted to CFX to calculate the torque on each blade. After a further research of air foil profile various different NACA airfoils were studied for design optimization of the original blade. Qblade is an open source software that designs a wind turbine blade on basis of given parameters. A new blade profile was extracted to CFX along with its domain in which various velocity analysis, pressure distribution were analyzed and a torque was calculated. Using the new calculated torque the efficiency of the blade was calculated and was found to be 35%. This 7% increase in efficiency is the main finding of our project.



Fig: Wind Turbine installed at Palpa

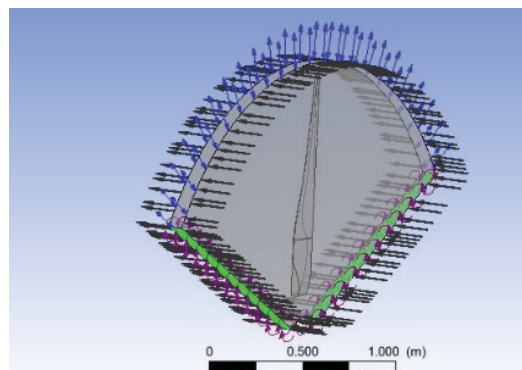


Fig: Simulation of original blade

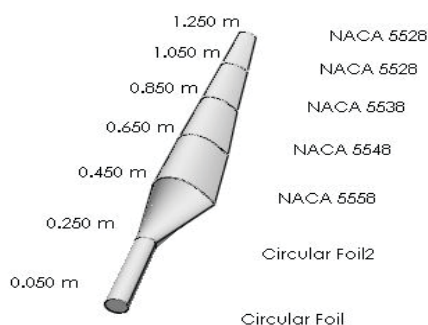


Fig: Design of new blade profile

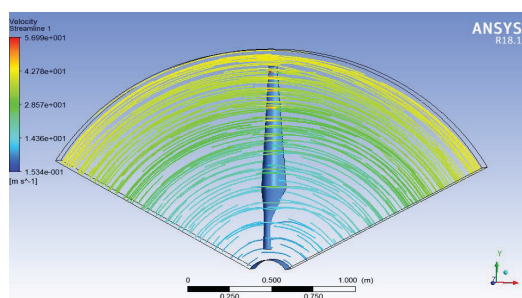


Fig: Simulation of new blade

DEVELOPING MANUFACTURING PROCESS FOR FRANCIS TURBINE IN CONTEXT OF NEPAL

Group Member: Harisharan Chaulagain, Jenish Thapa, Rishabh Thapa

Supervisor's Name: Dr. Biraj Singh Thapa, Associate Professor,

Email Address: rishabh.thapa95@gmail.com

Abstract:

Nepal has economically feasible hydropower capacity of 40,000 MW but only about 40% of Nepal's Due to high level of sediment laden rivers, erosion in hydraulic turbine has led to research where new design have been proposed to reduce erosion. But due to lack of turbine manufacturers in Nepal, European & Chinese turbines have been used but they are still prone to erosion. Turbines have to be specifically designed and manufactured for sediment laden conditions. Even with the tremendous capacity of hydropower in Nepal there are no turbine manufacturers, except micro hydropower up to 100 kW capacity.

Lack of experience in manufacturing turbine has been the major problem, so in order to make turbine in Nepal feasible and viable; options of developing turbines along with their procedures have been described here. In order to produce turbine with the existing machinery in Nepal conventional manufacturing techniques have been recommended. The processes recommended had been used for maintenance process and have been modified to meet the design specifications. Internationally practiced manufacturing process have also been described along with the machines required and components manufacturing process in this report.



Fig: Blade Welding



Fig: Blade Positioning and Placement

PERFORMANCE OPTIMIZATION OF FINNED TUBE IN TUBE HEAT EXCHANGER USING NUMERICAL SIMULATION

Group Member: Dibyank Kumar Singh, Sunil Kumar Mahato

Supervisor's Name: Mr. Nirajan Bastakoti, Lecturer

Email Address: mahatosunil192@gmail.com

Abstract:

Compact Heat Exchangers are widely used all over the world. Especially, in chemical industry, it is widely used. So, for the compact Heat exchanger Surface area density is always the concern. To maintain low surface area density fins are attached to increase the heat transfer over compact space. So, the optimization of fins height is the major limelight of our project to full fill the space requirements and to reduce cost by reducing the material wastage.

DESIGN AND ANALYSIS OF FOUR WHEEL STEERING SYSTEM

Group Member: Rajesh Dhungana, Rijan Niraula, Sanjaya Rayamajhee

Supervisor's Name: Dr. Daniel Tuladhar, Associate Professor

Email Address: sanjay.rayamajhee80@gmail.com

Cost: NRs. 4000.00

Abstract:

In standard two Wheel Steering (2WS) System, the rear set of wheels are always directed forward and do not play an active role in controlling the steering. While in four Wheel Steering (FWS) System, the rear wheels do play an active role for steering, which can be guided at high as well as low speeds. Production cars are designed to under steer and rarely they over steer. If a car could automatically compensate for an under steer/over steer problem, the driver would enjoy nearly neutral steering under varying operating conditions. Also in situations like low speed cornering, vehicle parking and driving in city conditions with heavy traffic in tight spaces, driving would be very difficult due to a sedan's larger wheelbase and track width. Hence there is a requirement of a mechanism which result in less turning radius. We have developed an innovative 4-wheel steering design to implement a mechanism that can serve the purpose of changing in-phase and counter-phase steering of rear wheels depending upon the conditions of turning and lane changing with respect to front wheels, thus enhancing the maneuverability of a vehicle in accordance with its speed.

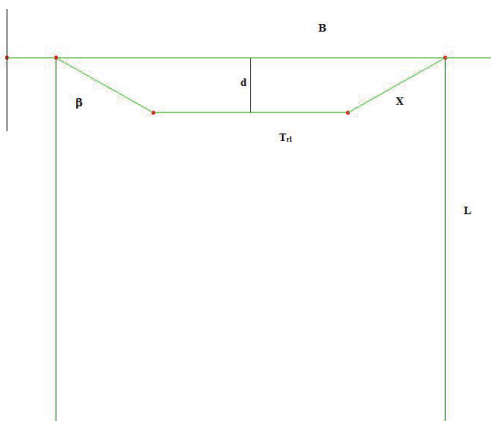


Fig: Mathematical model of Two wheel steering system

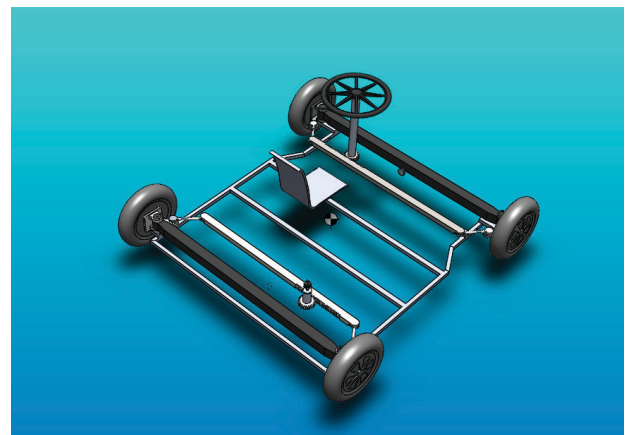


Fig: Final design in Solid works

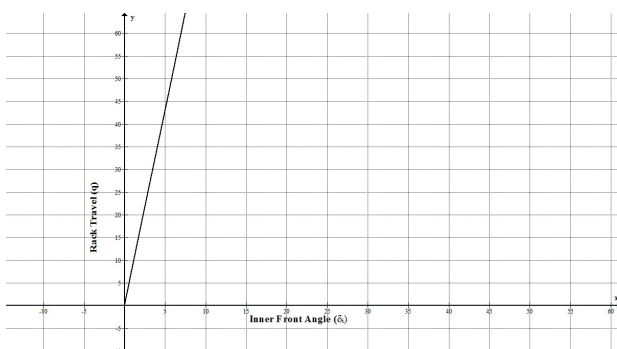


Fig: Graph of Rack travel vs. Inner front angle in MATLAB

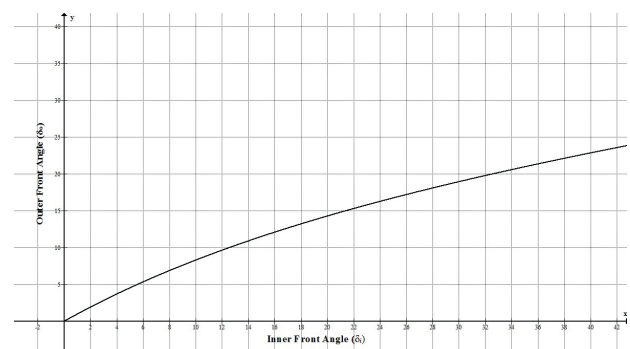


Fig: Graph of outer Front angle vs. Inner front angle from MATLAB

DESIGN OF HOSPITAL WASTE MANAGEMENT SYSTEM WITH ITS THERMAL ENERGY CONVERSION

Group Member: Ganesh Giri, Ranjeet Kafle, Rajeev Pandey

Supervisor's Name: Dr. Bivek Baral, Professor

Email Address: giriganeshh@gmail.com

Abstract:

The project is all about design of incineration system for managing hospital waste. Since the quantity of hospital waste is increasing on daily basis, measures should be taken for controlling and minimizing them. The hospital wastes are comparatively harmful for human health as they contain harmful bacteria and contamination. Hence, they should be handled with special care. In modern practices, these wastes are either burnt or dumped in open space affecting human health and degrading environment. Due to minimum reduction in waste volume, less space, immediate waste reduction and chance of energy recovery from incineration, it can be a viable option to reduce hospital waste. Our system consists of bunker, feeding system, incinerator, heat recovery system and chimney. The incinerator used is multiple chamber retort incinerator consisting of primary and secondary chamber. Fuel is supplied to the waste in primary chamber until the waste can sustain its own combustion. Combustion of waste to its fullest is carried out in the secondary chamber where temperature rises to around 1100°C . This high heat after combustion in secondary chamber is then used in heat recovery system to provide hot water for laundry and kitchen in hospitals. The flue gas is treated by electrostatic precipitator and passed through the chimney. This project mainly focuses on the design of the incinerator system and thermal energy conversion after incineration. The adiabatic flame temperature, air fuel ratio of the waste mixture and temperature of air at the exit of heat recovery equipment are also calculated in design process.

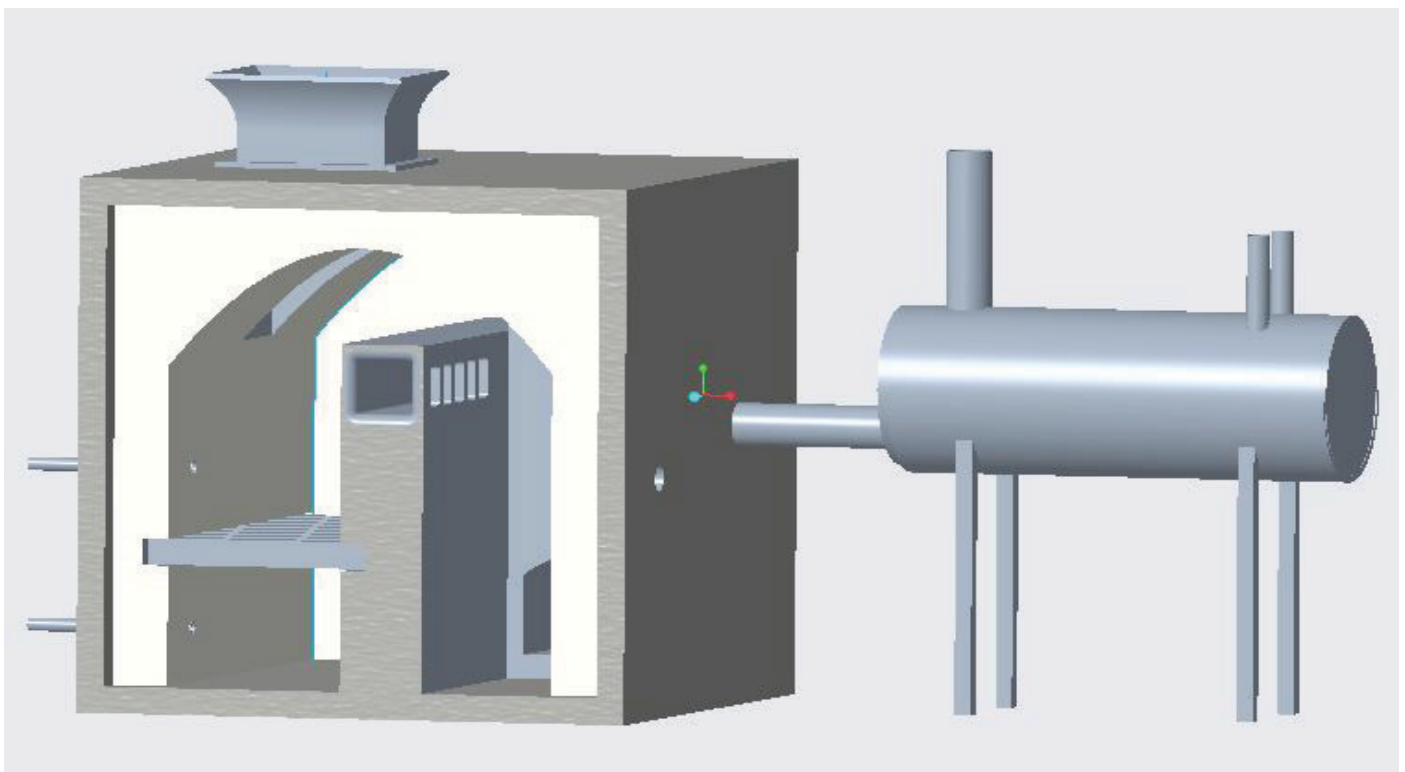


Fig: 3D Modeling of Retort Incinerator with heat recovery system

COMBUSTION CHARACTERISTICS COMPARISION OF SINGLE POT METALLIC GASIFIER STOVE AND METALLIC IMPROVED COOKING STOVE AT CONSTANT FIREPOWER

Group Member: Aashish Adhikari, Prabidhi Adhikari

Supervisor's Name: Dr. Bivek Baral, Professor

Email Address: prabidhiadhikari16@gmail.com

Abstract:

Increasing dependency on the firewood due to increasing population in many parts of Nepal has result many adverse effects on environment and human health. Total share of traditional biomass in world is only 10% but in Nepal, traditional biomass accounts for more than 80% of total primary energy consumption. Traditional system of cooking has proved itself inefficient through its demand of huge amount firewood consumption, considerable amount of heat loss to ambient environment and high smoke production as well as it improper draft system. The use of efficient cooking stoves saves the fuel wood as well as it enhances effective burning with low emission to smokes. The efficiency of the traditional stoves accounts from 3% to 15% whereas the efficiency of the stoves has been nearly reached to 30% incorporating various technologies with it. These technologies include the use of high insulating materials, several modifications on design and use of chimneys, grates as a part of stoves. The efficiency of the cooking stove depends on various factors and is the best compromise of heat transfer efficiency and combustion efficiency. For the best and appropriate design there is also compromise between time to boil and efficiency. Heat transfer efficiency increases with height until it reaches the maximum value and again gradually decreases, keeping all other parameter constant. This is due to draft action creates because of pressure difference. In the case, the thickness of thermal boundary layer decreases. The combustion also depends upon the air supply and is more efficient when both primary and secondary combustion occurs.



Fig: Testing of Fabricated Stove

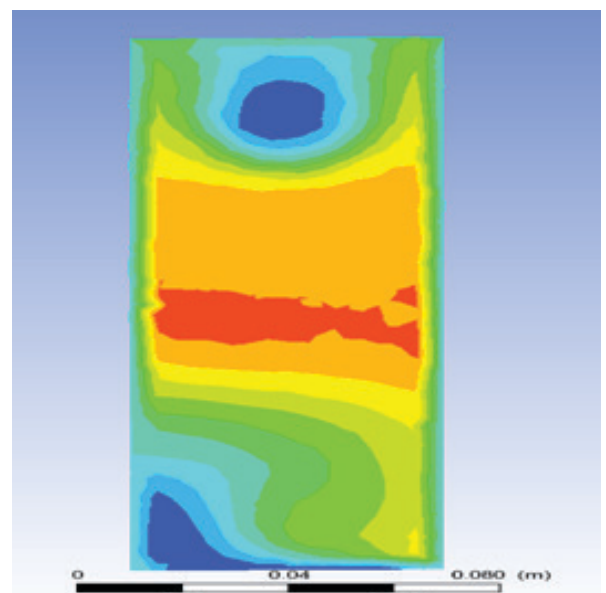


Fig: Temperature Profile During Combustion in Gasifier

CALCULATING ENERGY RATING OF DOMESTIC REFRIGERATORS BY HEAT TRASFER MEASUREMENTS AND COMPUTER SIMULATION

Group Member: Chhetri Roshan Kumar, Ghimire Manish, Kharal Dhanraj

Supervisor's Name: Dr. Bivek Baral, Professor

Email Address: chhetriroshan545@gmail.com

Cost: NRs. 26843.00

Abstract:

Refrigerator is one of the home appliance utilizing mechanical vapor compression cycle in its process. Performance of the system becomes main issue and many researches are still ongoing to evaluate and improve efficiency of the system. Therefore, this paper presents the development process of refrigerator test rig and performance analysis of a domestic refrigerator. The experiment platform which called test rig was developed from refrigerator model 9233icloud. The main objective in this study was to obtain performance of the refrigeration system in terms of Refrigeration Capacity, Compressor work and Coefficient of Performance (COP) by determining two important parameters during its operating mode which are temperature and pressure. In the test rig, all temperature sensors were taped externally to measure temperature at particular points on the refrigeration system. Pressure gauges were used to measure pressure. The data were taken in the normal environmental condition at which domestic refrigerator is operated in our daily life. There are three sets of experiment data which were collected in order to evaluate the refrigerator rating. The rating in our experiment is done based on Bureau of Energy Efficiency (BEE) standard. Each data was collected for a cycle of operation for 1.5 hours. The result shows that the average COP of the refrigeration system using the refrigerator test rig was about 2.2 in no load condition and 3 with load in refrigerator.

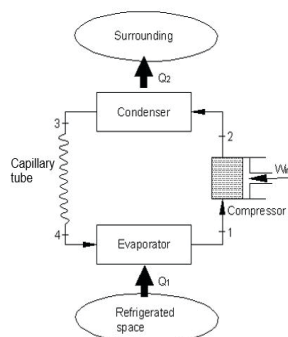


Fig: Refrigeration cycle

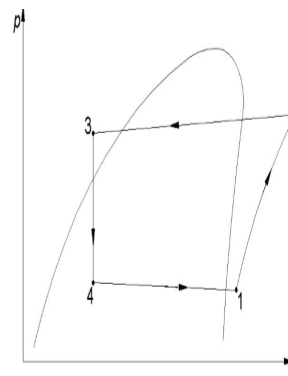


Fig: P-H diagram of vappour compression cycle

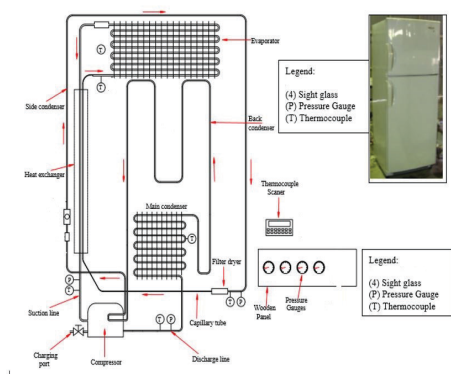


Fig: Test Rig and Experimental Setup

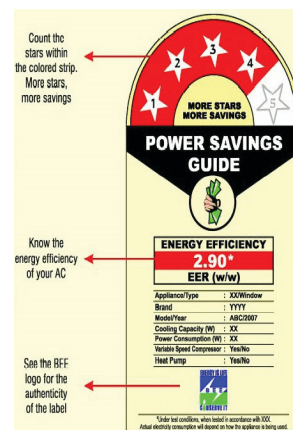


Fig: BEE logo star rating

DESIGN AND FABRICATION OF FARMBOT

Group Member: Ashish Gautam, Kshitiz Bhandari, Nabin Joshi, Rupendra Banjara, Shubham Neupane

Supervisor's Name: Mr. Ashok Sapkota, Teaching Assistant

Email Address: ashishsridhar3333@gmail.com

Cost: NRs. 8500.00

Abstract:

FarmBot is an automated precision farming machine similar to CNC milling machines. FarmBot hardware employs linear guides in the X, Y, and Z directions that allow for watering precisely on the plants and soil. The entire system is numerically controlled and thus fully automated. The world's population is growing and with that growth we must produce more food. Due to the industrial and petrochemical revolutions, the agriculture industry has kept up in food production, but only by compromising the soil, the environment, our health, and the food production system itself. Most agricultural food production in the modern day is performed in large scale, monocrop farms on huge plots of land. Monocrop farming puts a significant strain on the soil and the surrounding environment by using up specific nutrients for different crops, as well as using tremendous amounts of water. The idea with Farmbot is to shift dependence on large scale agriculture by giving people the ability to cultivate their own plants with little to no actual physical labor on their home.



Fig: Farm Bot

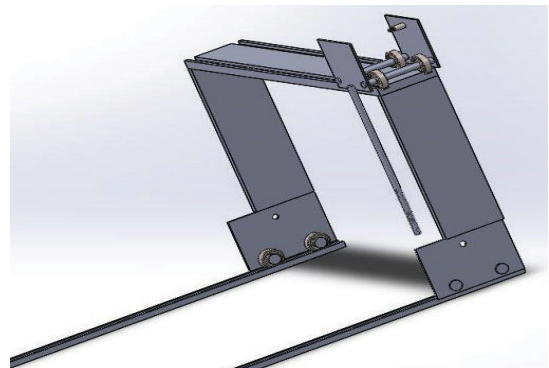


Fig: CAD design

DESIGN AND DEVELOPMENT OF PEDAL ASSISTED ELECTRIC BIKE

Group Member: Sabal Bista, Arnold Pradhan, Prabin Shakya, Dipak Timalisina

Supervisor's Name: Mr. Abhisek Karki, Research Assistant

Email Address: dipak.timalisina@student.ku.edu.np

Cost: NRs. 8500.00

Abstract:

The aim of this project is to design and develop a pedal assisted E-bike, which can sustain a rider weighing up to 60 kg and reach maximum speed of 30 km/hr. at highest assist level. A power source of 36V and 8.8 Ah lithium ion battery, a 250 W rear wheel hub motor and a smart led display integrates with a chassis; which is modeled in solid works, simulated and fabricated at TTC. A triple (torque, position and rpm) sensor placed between the crank and edge of bottom bracket fetch data to controller and the system responds accordingly at the same time Rider can choose different assist level from 1-3 depending upon the riding situation and rider mood. After the chassis fabrication, Experimental set up was done and transmission, display were tested first. After the successful testing of transmission and display, the bike was tested in KU premises and it reached up to 25 km/hr and easily sustained the rider's weight. Core competencies of health, environmental and economic benefit makes pedal assisted electric bike a better option between a pure cycle and a motorbike.

DEVELOPMENT OF A WEARABLE SENSOR FOR QUANTITATIVE GAIT ANALYSIS

Group Member: Ang Lakpa Sherpa, Avinandan Prakash Karna, Madhukar Yadav, Shishir Bhattarai

Supervisor's Name: Mr. Pratisthit Lal Shrestha, Associate Professor

Email Address: madhukaryadav207 @gmail.com

Cost: NRs. 8000.00

Abstract:

This project proposes a method for measuring human gait posture using wearable sensors. The sensor used consists of a tri-axial acceleration sensor and three gyro sensors aligned on three axes. These are worn on the abdomen and the lower limb segments (both thighs, both shanks and both feet) to measure acceleration and angular velocity during walking. Three dimensional positions of each lower limb joint are calculated from segment lengths and joint angles. Segment lengths are calculated by physical measurement and joint angles can be estimated mechanically from the gravitational acceleration along the anterior axis of the segments. However, the acceleration data during walking includes three major components; translational acceleration, gravitational acceleration and external noise. Therefore, an optimization analysis was represented to separate only the gravitational acceleration from the acceleration data. Because the cyclic patterns of acceleration data can be found during constant walking. A pattern of gravitational acceleration was assumed using some parts of these characteristic frequencies. Every joint position was calculated from the pattern under the condition of physiological motion range of each joint. An optimized pattern of the gravitational acceleration was selected as a solution of an inverse problem.

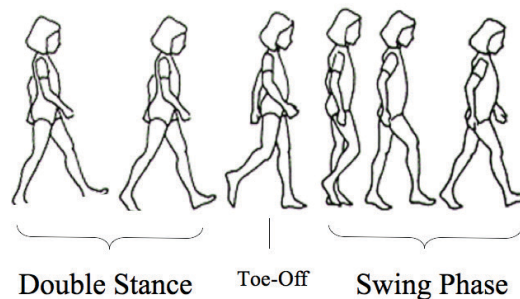


Fig: Gait Pattern

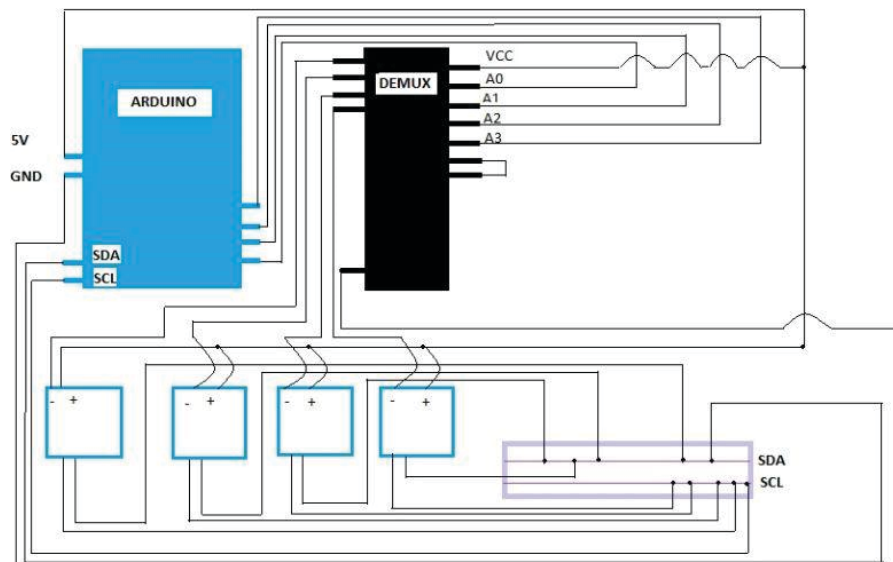


Fig: Control System

MEASUREMENT OF VAPOUR PRESSURE AND ENTHALPIES OF VAPORIZATION OF GASOLINE AND KEROSENE BLENDS AND THEIR EFFECTS ON MIXTURE PREPARATION IN AN SI ENGINE

Group Member: Shashwat Adhikari, Nirmal KC, Niraj Kattel, Bishwash Sigdel

Supervisor's Name: Dr. Bivek Baral, Professor

Mr. Hari Dhakal, Lecturer

Email Address: kcnirmal11@gmail.com

Cost: NRs. 3750.00

Abstract:

In this project, the study was carried out to determine the vapor pressure and enthalpies of vaporization of gasoline and kerosene blends. For the determination of vapor pressure, Vapor pressure setup was designed taking reference of HK-1022 Reid Vapor Pressure Bath-ASTM D323. Enthalpies of vaporization of different v/v% gasoline and kerosene blends were determined by plotting $\ln P_{\text{sat}}$ against $1/T_{\text{sat}}$. With the help of enthalpy of vaporization, engine parameters like evaporative cooling rate or charge cooling effect are studied. At the end of this project, 10% v/v of gasoline and kerosene blend having higher evaporative cooling rate, is selected.

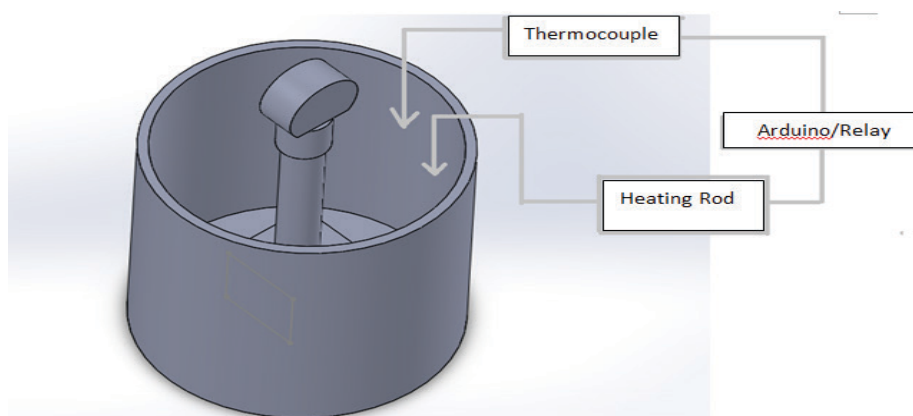


Fig: Solidworks Modeling of Vapor-Pressure Rig

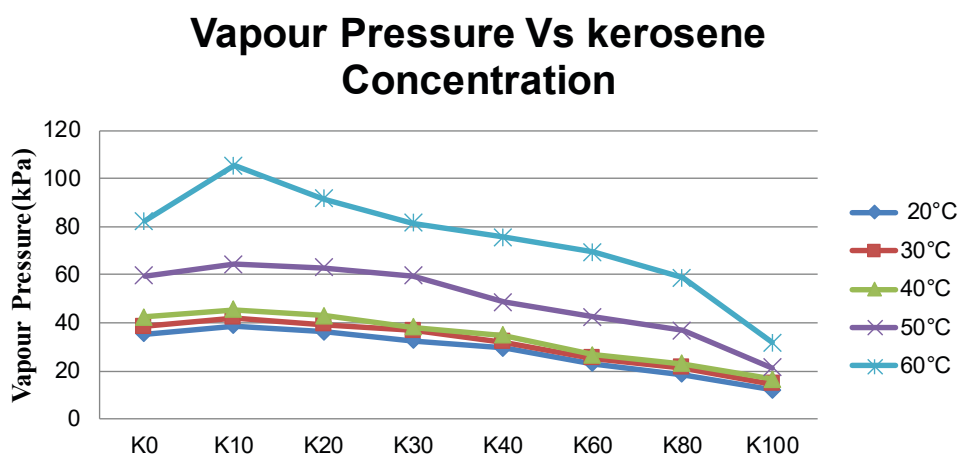


Fig: Measured Vapour Pressure against Kerosene Content by volume at different temperatures

STUDY AND DEVELOPMENT OF FEM CODE FOR LINEAR STRUCTURAL ANALYSIS IN MATLAB

Group Member: Ashesh Bhattarai, Ijan Adhikari, Rajiv Bhandari

Supervisor's Name: Dr. Krishna Prasad Shrestha, Asst. Professor

Email Address: ijan.adhikari11@gmail.com

Cost: NRs. 2000.00

Abstract:

Engineering structures like trusses, spring consist of complex geometries which are not convenient to analyze manually, so there is a need to use Finite Element Method for analyzing these structures. This software uses FEM in MATLAB to solve for forces and displacements in given combination of spring elements or simple 2D trusses by applying direct method. This software can also be used in variety of real world spring and truss problems.

DESIGN AND FABRICATION OF SAND SIEVER

Group Member: Abhishek Paudel, Surendra Kumar Sharma

Supervisor's Name: Mr. Chiranjeevi Mahat, Lecturer

Email Address: 9803403883suren@gmail.com

Cost: NRs. 10000.00

Abstract:

We have worked on the project entitled "Design and fabrication of sand sieve". Our project will reduce the construction time in huge amount and parallel with this, the labor cost in construction will also reduce. There has been seen that sand for construction take maximum construction time and in unavailability of proper sand construction may have to stop for several days. We have used the motorized way to sieve the sand which will reduce wastage of sand and also reduce labor cost. Our project is primarily made for all the construction work. It will sieve about 200 kg of sand in one hours. Our project is motor operated and designed with keeping many criteria in mind, so it will reduce sand wastage.



Fig: Fabricated Project

FABRICATION OF A FLYING MACHINE HARNESSING AN INNOVATIVE IDEA

Group Member: Kshitij Kunwar, Parbat Thapa

Supervisor's Name: Mr. Pratisthit Lal Shrestha, Asst. Professor

Email Address: kshitijemail@gmail.com

Cost: NRs. 8600.00

Abstract:

This project is an advancement in the flying concepts. We have an innovation that, we think, has the potential to create a great impact in the aerospace industry. Our innovation specifically targets the waste drag force that do nothing but lessen the flying capacity of a flying machine. The objective is to suck the power out of that drag force. We have innovated a simple mechanism, that has some similarities with the cyclocopter but different in configuration with added advantages. We carried out this project in two phases; the first phase was to construct just the mechanism with the simple material like wood block, some iron nails and insulated copper wire and the second phase was to fabricate a much intricate and strong version of the machine. The future of this innovation seems to be very bright as this project has been successfully tested by many researcher in the form of quad-cyclocopter with a highly advanced testing technology. This report presents the overall setup and methodology of this innovation together with the problem that are encounter while making it in the different phases of fabrication.

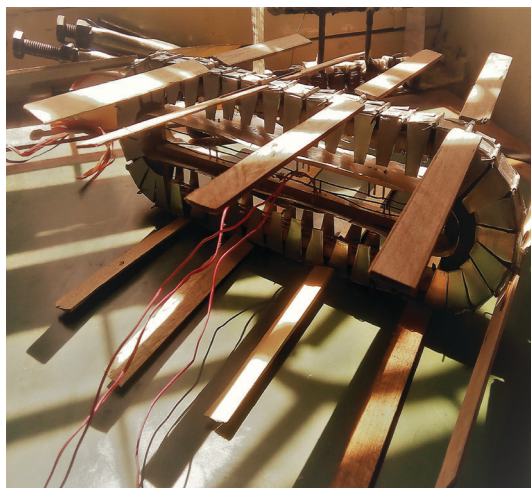


Fig: Side View of Flying Machine



Fig: Isometric view of Flying Machine

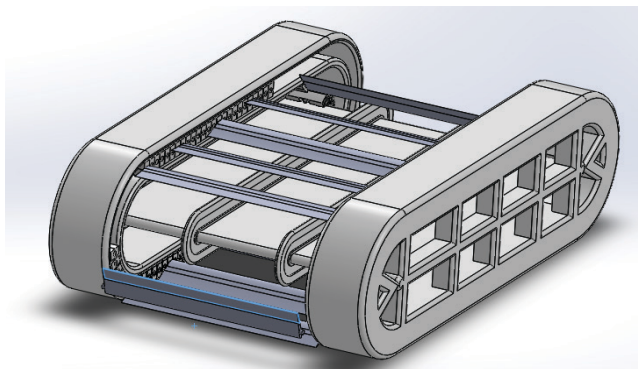


Fig: Solidworks Conceptual Design

DESIGN & FABRICATION OF AUTOMATIC STEERING SYSTEM FOR FOUR WHEELERS

Group Member: Bibek Yadav, Keshav Verma, Sagar Thapa

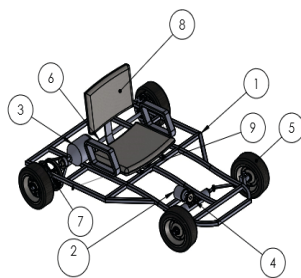
Supervisor's Name: Dr. Daniel Tuladhar, Associate Professor

Email Address: keshaverma99@gmail.com

Cost: NRs. 40000.00

Abstract:

The objective of our project is to come up with an Automatic Steering System prototype that can be operated by the help of microcontroller and camera to turn left or right automatically according to surrounding to avoid accident without driver input. Automatic Steering System is being employed in vehicles nowadays to prevent the accidents and for correct steering. Electronically controlled motors are used to operate steering automatically with the help of sensors. Microcontroller is used to control the motion of motor at the time of turning. Microcontroller continuously interprets the signal about the presence of obstacles from the sensors fixed around the vehicles and video by camera feed. The aim of making this type of Automatic Steering System is to provide controlled environment to the driver and prevent accidents. It is anticipated that Automatic Steering System will be an efficient system in automobiles helping to enhance life and provide better, controlled environment.



Part No.	Description	Quantity
1	Chassis	1
2	Wiper Motor	1
3	AC Motor	1
4	Rack & Pinion	1
5	Wheels	4
6	Shaft	1
7	Disc Brake	2
8	Seat	1
9	Actuator	1

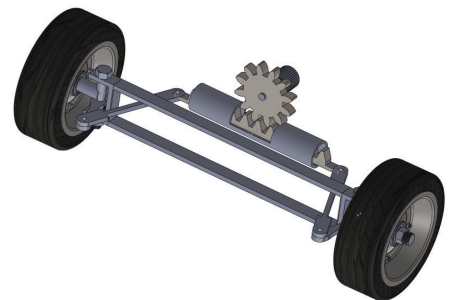


Fig: CAD Drawing of Automatic Steering System For Four-Wheeler

Fig: CAD Drawing of Steering System

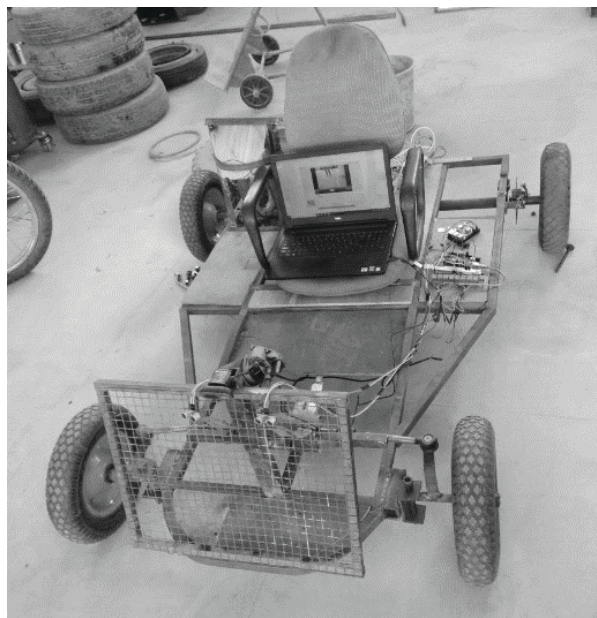


Fig: Automatic Steering System

MANUFACTURING PROCESS OF MODEL FRANCIS TURBINE RUNNER FOR LABORATORY TESTING APPLICATION

Group Member: Smrit Dhimal, Raju Khadka, Paurakh Paudel, Prashil Raj Shrestha

Supervisor's Name: Dr. Biraj Singh Thapa, Assistant Professor

Email Address: prashilrajshrestha@gmail.com

Cost: NRs. 2000.00

Abstract:

The present reality of Nepal is that no advancement in the field of manufacturing Francis turbine have undergone serious advancement in terms of manufacturing. The expertise in this field is quite extensively focused in terms of paperwork only. This project displays the utilization of various accessible assembling advances, which is appropriate in the Nepalese hydropower. Moreover, CAD from Creo and Solidworks, 3D printing from Rapid Prototyping Machine (RPM), and manufacturing these designs by different methods such as CNC machining, pressing, die casting, lost wax casting, and forging in a workshop have been described. The outcome of this work is based on python based framework which helps us in the identification of suitable Model Francis turbine Runner development methodologies in context of Nepal, incorporating industrial revolution through research based products.



Fig:92 KW francis turbines manufactured at NHE, Nepal

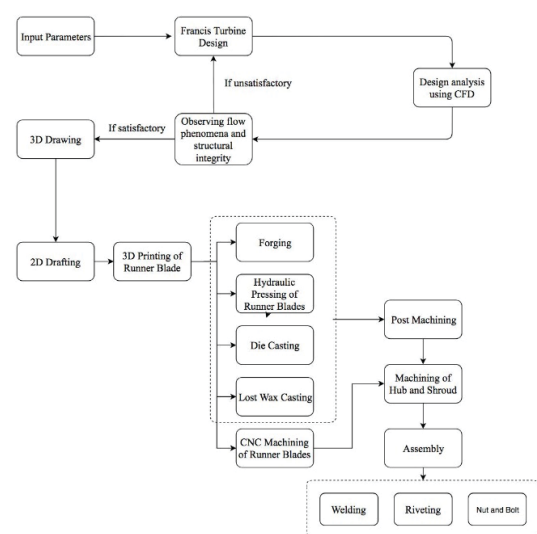


Fig:Deatiled Manufacturing Process of Francis Turbine Runner

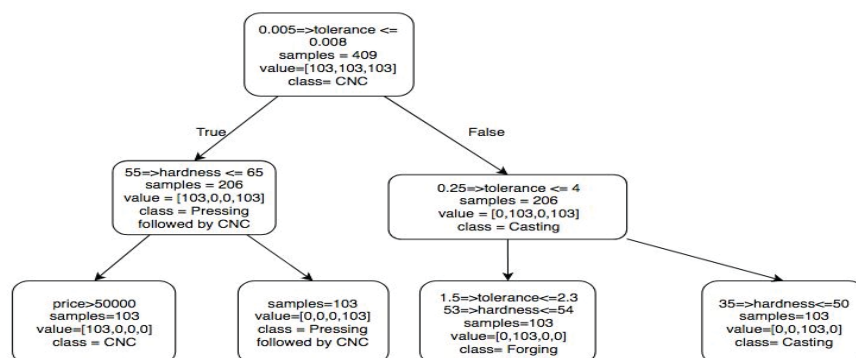


Fig: Decision Tree Flowchart

DESIGN AND FABRICATION OF FLOATING ROTOR HYDRO ASSEMBLY

Group Member: Navin K.C , Sarad Niraula, Saurav Pokharel

Supervisor's Name: Mr. Gokarna Paudel, Instructor, KUTTC

Email Address: Saurav.10m@gmail.com

Cost: NRs. 7500.00

Abstract:

"Floating rotor hydro assembly" can be an excellent method of harnessing renewable energy from small rivers and streams. This project designed to float on the river which powers it. This will help in portability and easy maintainability of the assembly the assembly consists of a floater, rotor and a generator/dynamo in its basics. The floater which may be plastic drums or tubes, or raft too, help to hold the assembly on the river. The blades transfer river's kinetic energy by reaction, not impulse, to the generator which produces electricity. This assembly helps in cost effective electrical power production with no dam and environmentally benign energy technology for rural electrification in less developed countries. The design study showed that construction of "Floating rotor hydro assembly" was feasible and there were no major problems apparent at the design and implementation stages. The assembly does float in water and produces certain electricity, not in the scales we intend to owing to its limitations. However, these can be surely mitigated with better parts and generator.



Fig: The floating Rotor Hydro Assembly



Fig: Replaceable Blade

DESIGN AND FABRICATION OF BENDING MACHINE

Group Member: Biwas Thapa, Manoj Shrestha, Sandhya Mishra, Sudarshan Poudel

Supervisor's Name: Er. Dadi Ram Dahal, Research Fellow, KUTTIL

Email Address: manojshrestha677@gmail.com

Cost: NRs. 6800.00

Abstract:

Bending is one of the important phenomena for the manufacturing processes. Bending machine is a common machine in machine shop that used to bend a metal sheet, plate and pipe. The three-roll bending of metal is an important and flexible manufacturing process due to simple configuration. It is suitable for forming sheet and tube parts with complex, curved faces. So, the portable bending machine can be the convenient way to work with the portable work. The aim of this project is to develop a portable metal bending machine. It is easy to carry and use at any time and any place. This project uses 3 rollers to bend metal. During the roll bending process the sheet or plate or pipe is passed through consecutive rollers that gradually apply pressure on pipe. Because of this pressure the change in radius of pipe or sheet occurs.



Fig: Bending Machine

DESIGN AND FABRICATION OF AUTOMATIC PAPER CUTTING MACHINE USING GENEVA MECHANISM

Group Member: Rajesh Khatiwada, Sandeep Giri, Siddha Raj Timilsina

Supervisor's Name: Dr. Krishna Prasad Shrestha, Asst. Professor

Email Address: siddharajtimilsina@gmail.com

Cost: NRs. 5000.00



Fig: Final Product

Abstract:

The design and fabrication of paper cutting machine using Geneva mechanism is useful to cut papers in equal and accurate dimensions. Geneva drive is a mechanism that converts the continuous rotational motion in intermittent motion, due to which the papers are moved in to the equal intervals of cutting period. Then paper cutting can be obtained by crank and lever mechanism. The cutter will be back to its original position by crank and lever mechanism. The objectives of this concept is to design the Geneva mechanism operated cutting machine which eliminates the most time taking process of paper marking and helps in feed equal dimension paper in each rotation. This machine is used to reduce the manual work of paper cutting, and also time saving. This machine is very useful for paper manufacturing industry also we can avoid the human errors and also we can use this machine in everyday life processes such as schools, colleges, shops etc.

A STUDY ON SOLAR ASSISTED ROOM HEATING SYSTEM

Group Member: Aayush Bastola, Anusheel Chapagain, Divya Darshan Tiwari, Rabin Nepal

Supervisor's Name: Dr. Bivek Baral, Professor

Email Address: rabin.nepal53@gmail.com

Abstract:

Despite successful implementation of solar PV projects and solar water heaters in Nepal, one aspect of utilization of solar energy, solar space heating, has not been practiced much. This study intends to design a solar under-floor heating system for a room only to study the design parameters. With suitable site selection, detailed design and calculation of thermal parameters are done. Here, total heating load was calculated to be 1831.19078 W, which we have aimed to supply by solar system. To meet this heating load 0.66856m², collector area was calculated with the flow of 224.9774 kg of water per hour. And, finally the total heat transferred by the water flowing inside to the room was 1803.3848 W that was from our design which has almost fulfilled our heating load value. So, the design was optimized at this point.

This project is only a significant study over thermal comfort and numerical analysis over the study of the heat and mass transfer.

DESIGN ANALYSIS OF SKELETON STRUCTURE OF BUS BODY

Group Member: Alisha Shrestha, Nashla Shaky, Rejsha Khoteja, Susmita Gurung

Supervisor's Name: Mr. Dadi Ram Dahal, MS Candidate, KUTTTL

Email Address: rejsha.khoteja@gmail.com

Budget: NRs. 4000.00

Abstract:

Buses are the foremost mode of road transportation. In Nepal, the majority of buses are fabricated without having specific design and on the basis of ancient times experience. The purpose of this project is to simulate and forecast the structural response of the bus body in terms of stress, strain and displacement, under several loading and constraining conditions. This project describes a new approach and specific design procedure for more strength. Here we analyzed two different models, one being the existing model and other, newly designed model. The 3D modeling of the structure is done using SOLIDWORKS 2016. Static structural analysis is done on both the models to determine the strength of the structure. Analysis is done in ANSYS 15.0 Workbench. A comparison study of both models is done and it is witnessed that new model is better than existing model in terms of stress, deflection, factor of safety.

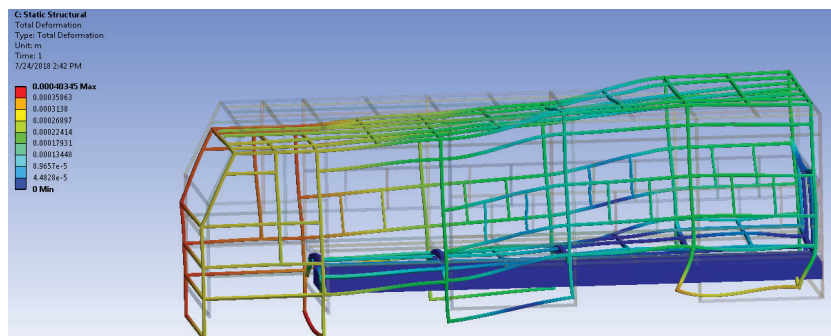


Fig: Deformation in Existing Model

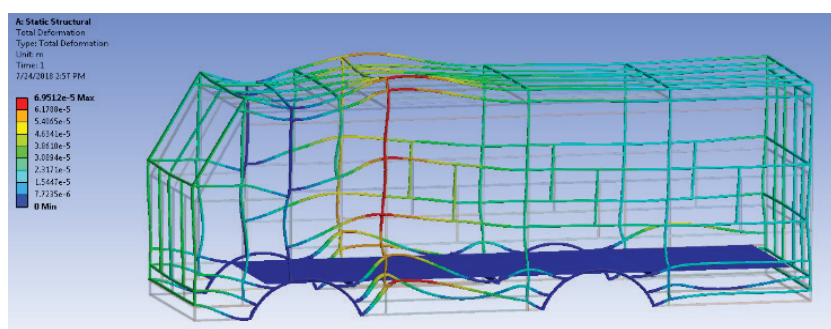


Fig: Deformation in New Model

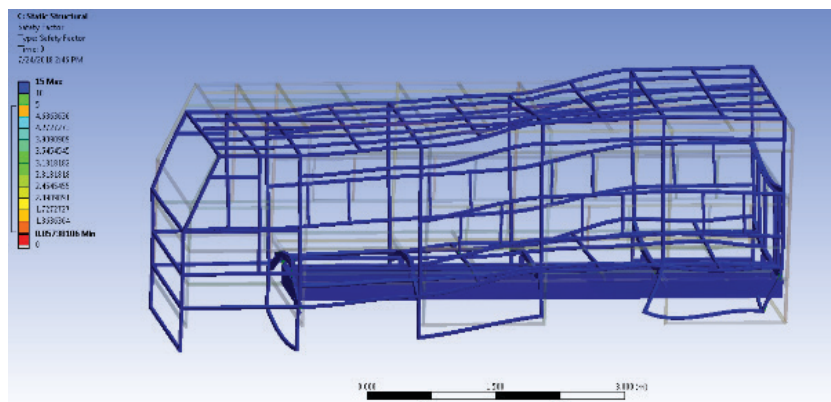


Fig: FOS in New Model

DESIGN AND FABRICATION OF PADDLE WHEEL FOR ALGAE CULTIVATION AND ESTIMATION OF ENERGY VALUE OF ALGAL BIOMASS

Group Member: Pratik Adhakari, Dipin Gyawali, Pratik Raj Khadka, Raman Silwal

Supervisor's Name: Mr. Pratisthit Lal Shrestha, Assistant Professor

Email Address: dipim1234@gmail.com

Cost: NRs. 10000.00

Abstract:

Algae traps solar energy in themselves from the sun. This trapped energy can be utilized by drying algae to use as a source of biofuel. Algal strain *Chlorella vulgaris* is grown in raceway pond in large quantity. These are extracted, dried and made into pellets. The optimum calorific value of different combinations is 8154 cal/gm with 50-50% combinations of algae and wood. Though, the maximum calorific value attained is 9488 cal/gm with 75% wood and 25% algae combination, algae use is minimized in this combination. Designed paddle wheel was installed at the raceway pond, it was able to make water flow in the pond effectively. Thus, aeration is also confirmed.



Fig: Fabricated Project

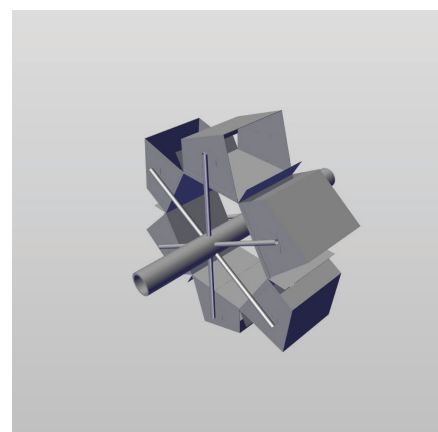


Fig: CAD Design of Paddle Wheel

DESIGN AND FABRICATION OF SEED SOWING BATTERY POWERED MECHANISM

Group Member: Alos Basnet, Arjit Mani Dhakal, Avishek Dahal, Sandesh Aryal

Supervisor's Name: Dr. Bivek Baral, Professor

Email Address: arjitcatalandhakal@gmail.com

Cost: NRs. 14500.00

Abstract:

This project deals with the a seed sowing mechanism used in Nepal using Power tilling and Hopper mechanism. Since the basic requirements for small scale sowing machines are; they should be suitable for small farms, simple in design and technology and versatile for use in different farm operations, a manually operated seed sowing planter was designed and developed to improve planting efficiency. The project focuses on simplifying the operating and maintenance principles for effective handling by unskilled operators (farmers). Now a days the availability of labor is a major problem faced by farmers, so this project aims in reducing the number of labor required for sowing process and hence to reduce labor cost as well as to reduce the cost of machine. The project also attempts to put the seeds at desired depth and maintain seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. The recommended row to row spacing, seed to seed spacing and depth of seed placement vary from crop to crop and for different agro-climatic conditions to achieve optimum yields.

DESIGN AND FABRICATION OF HYBRID VEHICLE

Group Member: Ayush Karn, Lokesh Bhatta, Prakash Dhami, Subham Kandel

Supervisor's Name: Dr. Daniel Tuladhar, Associate Professor

Email Address: prkshdhami1@gmail.com

Cost: NRs. 20000.00

Abstract:

Hybrid vehicle originates because of the necessity of developing alternative methods to generate energy for vehicles due to limited fuel-based energy, global warming and exhaust emission limits in the last century. Hybrid Vehicle is a vehicle which run with the combine effort of combustion engine and the electric powered motor. The combine effort reduces the uses of fuel and also reduces the environmental impact over conventional vehicle. The objective is to design and fabricate hybrid vehicle powered by both battery and gasoline with low fuel consumption using chain driven differential system. The fabricated vehicle consists of electric motor and combustion engine which is parallelly aligned. The motor drives vehicle at low-speed driving and combustion engine drives at high-speed driving. The switching of motor and engine is done manually. The projected vehicle limits the carrier weight to 150 kg. The combination of both the system makes the vehicle dynamic in nature. The hybrid vehicle can be used in every automobile sector. It gives a good efficiency at low fuel consumption which fulfill the demand and solve the present facing limited fuel-based problem.



Fig: Fabrication of Hybrid Vehicle

DESIGN AND FABRICATION OF PLASTIC PYROLYSIS PLANT

Group Member: Aashutosh Neupane, Jitesh Kalwar, Rabin Maskey

Supervisor's Name: Mr. Malesh Shah, Lecturer

Email Address: jiteshkalwar10@gmail.com

Cost: NRs. 12600.00

Abstract:

Pyrolysis is a thermal decomposition of organic material at elevated temperatures in the absence of oxygen (or any halogen). The increasing consumption of the plastic waste and their effective and safe disposal has become matter of concern. The incineration of plastic wastes leads to severe air pollution. Plastic pyrolysis process is a widely used technique to handle plastic wastes in many foreign countries. It is a new technology in Nepalese context. It consists of different processes such as melting, vaporizing, condensing and distilling the plastic wastes to obtain fuel. Plastics are heated to boiling point in the pyrolysis reactor and the vapor thus produced is guided to shell and tube condenser where condensation takes place. The condensed liquid is collected as crude pyrolysis oil. Char remains as a residue in the pyrolysis reactor. The yields depend on various factors like type of plastics used, cracking temperature, heating rate, operation pressure, reactor type, residence time, application of catalyst, etc. Design of plant was done in CAD software. Reactor used to pyrolyze plastic is batch type and plastic is pyrolyzed about 600°C for this process. Low Density Polyethylene has highest oil yield rate (95% by wt.) ,so for testing purpose this polyethylenes is to be used.



Fig: Plastic Pyrolysis Plant

DESIGN AND FABRICATION OF BATCH TYPE TORREFACTION REACTOR

Group Member: Basanta Bhattarai, Bibek Gautam, Nayan Acharya

Supervisor's Name: Mr. Malesh Shah, Lecturer

Email Address: acharyan68@gmail.com

Cost: NRs. 7000.00

Abstract:

Torrefaction, a process of improving the fuel with low heating value, low combustion efficiency by removing the moistures and volatiles can be a better option over the other concept of biodegradation and solid waste management. The project aimed to fabricate a batch type torrefaction reactor for the study purpose. The research with the project studies the heating rates and cooling rates of the reactor with different operating condition. Also the study focused on the changes in physical appearance with respect to the torrefaction temperature of 150°C till 350°C for food waste with 50°C of interval. Preliminary the maximum yield is prospected to be in sample tested at around 200°C for Food Wastes from Household.

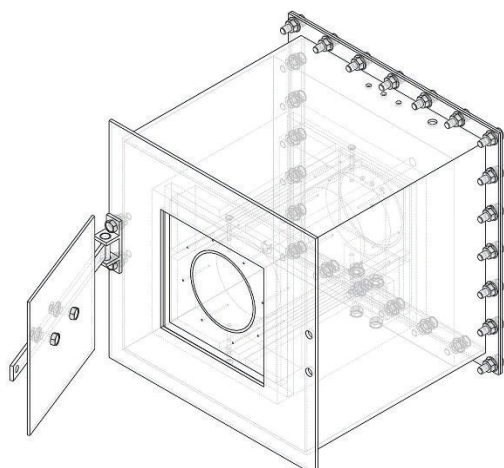


Fig: CAD view of reactor



Fig: Experimental Setup for reactor testing

Subsequent heating and cooling of reactor in different cooling conditions

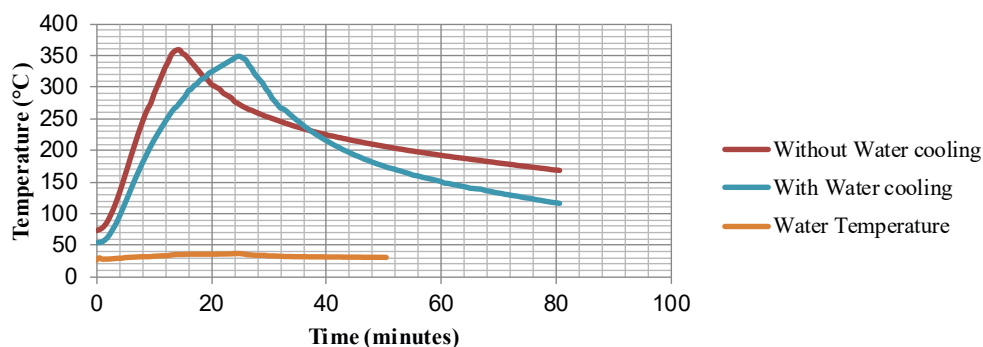


Fig: Subsequent heating and Cooling in Reactor with and without cooling circuit

NUMERICAL AND EXPERIMENTAL INVESTIGATION OF PICO TURBINE

Group Member: Manish Adhikary, Ram Manandhar, Ranjeet Twayna, Sanjaya Pd. Sah, Suprim Shrestha

Supervisor's Name: Mr. Atmaram Kayastha, Research Associate, KUTTTL.

Email Address: maneesh.adhikary@gmail.com

Cost: NRs. 22000.00

Abstract:

The Pico Turbine, a hydroelectric impulse turbine generally suited for low head applications, has gained renewed attention in research due to its potential applicability. A low-cost Pico turbine was built and its experimentation was done with test rig developed to measure various parameters; torque, power, efficiency with varying flow rate and a CFD model was developed to predict its efficiency, pressure on the runner and torque as a function of each parameter above and their interactions. The purpose of this study is to establish empirical design guidelines that enable small hydroelectric manufacturers and individuals to design low-cost efficient Pico Turbines that can be optimized to a specific pico-hydro site. Such hydropower can be used during emergency relief, places where national grid has not reached. The results are also expressed in dimensionless parameters to allow for potential scaling to larger systems and manufacturers. The numerical and CFD analysis provides validity to new design of Pico turbine that can be installed in desirable sites.

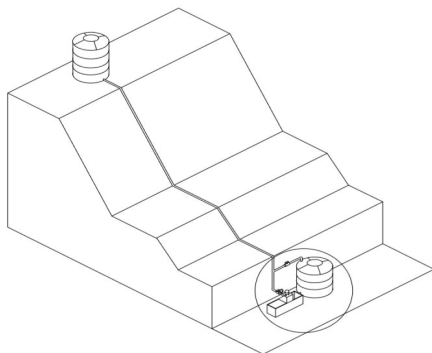


Fig: Experimental Setup for Pico Turbine

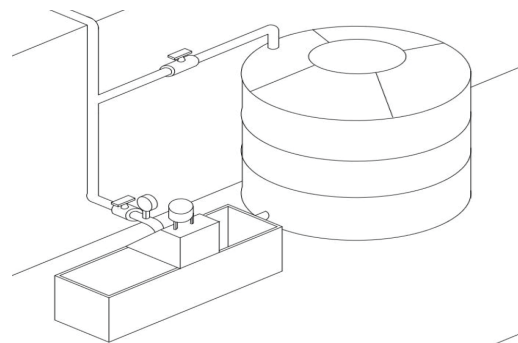


Fig: Arrangement for Pumping Water Attached with the Setup



Fig: Runner

PERFORMANCE ANALYSIS OF SCALED-DOWN MODEL OF FRANCIS TURBINE WITH COMPUTATIONAL METHOD

Group Member: Ajay Prabin , Bishnu Sah , Rajan Karki , Girish Chandra Pokhrel

Supervisor's Name: Mr. Atmaram Kayastha, Research Associate, KUTTL

Email Address: ajayprabin@hotmail.com

Abstract:

The basis of this project is to study, analyze and predict the hydraulic behavior and efficiency of Francis turbines before they are put in actual use. Experimental approach of predicting the performance of turbine is costly and time consuming compared to CFD approach, so it helps to predict the performance and efficiency of Francis turbine using CFD approach. The overall efficiency of the turbine is determined based on the fundamental equation i.e. ratio of output to input power in which boundary condition used for simulation is mass flow inlet and pressure outlet were used. Hence, overall efficiency of turbine was predicted with CFD approach which may be helpful in improvement of the existing efficiency and evaluation of the performance of Francis turbines.

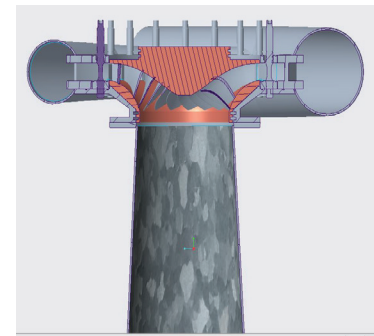


Fig: Francis Turbine

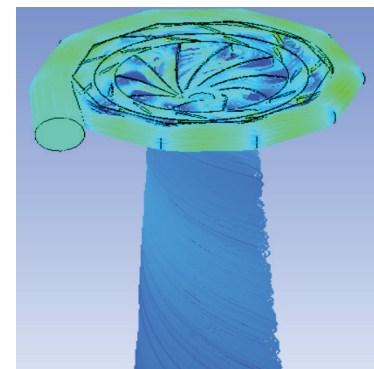


Fig: Francis Turbine Simulation

MICROSTRUCTURAL INVESTIGATION AND HEAT TREATMENT ANALYSIS DURING MAINTENANCE OF PELTON RUNNER

Group Member: Bikash Singh, Milan Shrestha, Paras Khanal, Sabin Baral, Shyamhari Acharya

Supervisor's Name: Mr. Nirmal Acharya, Research associate, KUTTL

Email Address: khanalparas@gmail.com

Abstract:

In micro-hydropower major problem is erosion and cavitation which reduces the overall efficiency gradually. Mild steel is commonly used for the manufacture of cross-flow runner in micro -hydropower. Manufacturing defects, inadequate design and improper maintenance are the root problems for formation of the crack in the runner. Among these, improper maintenance of the runner is main problem in the context of Nepal. Studying the effect of heat treatment during repair is necessary. The effect of heat treatment on the mechanical properties of the mild steel has been carried out. After heat treatment, the test specimen has been carried out for hardness, toughness and microstructural investigation. Heat treatment has been done in muffle furnace which has maximum temperature of 1200 degree Celsius. Hardness has been done in the Brinell hardness test and toughness test on the Charpy impact test. Microstructural investigation has been carried out after the heat treatment and toughness test in the optical microscope and calculated the ASTM grain size number. After final conclusion, the heat treatment process was better for the best performance of runner was identified.

STUDY OF EROSION IN FRANCIS TURBINE RUNNER DUE TO EROSION INDUCED CLEARANCE GAP IN GUIDE VANES

Group Member: Aashutosh Parajuli, Gopal Gautam, Niroj Koirala, Manjur Raj Basnet

Supervisor's Name: Dr. Sailesh Chitrakar, Senior Researcher, KUTTL

Email Address: aashutoshparajuli@gmail.com

Cost: NRs. 7000.00

Abstract:

In the context of our country, where the hydropower operating on ROR is profound, the problem of sediment erosion should be considered which is the leading problem in the context of our country. Thus the project incorporates the effect of sediment on the runner of turbines and the erosion distribution throughout the profile. Also the study of flow pattern around guide vanes using PIV is done.

In CFD, the effect of sediment on the runner is studied. For this purpose, guide vanes of different NACA profiles is used at various operating conditions to check the intensity of the erosion in runner profile. The specifications of the sediment is specified for the study.

In PIV, the flow pattern is studied in a fabricated rig where a guide vane of NACA-0012 with chord length 97mm is kept and its angle was varied for five different conditions (-50, -30, 00, 30, 50).

The results from CFD is also obtained and the erosion intensity is found to be greater at the tip of runner blades. The results are verified with other similar studies carried out previously and also with the extracted picture of Jhimruk runner blade exposed to sediment erosion.

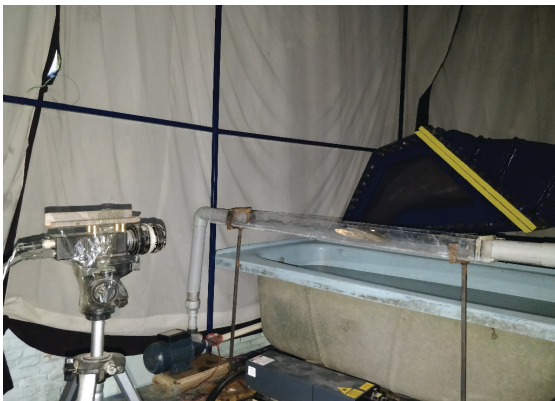


Fig: PIV Setup

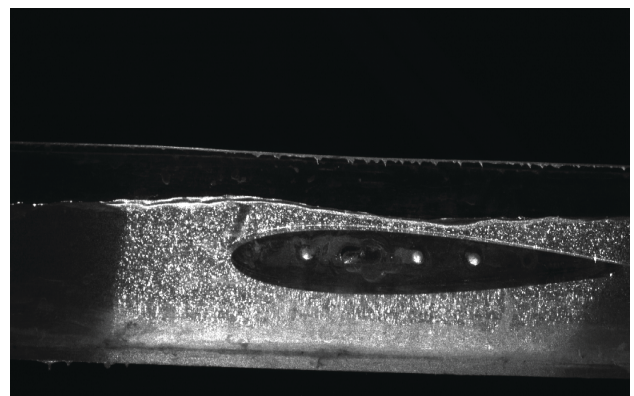


Fig : Raw image of PIV

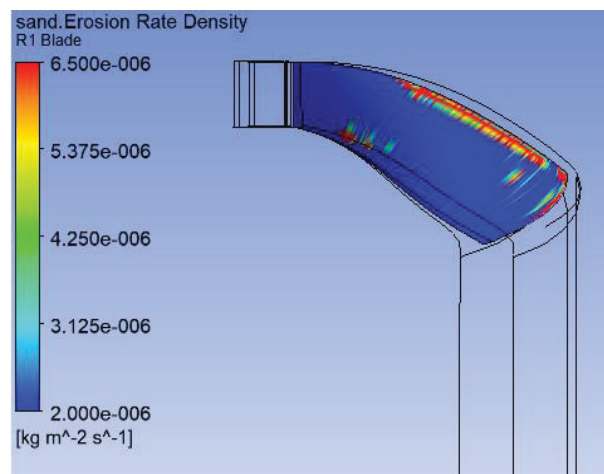


Fig: Sand Erosion Rate Density at Runner Vane at 1.5 mm CG

PERFORMANCE ANALYSIS OF 1 kW PICO FRANCIS TURBINE WITH EXPERIMENTAL AND COMPUTATIONAL METHODS

Group Member: Bibek Giri, Nabin Bhatta, Prabin Dhakal, Samita Rimal

Supervisor's Name: Mr. Atmaram Kayastha, Research Fellow, KUTTTL

Email Address: rimalsamita21@gmail.com

Cost: NRs. 8700.00

Abstract:

This project is aimed to test and analyze the Pico Francis Turbine Components fabricated for 2 kW runner provided by Turbine Testing Lab. The fabricated components include: Spiral Casing, Stay Ring along with Stay vane (guide vane and stay vane fused together) and conical draft tube.

The project started with learning to use the test rig of Francis Turbine at TTL for observing required data for experimental analysis and learning ANSYS for computational analysis. Reservoir type Panauti Hydropower Plant was visited to know more about hydro driven machineries. The experimental analysis of test rig and CFD analysis of the turbine was carried. Further, the experimental analysis of the fabricated model was done so as to compare the results with that from standard turbine of the test rig.



Fig: Test of the product

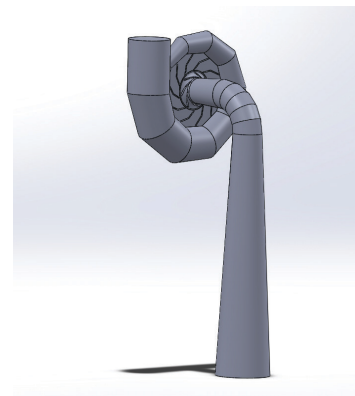


Fig: Fluid Domain of Fabricated Francis Turbine

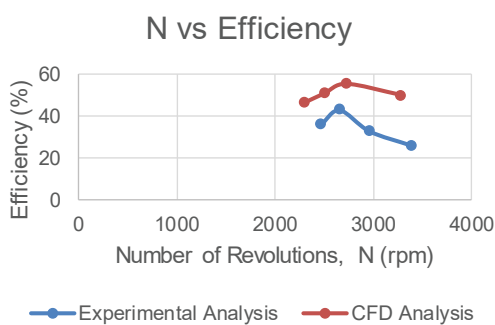


Fig: RPM vs Efficiency Comparison

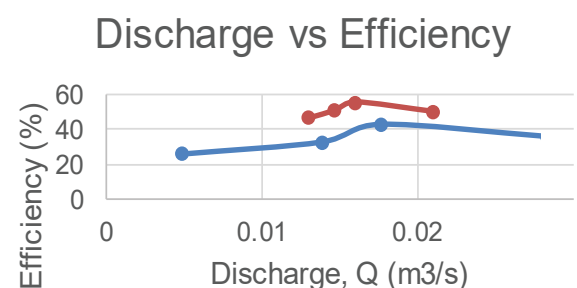


Fig: Discharge vs Efficiency Comparison

DESIGN OF HIGH SPECIFIC SPEED FRANCIS TURBINE FOR LOW HEAD APPLICATIONS

Group Member: Bikalpa Khadka, Dipendra Karki, Nikshan Poudel, Utsarga Lamichhane

Supervisor's Name: Dr. Biraj Singh Thapa, Asst. Professor

Mr. Dadiram Dahal, MS Candidate, KUTTTL

Email Address: utlamichhane12345@gmail.com

Abstract:

In this project, the study has been carried out to investigate the effects of turbine runner parameters on the design. For determining the parameters effects a Francis turbine runner for high specific speed has been designed and the parameter has been studied and numerically analyzed. Design of turbine runner blade is done using Bovet approach. Blade geometry of runner is generated using ANSYS Bladegen software. Numerical analysis has been carried out to determine different parameter's effects on turbine performance. By varying blade outlet angle, efficiency and sediment erosion has been compared to design an efficient model of Francis turbine – runner for high specific speed.

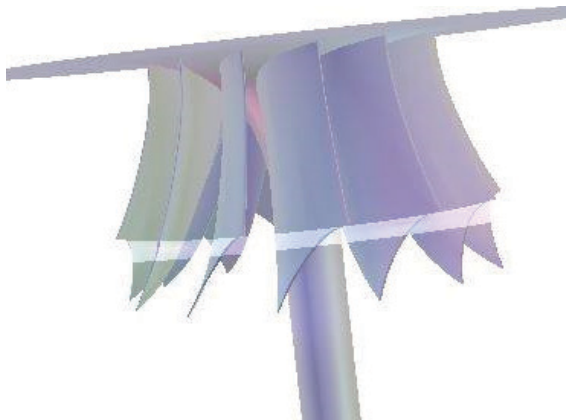


Fig: 3D geometry of runner

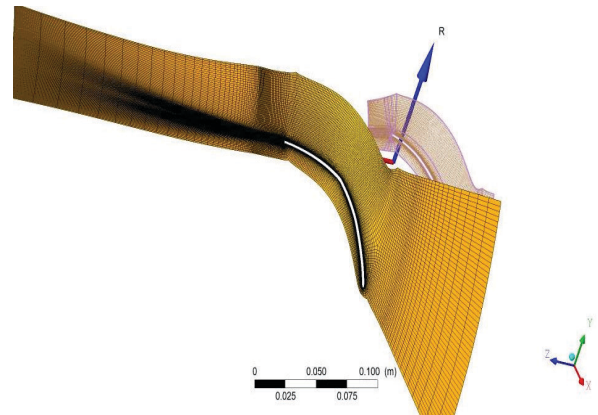


Fig: Mesh for one blade passage

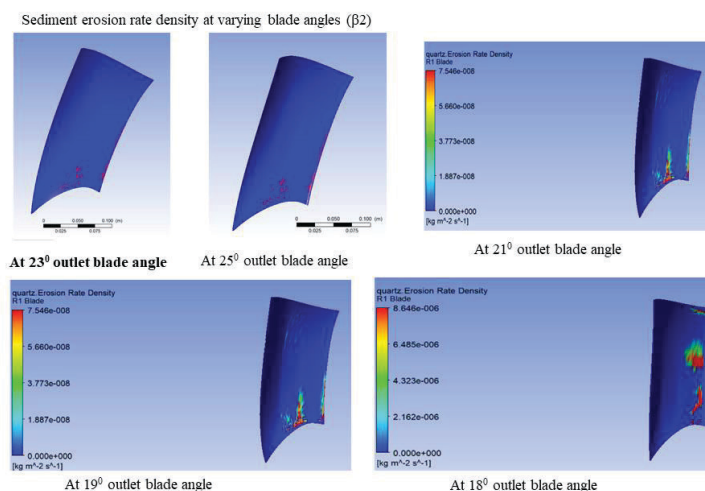


Fig: Sediment erosion rate density at varying blade angle

DESIGN AND FABRICATION OF SOLAR UPDRAFT WIND TURBINE

Group Member: Abhar Bhattarai, Erica Tamang, Surath Mahat

Supervisor's Name: Dr. Bivek Baral, Professor

Email Address: tmgerica9841@gmail.com

Cost: NRs. 3330.00

Abstract:

This project works in the utilization of solar thermal energy to heat up air and thus drive a turbine by generating a collective updraft. It is aimed to fabricate a solar updraft wind turbine as to gain theoretical and practical experience of making a small and less expensive prototype plant which can be built on areas where solar thermal can have a greater scope than solar PV. The solar updraft tower is a non-concentrating solar thermal technology, which employs both solar and wind energy to operate. The plant essentially consists of three basic parts: a large greenhouse collector, which surrounds a tall chimney, and a wind turbine geared to a generator at the base of the chimney. The collector converts solar radiation into thermal energy by means of greenhouse effect, to heat the air beneath the collector subsequently: the heated air is converted into kinetic energy in the chimney to drive the wind turbine to produce power.

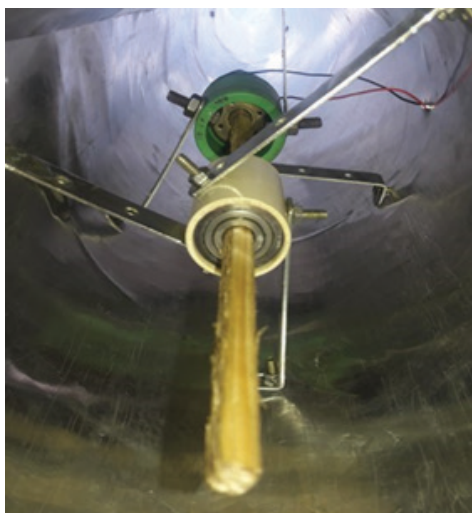


Fig: Shaft Connected to Generator inside the Tower

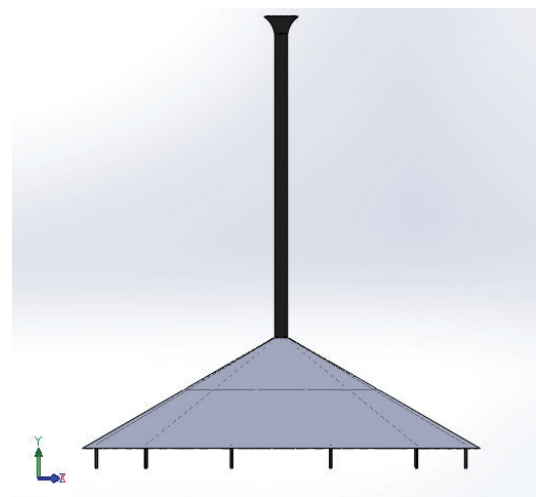


Fig: CAD Design



Fig: Turbine Connected to shaft

DESIGN AND FABRICATION OF PROTOTYPE MODEL OF REGENERATIVE BRAKING SYSTEM

Group Member: Ayush Shrestha, Bikash Mehta, Rashbin Lamichane, Santosh Adhikari

Supervisor's Name: Mr. Hari Dhakal, Lecturer

Email Address: beekashmehta@gmail.com

Cost: NRs. 5940.00

Abstract:

Electrical vehicles use the concept of regenerative braking system. The development in automobile fields leads to various innovations. Recent development in the automotive sector mainly focuses on energy conservation. Reduction of fossil fuels is one of the prime target set by the automobile companies. Nowadays electrical vehicles are slowly replacing the conventional fuel powered vehicles. The regenerative braking system is an energy recovery mechanism. In contrast to the old braking system in which all the kinetic energy was lost due to friction in the form of heat, the regenerative system uses motors as generators to produce energy which can be later used for the vehicle. As a whole this makes it more efficient than the conventional braking system.

Regenerative braking promises significant gains in town driving since 62.5% of energy is dissipated in the Metropolitan cycle due to frequent braking. If all brake energy could be regenerated with no loss in the regenerative system, fuel consumption would be improved by 33%. Alternative sources state that the addition of regenerative energy storage systems to motor vehicles can achieve theoretical fuel savings of up to 23% in a 1600 kg vehicle on a level road urban driving schedule. Our regeneration system aims to use both of these works and convert such mechanical work into electrical energy.



Fig: Fabricated Product

DESIGN AND FABRICATION OF ROVER FOR EXPLORATION AND SAMPLE COLLECTION

Group Member: Lava Gurung, Manoj Mali, Nishan Sapkota, Vijan Bhandari

Supervisor's Name: Mr. Hari Dhakal, Lecturer

Email Address: nishan205566@gmail.com

Cost: NRs. 7000.00

Abstract:

The project presents the design and fabrication of rover for exploration and sample collection. The project mimics the mars rover that is already reaching the place beyond human reach. Rocker bogie mechanism i.e. six wheeled mechanism incorporated with a three axis robotic arm makes it an ideal bot for exploration where humans can't reach. A camera is also placed in the bot for image processing i.e. the bot is capable of recognizing objects. The main purpose of this project was to provide an efficient way for the extension of human hand and it gracefully completes the task.

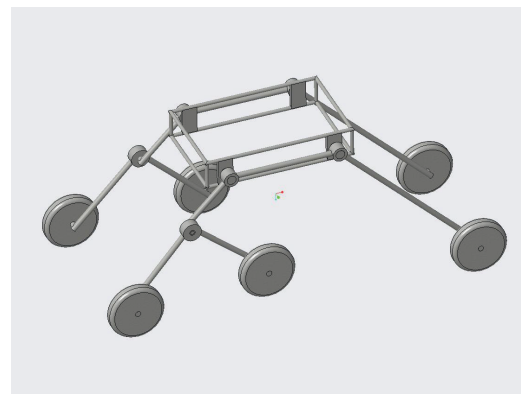


Fig: 3D Model of Rover

DESIGN AND FABRICATION OF PEDAL OPERATED RECIPROCATING PUMP

Group Member: Bhim Tiwari, Madan Kshetri, Siddhartha Bikram Shah and Tilak Raj Pant

Supervisor's Name: Dr. Daniel Tuladhar, Associate Professor

Email Address: prateekpant65@gmail.com

Cost: NRs. 5200.00

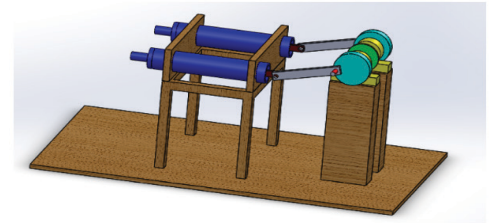


Fig: CAD Design

Abstract:

The development of an improved pedal powered water pump machine was undertaken with the intention of providing a simple cost solution to the problem of delivery of ground water with relatively less effort. This project analyzes the development of an improved pedal powered water pump for rural use. This development was prompted due to the need for pumping systems that does not use electricity as its power source is in under developed area. The system is composed of a reciprocating pump powered by pedaling. The pedal power is being transmitted to the pump via a chain drive. Based on this design, the pump has a cylinder bore of 56cm and a speed stroke of 60 stroke/minutes. The results of the test carried out showed that the pump discharge was $0.0016 \text{ m}^3/\text{s}$ at a head of 20 m using a driving torque of 29.5 Nm with estimated efficiency of 90% which is fairly a good result for a pedal operated pumping system. It can be used for irrigation and drinking water purpose. It is more productive operated pumping system and is time saving.

DESIGN AND FABRICATION OF WHEEL SPRAY PUMP

Group Member: Poshan Sah, Suman Thapa, Samip Timilsina

Supervisor's Name: Dr. Daniel Tuladhar, Associate Professor

Email Address: timi.samip@gmail.com

Cost: NRs. 5750.00



Fig: Wheel Spray Pump

Abstract:

Nepal is said to be an agricultural base country where directly or indirectly 75% of the people are dependent on farming. In this agriculture sector there is a lot of field work such as weeding, reaping, sowing etc. Apart from these operations, spraying is also an important operation to be performed by the farmers to protect the cultivated crops from insects, pests, fungi and diseases for which various insecticides, pesticides, fungicides and nutrients are sprayed on crops for protection. In today's world, one use many different spraying technologies using energies like electrical energy, solar energy, and chemical energy of fuels. Farmers are facing enormous problem while spraying the pesticide like tank capacity is very small, high cost and spaying time taken more. In order to reduce problems, different type of sprayers has been introduced in the market, but these devices do not meet the specified problems or demands of the farmers. To solve these difficulties we worked on a new equipment that is automatically operated wheel driven sprayer. It is a portable device which is easy to move and spray the pesticide. This motor driven pesticides spray equipment consumes less time and achieves uniform nozzle pressure. Also consist the crank mechanism with piston pump which is driven by the motor. The aim of making this type of Automatic Wheel Spray Machine is to develop a low cost automatically operated spray pump for Nepali middle scale farmers and to make spraying process easier and faster.

DESIGN AND FABRICATION OF ELECTROMAGNETIC BRAKING SYSTEM INCORPORATE WITH ELECTRONIC BRAKE FORCE DISTRIBUTION

Group Member: Nitesh Kumar Yadav, Nitu Shrestha, Sujan Shrestha, Suman Bikram Bam

Supervisor's Name: Dr. Daniel Tuladhar, Associate Professor

Email Address: ynitesh2071@gmail.com

Cost: NRs. 6700.00

Abstract:

This project mainly focuses on the analysis and design of Electromagnetic Brakes when coupled with Electronic Brake force distributor. The objective of our project is to come up with a Electronic Braking System with EBD prototype that can be operate by the help of microcontroller to provide appropriate amount of brake force the brakes automatically at the instance required without driver input. EBD are till now being employed in vehicles with ABS to prevent the accidents. Electromagnetic brakes are used to apply the brakes automatically. Microcontroller is used to control the motion of brakes and motor at the time of braking. Microcontroller gets signal about the distribution of load over the vehicle and provides required amount of braking force to rear and front wheels resulting in effective and efficient braking. The aim of making this type of braking system with EBD is to check how EBD reacts when combined with Electromagnetic brakes and prevent the possible effects of accidents caused due to insufficient amount of brake force required to stop vehicle. It is anticipated that this will be an efficient system if tested successfully in automobiles, helping to prevent the loss of life and property.



Fig: Fabricated system

DESIGN AND FABRICATION OF PEDALPOWERED WASHING MACHINE WITH AGITATING WASH CYCLE AND RINSE CYCLE

Group Member: Akriti Belbase, Bikash Sharrf, Manisha Upreti, Parash Jung Karki, Prashun Acharya

Supervisor's Name: Mr. Chiranjeevi Mahat, Lecturer

Email Address: aakritibelbase123@gmail.com

Cost: NRs. 6050.00

Abstract:

This project deals with the design and fabrication of pedal powered washing machine with agitating wash and rinse cycle. In commercialized washing machine when motor turns into one direction only agitator agitates while when it turns into another direction both agitator and the bucket rotates in same direction. Though the washing machines that we use nowadays are much efficient but, they also bring several demerits in our daily life. They are expensive during the time of installation and consume a lot of electricity. Thus this washing machine will be simple, effective, and easy to maintain and will operate similarly to commercialized washing machine. The agitating motion during the wash cycle is transcribed by using cross belt pulley mechanism. This model can be widely used in remote places. This product is an alternative to the hand washing method with the features of commercialized washing machine. This pedal powered washing machine has agitator that agitates which makes it different from previously designed machines.



Fig: Fabricated Product

DESIGN AND FABRICATION OF MECHANICAL FOOTSTEP AND TREADMILL POWER GENERATOR

Group Member: Abhishek Paudel, Atul Pandey, Bidur Aryal, Pranabh Regmi, Samrat Khanal

Supervisor's Name: Dr. Krishna Prasad Shrestha, Assistant Professor

Email Address: pranabhregmi@gmail.com

Cost: NRs. 9700.00

Abstract:

The main idea of the project is to create two fully functional power regeneration models that can be attached to two special equipments. When carrying out the "Power Regeneration" concept and applying it, it is important for the team to know what type of environment to work in. As most of the energy applied goes to waste in the gym where people come to work out and use mechanical energy however it is not converted into other forms of energy. Thus, the project aims to use two of the most common gym equipment and convert it into a working model that converts mechanical energy into electrical energy. The equipment of choices are Gym bench and treadmill. The gym bench or 'The footstep Generator' uses gears to transfer power and convert mechanical energy into electrical energy and the treadmill generator uses the pulley system. The projects aims to create enough energy to charge at least a mobile phone and at maximum a laptop.



Fig:Treadmill Power Generator

DESIGN AND FABRICATION OF MANUAL BRICK MOLDING MACHINE

Group Member: Bishwash Neupane, Milan Pathak, Mukunda Adhikari, Nikhil Thapa

Supervisor's Name: Mr. Gokarna Paudel, Instructor, KU TTC

Email Address: bishwash.neupane@student.ku.edu.np

Cost: NRs. 5000.00

Abstract:

In an attempt to improve the production of clay bricks for housing and general construction purposes, we came up with an idea of designing and fabricating a manual brick molding model. The model that we developed works utilizing the concept of multiple lever mechanism. The model consists of different parts like hopper/feeder, wooden frame, conveyer belt, press, and multiple lever mechanisms. The materials selected to make the above mentioned parts are locally available ones like mild steel, seasoned wood, sheet metal, pipes and so on. The main target of this model is to form the required shape of brick which will be sent later to the kiln for baking. Water is added in required amount to the clay after sieving to form a paste. The paste is passed to the conveyer belt through feeder and conveyer belt takes the paste up to the press where the paste is pressed using manual force with the help of press. The production is continuous and the die is made in such a way that it produces three bricks per press and it just takes few seconds to do so which means that this model can be used for mass production. The model helps to reduce the human effort while making the brick and also increases the production of quality bricks. It is easy to operate, small in size and is portable.



Fig: Fabricated Model

DESIGN AND FABRICATION OF BIONIC PROSTHETIC ARM

Group Member: Anish Shah, Basista Basnet, Sagar Shrestha, Sailesh Bhatta, Santosh Thapa Magar

Supervisor's Name: Mr. Prathistit Lal Shrestha, Assistant Professor

Email Address: sagsth15@gmail.com

Cost: NRs. 48000.00



Fig: 3D Model showing the back of the hand

Abstract:

We have designed an anthropomorphic (consisting human characteristics), open source, light-weight and affordable prosthetic hand that can be controlled via electromyography (direct impulse from brain) designed for use by people with transradial (below the elbow) amputations in low income countries. The hand uses mostly locally found materials and can be easily reproduced using rapid prototyping techniques such as 3D printing. It has both qualitative and quantitative features comparable to that of commercial prosthetics but will cost extremely less. It will be designed to be functionally and aesthetically natural while optimizing the performance and features.

30 million amputees are found to be living in low-income countries, 80% of whom cannot afford commercial prosthesis. For people having transradial amputation, lack of a prosthetic is a major disability that affects their quality of life. They need an affordable, easy to use, natural looking and high performance prosthetic arm which is the exact purpose of our project.

DESIGN AND FABRICATION OF WIND TURBINE WITH MAGNETIC LEVITATION

Group Member: Amit Prasad Singh, Abhishek Subedi, Ishan Tamrakar, Shrayas Pradhan

Supervisor's Name: Dr. Krishna Prasad Shrestha, Assistant Professor

Email Address: ishantamrakar24@gmail.com

Cost: NRs. 5925.00

Abstract:

The project features a modified design of Savonius blade, and an innovative design of a wind turbine with magnetic levitation. A Computer Aided Design (CAD) tool was used to make a design of basic turbine rotor on the basis of standard blade of Savonius. Taking guideline of the Savonius turbine design and simulation done by the respected authorities, we studied to understand the characteristics of a Savonius rotor, and obtained its pressure profile when subjected to a wind flow.

A design and calculation based on the Savonius turbine blade was carried out to list the performance of the newly designed blade under different conditions.

After fabricating the turbine and analyzing the results, we concluded that wind turbine with magnetic levitation does show a better performance on all fronts. Not only is it more efficient for the same cost, but it is more accepted for small scale electricity generation.

This design of wind turbine can be used in windy rural areas such as Mustang, Nepal for small scale electricity generation.

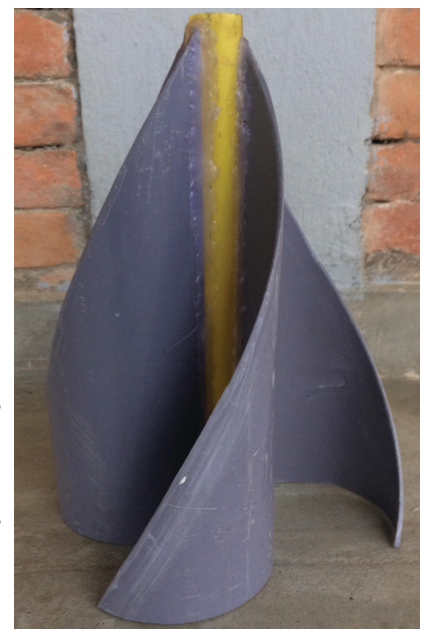


Fig: Picture of fabricated turbine blades using PVC pipes

DESIGN AND FABRICATION OF GENEVA BASED AUTOMATIC PUNCHING MACHINE

Group Member: AkleshTeli, Jitendra Khadka, Kapun Kumar Nayak, Prem Bahadur Chhetri, Santosh Yadav, Shekh Kalam Husain.

Supervisor's Name: Mr. Chiranjeevi Mahat, Lecturer

Email Address: aklesh.gupta123@gmail.com

Cost: NRs. 5000.00

Abstract:

Manual Paper punching process can be tedious and time consuming so with use of Geneva based punching mechanism, job setting time can be reduced and the manual work is also reduced by automatic feeding of paper for punching. The Geneva Mechanism gives the intermitted linear reciprocating motion from the rotatory motion of cam drive which helps in the punching of paper at exact interval of time and distance. The paper punching machine uses the arrangement of cam drive which has a slot to rotate the Geneva wheel. The Geneva wheel is attached with sprocket with the help of shaft and as the sprocket rotates the roller on the lower base consisting of sprocket which is connected by chain arrangement also sets in motion which helps for feeding of paper for punching process and the punching is done by punching machine which is in arrangement with cam drive with linear reciprocating motion of connecting rod.



Fig: Automatic Punching Machine

STUDY DESIGN AND FABRICATION OF ENERY STORED ELECTRIC COOKING STOVE (ESECS)

Group Member: Dhruba Nanda Regmi, Sandesh Rana

Supervisor's Name: Dr. Sunil Prashad Lohani

Email Address: smagar275@gmail.com

Cost: NRs. 10090.00

Abstract:

ESECS is a heat storage cooking stove which can be used for cooking when there is no electricity. It can be very useful for cooking in the place where is no source of electricity. It is smokeless. Moreover, we can do charging and cooking both at the same time. After it is fully charged, it can be used for cooking hours later for cooking another meal. Grey cast iron (Specific heat capacity 490 J/KgK) plate is electrically heated by Nichrome wire (Resistivity $1.10 \times 10^{-6} \Omega m$) where the heat is stored. The plate is insulated by different layers of insulators: Fire clay, Glass-wool and Asbestos.



Fig: Pictorial representation of ESECS

DESIGN AND TESTING OF SMALL SCALE COLD STORE

Group Member: Maulik Man Maharjan, Suman Poudel, Yaman Joshi

Supervisor's Name: Mr. Malesh Shah, Lecturer

Email Address: Yamanjoshi90011@gmail.com

Cost: NRs. 29498.00

Abstract:

A study conducted by the Solid Waste Management Technical Support Centre (SWMTSC) estimates 65 percent of household waste is organic in Nepal, mainly food waste of which 20 to 30 percent is due to bad storage condition. Addressing this issue of food loss due to bad storage conditions, our team came up with a project, which uses basic heat exchange processes to make an energy efficient storage unit. The project mainly consists of an underground network of pipes and evaporative cooler. Heat exchange takes place at the Earth Air Tunnel (underground network) by basic heat exchange process and at the evaporative cooler by the process of evaporative cooling. The system uses air as refrigerant and cools it to almost 15°C, which is sufficient to store vegetables and fruits for some days. With, further improvisation and better fabrication tools and techniques the efficiency of the system can be increased as theoretical calculations of the system shows the minimum cooling temperature of about 10-12 °C. The system is efficient in terms of power consumption than any of the other storage system for similar purpose as the power consumption can be reduce by 30-70%. A similar setup can also be used for air conditioning. This kind of system can be constructed under minimum supervision so it can be aimed to benefit a larger group of people.



Fig: Pictorial Representation of Earth Air Tunnel

DESIGN AND FABRICATION OF ULTRA LOW HEAD TURBINE FOR HOUSEHOLD PURPOSES

Group Member: Gyatabya Singh, Navin Bhatt, Prabesh Ojha, Sakar Bhattarai, Saroj Basnet.

Supervisor's Name: Mr. Ram Lama, PhD candidate, KUTT

Email Address: gyatabyasingh09@gmail.com

Cost: NRs. 4340.00

Abstract:

Ultra low head (ULH) turbine is the subject of this research which is suitable for small heads, discharges with little variability, is easy to manufacture and costs less.

It works on the principle of static pressure difference. Reason of the study was the ever increasing energy demand and the adequate amount of water resources in our country that has not yet been utilized in spite of having a high potential. The majority of very low head hydropower installations can be done on natural or man-made rivers and canals with little or no water storage capacity. It can be efficiently installed on those places where it is difficult to supply grid electricity. A working model was prepared from different mechanical processes and tested in Khowpasi.



Fig: Final fabricated product

DESIGN AND FABRICATION OF PICO-KAPLAN TURBINE

Group Member: Aasma Bhattarai, Bishal Humagain, Bishwash Gautam, Prashant Kunwar

Supervisor's Name: Mr. Dadi Ram Dahal, MS candidate, KUTTTL

Email Address: hmgm.bishal11@gmail.com

Cost: NRs. 4553.00

Abstract:

Kaplan turbine is a propeller type water turbine which is designed for low head water and high flow rate applications. It is an axial-flow turbine, which means that the flow direction does not change as it crosses the rotor. The main objective of the project was to study and fabricate a Pico Kaplan turbine. Affordability of the Pico hydro system at the household level (less than NRs.10000.00), can be manufactured locally at a small industrial scale and can optimally operate under conditions with 2 m head are the significance of fabrication of this project. This kind of turbine can be used in the plain region if energy is to be extracted from the water sources. This helps in the rural electrification and decentralized units in community, reducing the cost of construction of national grid and also to its dependency, in already aggravated crisis situation.



Fig: Pedal powered rope pump

DESIGN AND FABRICATION OF PEDAL POWERED ROPE PUMP

Group Member: Pawan Lal Bijukchhe, Prashant Raut, Prashrit Sapkota, Pratik Shrestha, Salim Maharjan

Supervisor's Name: Mr. Nirmal Acharya, Research Associate, KUTTTL

Email Address: salimmaharjan0123@gmail.com

Cost: NRs. 5353.00

Abstract:

This project is aimed for the design and fabrication of pedal powered rope pump which can be helpful in remote places of Nepal facing difficulty in irrigation. As rivers run below the level of many crop fields and due to unavailability of water lifting devices, people irrigate their lands using traditional ideas like throwing water to lands using buckets. Also, some areas have wells, but pumping water is done only on a primitive pulley system or rust affected piston pumps. To replace these primitive pulleys and as a solution for easy irrigation, rope pump can be used. The fabricated model uses materials like PVC pipes, PPR pipes, rubber seals and nylon rope. With a low cost of NRs. 5353.00 a complete working model of Pedal powered rope pump is fabricated which can lift water from a depth of 2m at a rate of 38.54 liters/minute possessing efficiency of 64.23%. Being easy to manufacture from locally available materials and easy to use, this kind of pedal powered rope pump can be an economical way for solving problems of irrigation in rural areas of Nepal.



Fig: Pedal powered rope pump

DESIGN AND FABRICATION OF GRAVITATIONAL WATER VORTEX TURBINE

Group Member: Indra Tamang, Manil Kayastha, Nirmal Kumar Subedi, Sandesh Tamang Ghising

Supervisor's Name: Mr. Atmaram Kayastha, Research Associate, KUTTL

Email Address: manilkayast@gmail.com

Cost: NRs. 9800.00

Abstract:

Demand of energy is ever increasing, especially in developing countries. Renewable energy such as hydropower has become one of the most demanded sources of energy because of its clean generation. Low head hydropower plant is demanded in area which cannot see grid extension due to difficult geographical terrain and other reasons. Gravitational water vortex power plant is one of such low head turbine in which the mechanical energy of free surface flowing water is converted to kinetic energy by tangentially passing the water to a basin, which forms a water vortex. The gravitation water vortex power plant is a type of micro hydro vortex turbine system which is capable of converting energy in a moving fluid to energy using a low hydraulic head of 0.7–3 meters (2 ft. 4 in–9 ft. 10 in). The technology is based on a round basin with a central drain. Above the drain the water forms a stable line vortex which drives a water turbine. This report consists of the fabrication of Gravitational Water Vortex Turbine. The main aim of this project is to fabricate a model of a Gravitational Water Vortex Turbine which can be a basis for installation in various places.



Fig: Gravitational Vortex Turbine

DESIGN AND FABRICATION OF SIMPLIFIED SUBMERSIBLE PUMP FOR LOW HEAD APPLICATION

Group Member: Raman Budhathoki, Ram Bishwas Yadav, Sabin Oli

Supervisor's Name: Mr. Atmaram Kayastha, Research Associate, KUTTL

Email Address: itsramanbudhathoki@gmail.com

Cost: NRs. 2500.00

Abstract:

A submersible pump (or sub pump, electric submersible pump (ESP)) is a device which has a hermetically sealed motor close-coupled to the pump body. The whole assembly is submerged in the fluid to be pumped. The main advantage of this type of pump is that it prevents pump cavitation, a problem associated with a high elevation difference between pump and the fluid surface. Submersible pumps push fluid to the surface as opposed to jet pumps having to pull fluids. Submersibles are more efficient than jet pumps. Common uses include water, sewage, petroleum and petrochemical pumping; a centrifugal fan is commonly used to implement a vacuum. The main aim of this project is to design and fabricate a model of a Simplified Submersible pump which can be a basis for installation in various places. We have calculated the theoretical power of the pump to be 0.0707 KW for the head of 2m and discharge of 0.037 liter/sec.

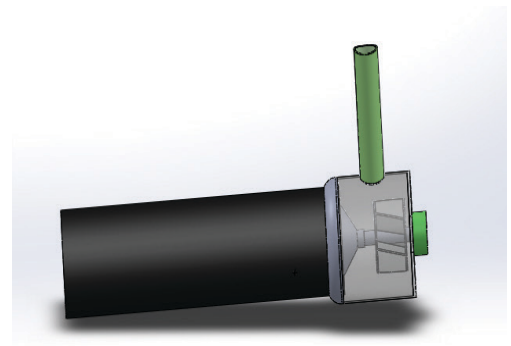


Fig: CAD Model of Simplified Submersible Pump

DESIGN AND FABRICATION OF UPDRAFT GASIFIER STOVE WITH TABLE TOP BURNER

Group Member: Arjun Prasad Awasthi, Chirag Byanjankar, Pradip Pandey, Rajan Prasad Mainali, Shuvas Khanal

Supervisor's Name: Dr. Bivek Baral, Professor

Email Address: pradipp.pandey@gmail.com

Cost: NRs. 6400.00

Abstract:

This report describes the Design and Fabrication of household sized Updraft Gas Stove with Table top Burner aimed to provide rural families with an alternative device for cooking. The stove basically is a top-lit updraft type (TLUD) which follows the principle of gasification converting the raw biomass fuel into combustible gases resulting into the luminous flame. The study mainly deals with the design and fabrication of stove. Design with the correct secondary air flow ensures combustion that allows high combustion temperatures and very low emissions (of carbon monoxide, particulate matter and oxides of nitrogen). With the effective thermal efficiency; this gasifier stove can be fabricated using locally available materials. Since the smoke and tar emission was found to be very minimal, it can be better alternative than the other traditional stove.



Fig: Gasifier Stove (TLUD)

DEVELOPMENT OF RADIATOR FOR HOT WATER BASED ROOM HEATING SYSTEM

Group Member: Arpan Koirala, Biplab Lamsal, Prabin Gaurav Chaudhary, Robin Koirala, Sunil Singh

Supervisor's Name: Dr. Bivek Baral, Professor

Email Address: Koiralarobin22@gmail.com

Cost: NRs. 10450.00

Abstract:

The desire of comfort in accommodation always been a quest in every human's life. Heating System is a solution to one of such quests. Room heating is a system to provide heat to the interior of a building (may be a portion or whole) from a single point of its operation. The main theme of Room Heating is to make a considerable change in the room temperature suitable for human accommodation. The main idea behind heating the room is to provide heat that suffices the total heat loss from the room. To visualize this concept in practice a radiator is required. Heated water is pumped to radiator via pipe network. Radiator loses heat of hot water through natural convection and promotes for room heating. Finally we were able to fabricate the radiator and meet all our objectives. Our Radiator with surface area of tube (0.187m^2) and overall heat transfer coefficient $366.206\text{ W/m}^2\text{K}$ was able to maintain 20°C room temperature when 80°C water was passed through the copper pipes. We added fins to increase the surface area. 0.07 m^2 area of fin was added for more efficient heat transfer.



Fig: Fabricated Model of radiator

DESIGN AND FABRICATION OF AUGER PELLET BOILER

Group Member: Akriti Thapa, Ananta Acharya, Sajol Bhandari, Shraddha Kuikel.

Supervisor's Name: Dr. Bibek Baral, Professor

Email Address: akriteethapa032@gmail.com

Cost: NRs. 2500.00

Abstract:

This project is dedicated to design an Auger Pellet Boiler. The design of the auger pellet boiler to be fabricated can be used with wood swarf or Lapsi seeds. The design outlet is expected to work for around 20 liters water capacity. Therefore, the Auger Pellet Boiler fabrication will allow us to reap the benefits of biomass energy and allow us to work on the improvement of these products. Moreover, this design in particular can be used in rural part of our country where locally designed biomass boiler can be replaced.

The project helped in the study and calculation of the theoretical efficiency of boiler and application of auger pellets boiler for space heating and power generation. This boiler may be the source of boiled water for thermal storage and central heating. Furthermore, what sets it aside from convention biomass boiler is, it is automatic.

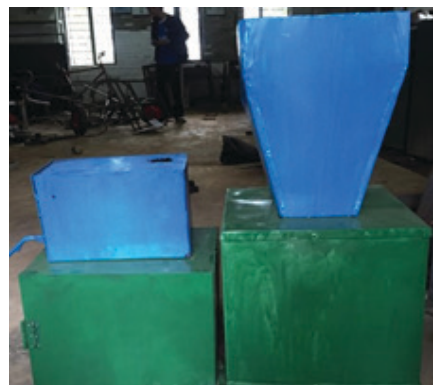


Fig: CAD Model of Simplified Submersible Pump

DEVELOPMENT OF SOLAR POWERED WATER EXTRACTOR FOR DRINKING PURPOSE FOR MOUNTANIOUS REGION OF NEPAL

Group Member: Aayam Chaulagain, Prabin Nepal, Sagar Suwal, Shreya Acharya, Sudeep Homagain

Supervisor's Name: Mr. Bijendra Shrestha, Lecturer

Email Address: acharyashreya14@gmail.com

Cost: NRs. 6900.00

Abstract:

A water extractor is a device that extracts water from humid ambient air. Water vapor in the air is condensed by cooling the air below its dew point, exposing the air to desiccants, or pressurizing the air. The air from the atmosphere is drawn inside the copper pipe by the help of the blower which is then circulated to the copper pipes that is installed 6 feet below the ground in order to reach the dew point temperature. The air circulating the copper pipe once reaches the dew point temperature starts to condense to form water droplet which is then collected into the container which is fitted at the end of the copper pipe coiled like an evaporator.

The technology of water extraction from atmospheric air is still at an early stage compared with other systems such as water distillation. Collecting dew is still a viable option to get water from air, however, the application of dew collection is restricted by the availability of dew. Installing the system on condition of appropriate relative humidity and temperature can reach up to the goal of extracting clean fresh drinking from the atmosphere.



Fig: Air Water Extractor Underground Installation

FABRICATION OF CIRCUIT BASED AUTOMATIC BIKE STAND

Group Member: Aashish Shrestha, Aayush Adhikari, Ajay Kumar Shah, Aami Rana, Eliza Sapkota, Krishna Kumar Gupta

Supervisor's Name: Mr. Bir Sundhar Thapa, Senior Researcher, KUTTC

Email Address: elizashapkota@gmail.com

Cost: NRs. 1800.00

Abstract:

The side stand is used for supporting a parked motorcycle. If the rider may forget to retract the side stands before riding, then the undistracted stand hitting the ground will affect the riders control during the turn. Considering this problem we finalized this project. The use of electric circuit to make automatic bike stand is the best and simple mechanism to prevent such existing problems in motorcycle. This mechanism consists of DC motor powered by motorcycle battery and different electronic components. We used push buttons to send electric signal to relay, relay to activate the DC motor in order to lift the stand and limit switches to cut the power supply to the motor in order to reverse direction of stand. This is the simplest method and can be suitable for all automobile similar to motorcycle. Our main objective of this project is to be able to learn fabrication arts and mainly to bring change in existing side stand lifting mechanism.

FABRICATION OF GIMBAL BASED ON THE PRINCIPLE OF CENTRE OF GRAVITY

Group Member: Ashim Khanal, Barun Nepal, Narendra Chaudhary, Navaraj Adhikari, Sanskar Gautam, Snehraj Kaphle

Supervisor's Name: Mr. Pratisthit Lal Shrestha, Assistant Professor

Email Address: gsanskar48@gmail.com

Cost: NRs. 4338.00

Abstract:

With the progress of time, there has been invention of things, which people living before us could not have had imagined. Among them, Gimbal is one. Gimbal is a device for keeping an instrument such as compass or chronometer horizontal in a moving vessel or aircraft, typically consisting of rings pivoted at right angles. The main objective of the project is to make small handheld prototype to support mobile photography and videography. Based on the principle of centre of gravity, this project is weight dependent as per the use of mobile phones and its weight. The project is a fabrication based project whose motive is to fabricate the Gimbal.



Fig: Fabricated Gimbal

FABRICATION ON SPROCKET BASED AUTOMATIC SIDE STAND RETRIEVING SYSTEM

Group Member: Abhishek Karki, Anup Nagarkoti, Bibek Karki, Bishnu Pandey, Satyam Shah, Thangsang Thapa Magar

Supervisor's Name: Mr. Hari Dhakal, Lecturer

Email Address: b91814411@gmail.com

Cost: NRs. 3500.00



Fig: Stand-on Position

Abstract:

In modern developing world, automobile plays important role especially two wheeler i.e, (motorcycles & bikes). Even though they are helpful there are some sad events like accidents due to carelessness of rider. Many accidents occur because of the side stand not being lifted in case of riders.

The new system "AUTOMATIC SIDE-STAND RETRIEVE SYSTEM" is to be designed based on the working principle of bikes. Since all bikes transmit power from engine to rear wheel by means of chain drive. So, the design setup is to be kept in between chain drive, then setup (Sprocket) rotates and side stand get retrieves automatically. The initial test were taken out with success.

DESIGN AND FABRICATION OF MAGNETIC SUSPENSION POWER GENERATION

Group Member: Anuja Shrestha, Ashish Sharma, Prajwol Joshi, Rohit Kumar Ray, Rounak Lal Shrestha., Subash Neupane

Supervisor's Name: Mr. Pratisthit Lal Shrestha, Assistant Professor

Email Address: sthaanuja01@gmail.com

Cost: NRs. 500.00



Fig: Magnetic Suspension Power Generation

Abstract:

The project comprises of prototype based upon Faraday's law of electromagnetic induction. The prototype consists of a ring and a disc magnet along with PVC shaft and cylinder. We saw the loss of energy in some linear jerking motion so felt the urge to extract the energy lost in such motion. We have used our idea and consulted properly to make our model. During the time of this model build up, the basics of fabrication and some of the machines used in fabrication were learned.

FABRICATION OF SAND SIEVING MACHINE

Group Member: Abishek Ghimire, Anmol Sagar Tamrakar, Arjun Kumal, Dipendra Raj Giri, Sankhar Aryans, Sunil Pandeya

Supervisor's Name: Mr. Chiranjeevi Mahat, Lecturer

Email Address: abishekghimire00@gmail.com

Cost: NRs. 5000.00

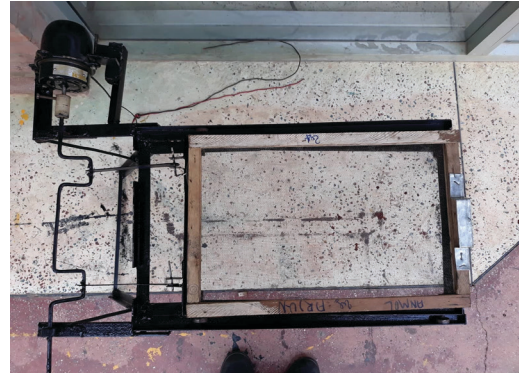


Fig: Sand Seiving Machine

Abstract:

Sand sieving machine is the extended form of simple sand sieving machine that we usually see in the construction work but it is automated and uses AC current instead. A lot of people work together with great effort to do simple construction work.

This machine reduces the human effort and it is cost effective by decreasing no. of manual workers thus decreasing wages to be paid. If more finishing is done and made ready for commercialization then it will make a huge impact on the speed of construction based projects. This project just uses simple mechanism of changing rotational motion into linear motion. AC motor is responsible for rotational motion which is powered by AC current thus making it semi-automated. In this way by using simple mechanism this machine can reduce no. of labors in huge amount if this machine is duplicated and made available in many construction sites. The conclusion is it separates residues greater than 3mm which is pretty much effective for general construction being carried out in our country. It is effective from other similar project being carried out because of its low cost and its light weight. Also it can be operated manually through a handle directly joined to the shaft.

STUDY AND FABRICATION OF SOLAR THERMAL DRYER

Group Member: Abhisek Neupane, Dikshant Shrestha, Dipendra Karki, Parth Singh Devkota

Supervisor's Name: Mr. Niranjana Bastakoti, Lecturer

Email Address: dikshant.stha@gmail.com

Cost: NRs. 5290.00

Abstract:

A study conducted by the Solid Waste Management Technical Support Centre (SWMTSC) estimates 65 percent of household waste is organic in Nepal, mainly food waste of which 20 to 30 percent is due to bad storage condition. Addressing this issue of food loss due to bad storage conditions, our team came up with a project, which uses basic heat exchange processes to make an energy efficient solar thermal dryer. The project mainly consists of a glass covering the storage unit to allow the light to enter and be absorbed and be converted to heat energy. The inside of the storage unit is painted black to it can absorb 90 percent of the light and only allow 10 percent of the light to be reflected. This project is relatively cheaper and can be constructed under minimum supervision so it can be aimed to benefit a larger group of people.

STUDY AND FABRICATION OF RECIPROCATING PUMP DRIVEN IRRIGATION SYSTEM

Group Member: Anan Ghimire, Asha Chalise, Ashim Lamichhane, Kapil Lamichhane, Kshitiz Koirala, Samjhana Karki

Supervisor's name: Mr. Malesh Shah, Lecturer

Email address: kshitizkoirala5@gmail.com

Cost: NRs. 5020.00

Abstract:

Solar energy is a perpetual source of energy which means that it never runs out. Therefore, in the century when energy consumption is at its utmost but the sources are limited, the researches on maximum utilization of solar energy are at its maximum. Keeping in mind the current need of energy utilization, this project was undertaken with the motive of using the wasted energy as a source for of a Solar reciprocating pump used in vertical gardening and other purposes.

The spectrum of solar energy is quite wide and its intensity varies according to the timing of the day and geographic location. Therefore, in the century when energy consumption is at its utmost but the sources are limited, the researches on maximum utilization of solar energy are at its maximum. Keeping in mind the current need of energy utilization, this project was undertaken with the motive of using the wasted energy. Under this project, reciprocating pump is joined with wiper motor of 12 volt and the motor is then connected to battery of 12volt. The battery is charged with solar panel of 10 watt. The energy is periodically added to generate flow. It is used in application where low discharge is required at high pressure. The collector was then connected to a storage tank. The water in the storage tank was circulated to vertical garden through the pump. The stand of solar panel and vertical garden setup was fabricated.



Fig: Solar Water Heater

FABRICATION OF SOLAR WATER HEATER MODEL

Group Member: Aakash Karki, Dikendra Acharya, Rajendra Singh Dhami, Sachin G. Tandukar, Shishir Bhusal

Supervisor's Name: Dr. Bibek Baral, Professor

Email Address: rajendradhami07@gmail.com

Cost: NRs. 4700.00

Abstract:

Solar energy is a perpetual source of energy which means that it never runs out. Therefore, in the century when energy consumption is at its utmost but the sources are limited, the researches on maximum utilization of solar energy are at its maximum. Keeping in mind the current need of energy utilization, this project was undertaken with the motive of using the solar energy for heating water for household purpose. Under this project, a Solar Flat Plate Collector was insulated and then connected to water storage tank through pipes and Thermosiphon effect is applied while the water is heated. The water in the storage tank is circulated back to the Flat Plate Collector in order to increase efficiency. Finally, we can obtain hot water from storage tank.



Fig: Solar Water Heater

STUDY AND DEVELOPMENT OF PARABOLIC CONCENTRATED SOLAR POWERED STIRLING ENGINE

Group Member: Dhadkan K.C ,Kamal Gautam, Nitesh Kumar Mehta, Pradeep Aryal, Saugat Upreti, Sundar Shrestha

Supervisor's Name: Mr. Malesh Shah, Lecturer

Email Address: kamalgautam643@gmail.com

Cost: NRs. 2600.00

Abstract:

Around 80% of total energy consumption in the world is served by fossils fuel. But we hear a lot about environment pollution, global warming, various impacts on living beings due to burning of fuels and even fluctuations in price every year. Thus, to address this problem, every country is working on development renewable energy. Conversion of solar energy to mechanical energy is major outcome of this project, which will ultimately give rise to energy conservation.

Solar energy can be converted into thermal energy with the help of different types of concentrator. In this project, we have used a parabolic concentrator with aluminum foil which gives power of 7 kW in a day. Further this power is used to operate a stirling engine of gamma configuration with theoretical power of 5.54 watt. This power can be increased by increasing temperature difference, minimizing dead space, optimizing phase angle and so on. Though the power is less, solar powered stirling engine can be very much significant for mechanical and electrical purpose in rural areas in upcoming days. Also, it is useful for utilizing waste heat and supports for pollution free environment.



Fig: Solar Powered Stirling Engine

FABRICATION OF PICO HYDRO PROPELLER TURBINE

Group Member: Ajaya K.C, Ayam Sapkota, Manish Parajuli, Prabesh Bhattarai, Sandesh Karki, Sanid Dahal

Supervisor's Name: Mr. Atmaram Kayastha, Research Associate, KUTTIL

Email Address: saniddahal2@gmail.com

Cost: NRs. 2500.00

Abstract:

Our project is a pico hydro propeller turbine with the scope of generating 5-10 watt of electrical power. The fabrication and designing of the runner was the main focus of the project. The project turbine is meant to work on low heads and high flow rates as of its type. It can be useful for low power generations in areas with less density. This project was created to understand Kaplan designs and be more familiar with reaction turbines. The turbine was fabricated with very basic materials like iron plates and cylindrical iron pipes from the junkyard. The proper turbine setup was created and tested in the rig to calculate the output power and efficiency. The project was chosen to understand more about the type of turbines that can be more useful in our country. These pico hydro propeller can be installed in rural areas even without high head water supply and can be used to generate small amount of electricity for feasible households.



Fig: Runner

FABRICATION OF PICO HYDRO PROPELLER TURBINE

Group Member: Bibek Aryal, Prithivi Gurung, Rakish Shrestha, Samman Singh Pradhan, Subarna Paudel, Sushobhan Bhattarai

Supervisor's Name: Mr. Dadi Ram Dahal, MS by Research, KUTTTL

Email Address: sushobanbhattarai336@gmail.com

Cost: NRs. 1290.00

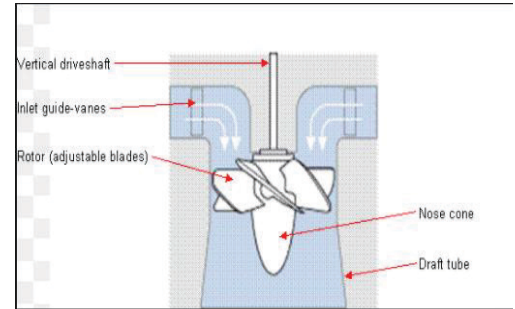


Fig: Overview of Propeller Turbine

Abstract:

This project "Pico Hydro Propeller Turbine" is a reaction turbine modeled to run and produce around 10 watts of electricity. This project is significant in those rural areas which are not connected to national grid system and containing a readily available water source to produce electricity enough to light a room. Due to the property of less technical difficulty and cost effectiveness, the project can be beneficial. The main aim of the project is to fabricate a model of a Pico Propeller turbine and its successful testing.

The project is carried out with the basic fabrication processes like cutting and fitting of different parts of runner and assembling fabricated runner with draft tube (Penstock). The runner components are made 3 pieces of blade exhaust fan and welded at around 36° to a 1.25" steel pipe (Hub). This runner is fitted to a shaft of 80cm by using nuts and washer welded on it. The runner is aligned by two bearings: one on wooden support attached on top of the casing; and other inside. The testing is done by the help of the test rig setup that delivers a head of 1.25m. Upon testing, the turbine achieved an output of 1.23 watts, which differed from our goal to generate 10 watts of electricity.

FABRICATION OF PICO HYDRO PROPELLER TURBINE

Group Member: Biplov Acharya, Sujan Adhikari, Asrut Aryal, Niraj Jaiswal, Kausal K.C., Saroj Shrestha

Supervisor: Mr. Ram Lama, PhD Candidate, KUTTTL

Email Address: biplov619@gmail.com

Cost: NRs. 555.00



Fig: Runner

Abstract:

Due to deficiency of power generation, most of the rural areas are suffering from electricity throughout the day for their household appliances. This project describes the design and development of Pico-hydro generation system using irrigation water reservoir supply in farm and other similar water sources.

In this project, we fabricated a Pico hydro propeller turbine. First of all we designed the turbine, collected materials for fabrication and fabricated it.

After completion of fabrication of turbine, we tested it in test rig. As a result this turbine is able to generate few watts of power which may solve electricity problem in some extent in rural areas of Nepal.

STUDY AND FABRICATION OF SOLAR PV DEMONSTRATION SETUP

Group Member: Pramod Acharya, Kokish Karan Bhusal, Arun Regmi, Debesh Sharma, Asim Upreti

Supervisor's Name: Mr. Malesh Shah, Lecturer

Email Address: sharmadevesh56@gmail.com

Cost: NRs. 3923.00

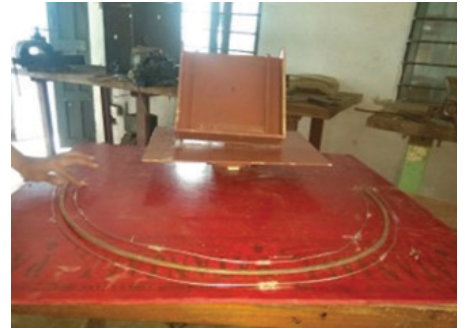


Fig: Fabricated Setup

Abstract:

This project describes a demonstrative model of a solar panel manual tracker with source placed in order to perform experiments on it and measuring the respective output. This project fabricates a demonstrative model such that it mimics the sun, the panel and the surroundings.

This project describes a demonstrative model of the solar panel inclination system so that the people can incline the panel in such an angle that a maximum output is gained from the solar panel. Due to lack of knowledge on the proper inclination of solar panel, the maximum output to be obtained from it is not available or produced. It will basically guide towards a relative inclination and will also show the highest part of the day when the solar radiation is at peak.

After completion of this project, the setup was tested as to observe the inclination factor affecting the output of the panel and somehow the minimal degree for the inclination of solar panel was obtained.

DESIGN AND FABRICATION OF IN-PIPE SPHERICAL TURBINE

Group Member: Ashal Lama, Jeewan Prakash Bhatt, Nishan Thapa Magar, Rahul Subedi, Sangit kattel

Supervisor's Name: Mr. Pawan Karki, Lecturer

Email Address: ashallama64@gmail.com

Cost: NRs. 3400.00



Fig: Final Assembly

Abstract:

The project focuses on the hydrokinetic turbine in the context of Nepal. The project deals with the design approach for hydrokinetic turbine and the fabrication of the prototype for demonstration purpose. Hydrokinetic turbine can be installed in free flow environment like rivers and in the country like Nepal, rich in water resources, consisting of 1000 rivers longer than 10 km, hydrokinetic turbine is best suited. The In-pipe spherical turbine is installed in gravity fed pipelines and is the clean and renewable source of energy which does not need the facility of damming. Each turbine can be installed in series producing the power in MW. Thus, the project acts as an introduction to the hydrokinetic turbine in case of Nepal. The turbine was tested in Roshi Khola, Panauti under four different flow condition and the maximum power was obtained at the velocity of 70 cm/s. After that with the increase in velocity there is decrease in power. It might be due to optimum tip speed ratio for the spherical turbine.

Word Jumble Puzzle

karsatcfnh _____

ucnpiolg _____

ucclth _____

oerutq _____

nptoel _____

aergiatnr _____

ruttnulbe _____

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ने. गुण-४५



Journey After This

Worked so hard for four long years so NOW WHAT?!

Trying to remove the confusion by sharing some experiences Aviyantaa team was in conversation with three successful KUians from different work field. Here's what they have to say.

What is the difference between academic and the real work life?

Academics are foundation to sustain in real life. Being student our decision affects us whereas, in real work life there are hundreds of people who will be affected by our decision.

What do you think are some qualities that the graduates of Kathmandu University have or lack as compared to graduates of other universities?

We are one of the best graduate in Nepal with lots of potential stored in us. I feel one point that should be strengthen within us; superficiality on technical majors.

What are the range of fields and job positions that one can pursue after a bachelor's degree in mechanical engineering, according to your experience?

We can accelerate our career in; Project management, Maintenance, CAD/ CAM, Research, Mechanical Design, etc. Almost all the sector currently employs Mechanical Engineer; Industries, Hospital, Hydropower, Automobile, Engineering Fabricators, Labs, Academics, consultancies, Hotels etc. Above all, having an aim of becoming Job Creator then Seeker is always better.

What is your message for the fresh batch of pass out mechanical engineers?

Congratulations, you are now a member of most excepted engineering family. Your 4 years old dream, has come true. You don't need to do alot to be best, understand your job responsibility and always stick to it ethically. At work, never build sense of competition, there is no competitor, everyone is on their own and excels based on personal achievements. Best wishes and hope to work with you at some point of our career.

What is the difference between academic and the real work life?

Designing nuts and bolts is an academic life and finding practical ways to fasten nuts in site with limited resource is real work life. To be honest I faced both converging and diverging situations.

What do you think are some qualities that the graduates of Kathmandu University have or lack as compared to graduates of other universities?

Have -strong research background- advance soft skills (Documentation - Presentation); Lack - Drawing skills(for mechanical)

What are the range of fields and job positions that one can pursue after a bachelor's degree in mechanical engineering, according to your experience?

Only sky is the limit. From technical designer to critical thinking manager

What is your message for the fresh batch of passout mechanical engineers?

Have faith on yourself. You all have that *X* factor. World needs an engineer like you. So 'Er' is not just an extra thing that you add in your name, it's an added responsibility too. Work wisely.



Ravi Koirala
ravikoirala@gmail.com
Project Executive at Unilever Nepal



Sojan Prajapati (Batch: 2011)
prajapatisojan@gmail.com
Master Candidate in Power Technology,
Technical University of Munich, Germany

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Fact:

"The original Royal Enfield logo featured a cannon, with the slogan "Made like a gun, goes like a bullet".

Never argue with an engineer because arguing with Engineers is like killing the mosquito on your cheek, you might or might not kill it, but you'll end up slapping yourself. "The original Royal Enfield logo featured a cannon, with the slogan "Made like a gun, goes like a bullet".

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राष्ट्रिय संचार



The 2nd Year Project Journey

This is a story of opportunity and experiences; the story of the faith of a project group upon an idea, and the hard work that helped materialize it.

In 2016/17, for our 2nd year project, the five of us decided to work on the problem of irrigation for a rural community. Our project, titled "Development of River Water Pump for Rural Irrigation", taught us so much that we decided to pursue it for our 4th year project and our internship too. There is still so much we can learn from this project and even more work to do to improve it.

During our CEP tour to Charikot, we understood the real problems in the community there. The barren agricultural lands nearby river streams were quite surprising to us. On interviewing some members of the community, we came to know that the crop production had been decreasing because of difficulty in irrigation. People had to carry the river water to the agricultural land which was a tedious work. In order to solve this challenge, we brainstormed different possible ways to find a reliable solution and finally, decided on the idea of developing a water pump. We chose precise words that would serve to keep our focus intact, naming it "River Water Pump", and that's how this journey began.

We worked hard, reiterating the design until it was functional and fabricating it accordingly. We tested it and it worked very well!

We believed our project needed to be presented in "Hydropower products & Services Competition", under Hydro expo 2018. We registered at the last hour and yet got into the top 3! During Hydro-Expo days, I used to convince my project members saying that our project and a mechanical bicycle are analogous to each other. As there is still an existence of mechanical bicycles in today's augmented world, similarly, there is a strong possibility of existence of our project as well. I use these words to convince my friends even today.

Later this year, we presented it in the "2nd Nepal Youth Science Summit 2018" and got awarded with "Youth Scientist in Engineering Science Category". Oh how I remember spending those days! At least 30 minutes to make each slide and later compressing it from 30+ slides to 15, to match the guidelines.

Till date, I can think of only 2 reasons behind the success of this project. One: the diversely intellectual team members, with one covering the weakness of the other; and two: having a great person and a great engineer Nirmal Acharya as our supervisor, who understood our views and the challenges in the project. He has always been there to motivate and



Milan Shrestha (2015 Batch)

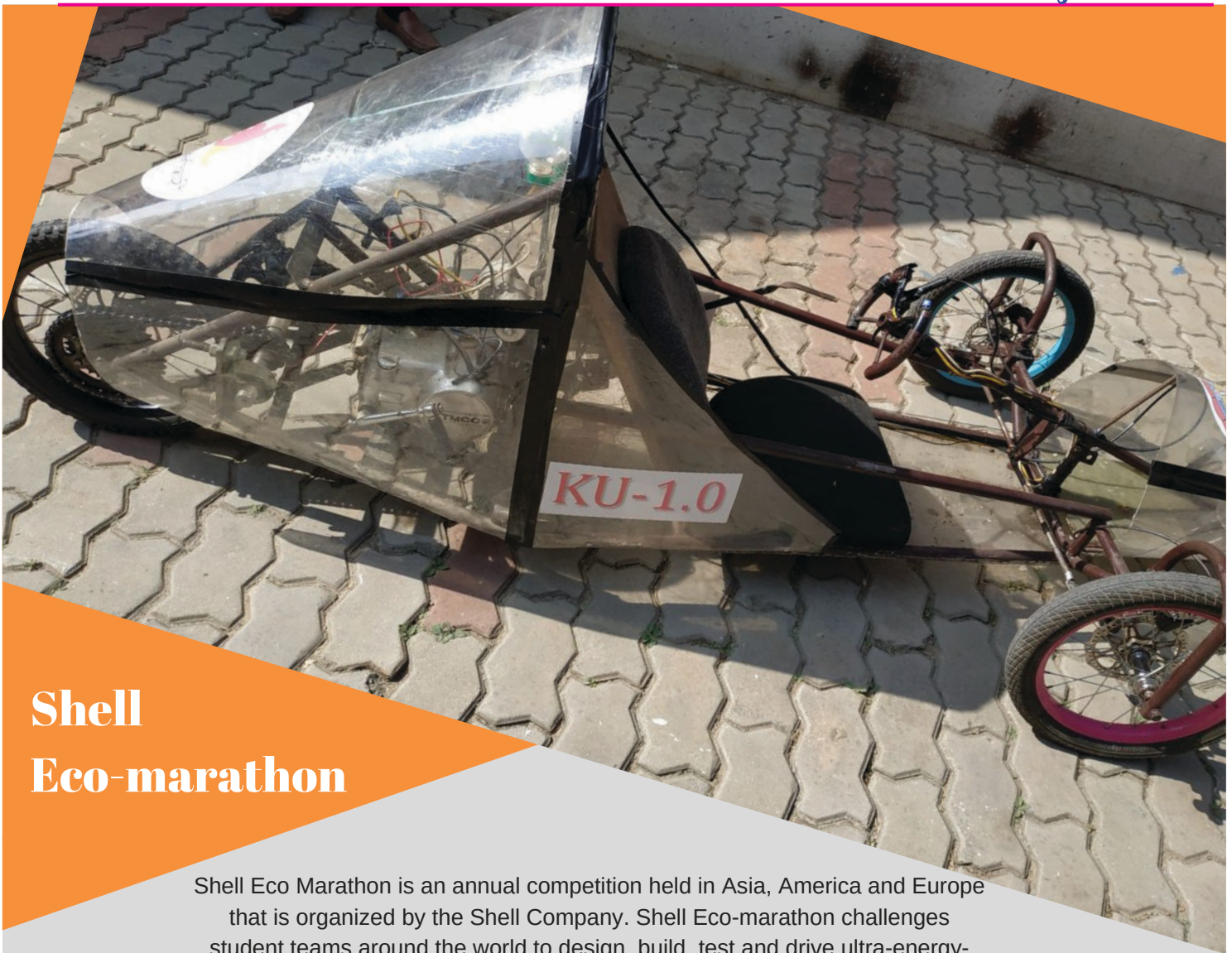
support us and to take the project to the next level.

As time passed, during our 6th semester exams, I heard of the KOICA funded "Integrated Rural Development Project", and I couldn't stop thinking about it. There were still 3 subjects left in the exams. Though I had an exam the next day, I still attended a 3-hour workshop for IRDP. It was my primary focus now. It was difficult, as I had exams too. But, our team used to meet our supervisor and discuss about IRDP daily. We were so deeply involved that we were suggested to prepare for our exams rather than dwell on IRDP. But deep down, we all knew that exams were already a second priority.

It was difficult getting everyone on the same page though. I saw the importance of the project and its applicability for IRDP, but it was tough maintaining that within the team. We spent almost 8-9 days, reforming the team on the semester break. We still had disagreements among our team members, so much that we were on a 13 minute call before we could fully agree to fill the IRDP proposal. This 13 minute call was the silver lining that decided the fate of our project. After registration, we had approximately 44 hours to prepare our proposal and budgeting. For me, the part of budgeting was a thrilling experience, which took almost 12 hours of my time. Among 200+ projects, we got selected within 70. After our presentation, we got selected from 70 to top 8 projects.

Every step we took in this journey, it was because we had such faith in our idea and we didn't want to halt this bittersweet journey in any way. That is what made it so long, fun and fruitful.

But I still have this feeling. This story is yet to begin.

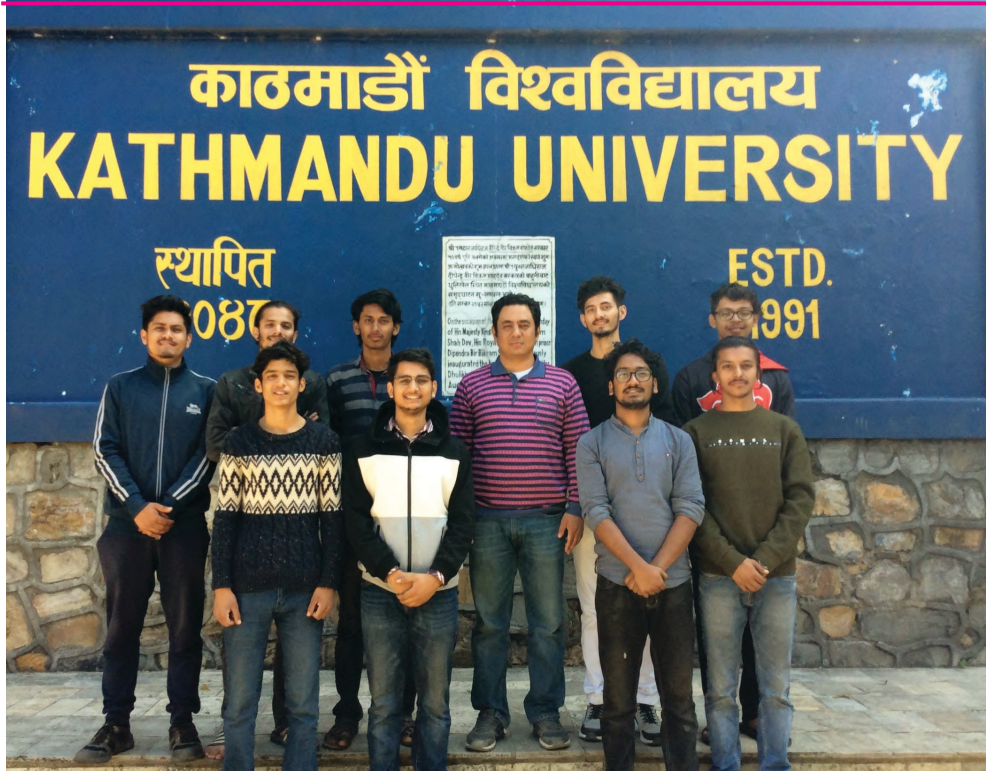


Shell Eco-marathon

Shell Eco Marathon is an annual competition held in Asia, America and Europe that is organized by the Shell Company. Shell Eco-marathon challenges student teams around the world to design, build, test and drive ultra-energy-efficient vehicles. There are two categories for participation in the competition; urban concept and prototype. We are on the path to compete in the Shell Eco Marathon Asia 2019

The team of Shell Eco Marathon Asia (SEMA) from Kathmandu University was formed through a rigorous selection process by the Department of Mechanical Engineering. We came up with the name "Junkiri" for the team. Junkiri is the nepali word for the insect firefly. It is believed that the Junkiri lights up its tail naturally with almost 100% efficiency; this reflects the competition moto and our goals for the competition very accurately so we thought it is the perfect name for the team. We used to meet twice every week after classes and any free time we got to discuss for the competition. We used to talk about the rules and regulations, future planning, deadlines, designs, technical aspects and feasibility of the project and various other logistics. We were divided into various small groups based on our interests to work on various components of the car such as chassis, shell (body), engine, transmission, braking, steering etc.

Immediately following the first phase registration we started working on the fabrication of the design for the second phase. First we made the chassis of KU - 1.0, the first version of our vehicle. We even collected money from within the team to buy the wheels for KU - 1.0. After installing the wheels the vehicle was starting to take shape. We now needed to assemble the steering and braking systems in order to get it running. During this time the results of the first phase came out and we had passed with 100 other teams out of 250 from various universities throughout Asia. This gave us inspiration to work even harder. We organized a "One Day Workshop in General Maintenance and Training of Two Wheelers" with help from the KU Technical Training Centre (TTC) in order to raise funds for the brakes. It was a successful event which received positive feedbacks from the participants. All the money collected for the event was spent on buying hydraulic disc brakes of a mountain bike for KU - 1.0. After completing the steering system and doing much experimentation on the length of the tie rods to make the turning radius just right we came up with a working framework for the vehicle. We were elated to see the vehicle running smoothly and taking sharp turns. Next we installed the brakes onto the KU - 1.0 and tested it on inclines which was also successful. At this time we were working tirelessly every day whenever we had free time whether it was after classes, at free classes or overtime late in the evening and morning.



KU Shell EcoTeam Junkiri 1.0

Follow us on facebook @teamjunkiri

Junkiri consists of 10 core members;

- Coordinator- Sagar Thapa (2015)
- Bishwash Neupane (2016)
- Madan Kshetrie (2016)
- Milan Pathak (2016)
- Nishan Sapkota (2016)
- Faculty advisor-Dr. Daniel Tuladhar
- Nitesh Yadav (2016)
- Prateek Pant (2016)
- Ishan tamrakar (2016)
- Smrit Dhimal (2015) along with several other volunteers.

Junkiri was highly motivated and self-inspired from the early days itself to deliver on a promise to make the first fuel efficient car of Nepal.

According to phase two requirements we needed a demonstrative video of the car with all its systems working. For this we needed an engine. Since we had decided to work on gasoline engine of small displacement we needed a four stroke 50cc petrol engine. We scoured every shop at Kathmandu for the engine but to no available. After exploring all alternatives, the deadline for phase two was nearing so we decided to acquire a 50cc Honda general purpose engine and an Electronic Fuel Injection kit from USA through air mail and another 100cc bike engine from a dealer at Kathmandu as a backup engine to make the demo video.

We quickly made harnesses to mount the 100cc engine to KU - 1.0 and transmission as well. The university was already closed for Dashain vacation and all our friends had left to celebrate while we stayed back to get the car running. We recorded the video a day before Fhulpati before we all went to celebrate Dashain. Every team member has worked with exceptional dedication whether it is staying overtime at night, staying back on weekends, holidays, working on lunch breaks and on chilly mornings. Since then, we have made important modifications to KU - 1.0 to make it run more smoothly and improved on the aesthetics as well. We have to thank the TTC family for providing us ample workspace and facilities to fabricate the vehicle, the mechanical engineering department for providing us the resources and the required logistics support, the dean of School of Engineering for recognizing our potential and supporting us and all our well-wishers without whom we would not have reached the position that we are right now.

Now with everybody's support Junkiri is working on the second version of the vehicle with aluminum chassis, high grade materials, better wheels, improved fabrication and troubleshooting on previous problems. We hope to achieve the greatest height in this competition and make history by becoming the first team to participate in this competition from Nepal. Team Junkiri is just the beginning of a new chapter of mechanical engineering in Kathmandu University. For us this is a golden opportunity to show what we are capable of and also to root the foundation for the upcoming batch, a platform to work hard. We hope to organize more workshops like the two wheeler workshop and events for the students in the future and to represent KU in the international platform as an unorthodox team from a small country like Nepal.

"The principle of the Shell Eco-marathon is simple: to design and build the world's most fuel-efficient vehicle - and produce the fewest emissions."



#KUDIARIES





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Automotive Industry, Its Development Considering Energy Uses & Environmental Issues

What revolutionized the automotive industry?

It's true that Innovation and technology makes human life easier and better, but if a business is developed with consideration to its relationship with the environment the chances of wealth creation and the welfare of mankind is higher. This didn't actually happen in case of Automobile industry. Every action had its consequence left behind.

Though the revolution uplifts lifestyle, we are unknown of the reason behind that revolutionary evolution. It may be because of a need for luxury, technological enhancement and market competition, or there may be some socio-economic factors, such as economic consequences, cultural values etc. I think the major dragging factors for that development were the problems it created side by side during the revolutionary advancement. Whatever be the reason it still left traces to environment degradation, one of them were emission of greenhouse gases.

How the revolutionists cope with the problems and challenges as opportunities?

I think it all started from inspirational quote as 'Tomorrow's problems can't be solved by yesterday's technology'. They need motivation to drag themselves to work, to change the perception of work, innovation and then invention. There were numerous research paper published worldwide, number of experiments were done in the lab and finally led the physicians along with engineers come to conclusion to stop this mass destruction by introducing technological, cultural and economic policies. The conclusion included economic study of different society and their cultural values, impact of fuel prices and financial performance, international automotive market competition. The economic policies included energy emission control, use of raw material, energy and oil security, need for product recovery. To assess these possible threats three criteria were used viz: timescale, likelihood and severity of environment threat.

What the future looks like?

As global market exponentially needs to be progressing during recent year, the future of car will be: Autonomous, Connected, Electric & Shared (ACES).

Autonomous: By early 2030, self-driven cars will lead industry. Self-driven cars save time such that

Nabin Joshi
Batch: 2015



drivers could travel with working although there will be no drivers driving cars then. Will it really come out fruitful? We have heard some news about self-driven cars failing to pass the collision test down the road with other vehicles. This is due to the fact that only few percentages of cars are autonomous and almost all others are driven by humans. So there isn't a proper understanding between self-driven cars and non-autonomous vehicles thus, accident occurs. But if all the cars that run down the road become autonomous, the probability of fatal accident might be reduced to almost zero unless technical error occurs. For technical error, there is always a solution available. So future travel system is connected and direct data will flow between each other.

Connected: Vehicles being equipped with built-in network capacity are increasing. Future automotive system will become so advanced that diagnosis of assistance system, enhancing safety system & inter-communication will be possible within one vehicle system. This will reduce causes of accident due to technical errors.

Electric: Concern over climate change limits various designs due to environmental regulations worldwide. Environmental friendly companies like Tesla Motors are working to put an end to gas & diesel cars on the road. Electric cars are changing up for green revolution. Electric vehicle with hybrid vehicle will probably run the market at that time possibly.

Shared: In major cities, the number of vehicles are increasing rigorously that the size of the road someday will become quite small for all the vehicles in the world. As a result, side-sharing as a mode of transport is finding more support in big cities in which number of people shares the same vehicle. Vehicle sharing will also support transport system between more than two owners.



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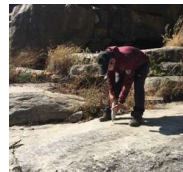
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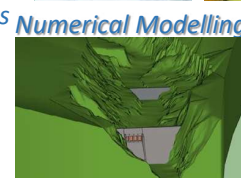
Study of Hydropower projects using national and international experts



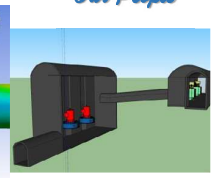
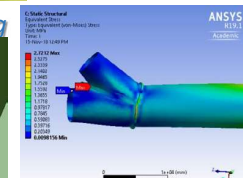
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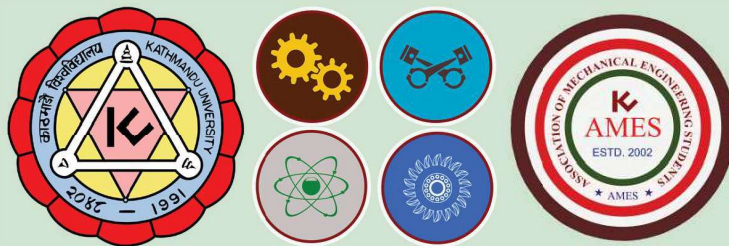
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Thank You for your assistance in the making of Aviyantaa'18. We are really exhilarated and like to express our gratitude for your help and support. We believe that we will receive the same kind of response from you in the future endeavors.



Team Aviyantaa'18



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