

AMEN

The Association of Mechanical Engineers

NEWSLETTER

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**"If you do not hope, you will not find what is beyond your hopes."
St. Clement of Alexandria**

Welcome Y7

Association of Mechanical Engineers heartily welcome all the new UG and PG Students of the Y7 batch and wishes their happy stay at IIT Kanpur. A.M.E. is an association comprising all the students of the department of Mechanical Engineering. Among its main functions comprises providing exposure to the Mechanical Engineering students about the various upcoming areas of technology and research, providing them exposure to real life engineering problems by organizing industrial tours, lectures on topics of general interest and seminars of specific interest and organizing social gatherings like fresher's welcome, farewell to the passing out batches. Two industrial tours are organised mainly for first and second year to enhance their industrial skills understanding. ME Fresher is organised around mid August and is tentatively scheduled on 18th of August this year.

AME also arranges winter trip of about 15 days for the 3rd year students in December. Apart from this AME helps the students in getting summer internships according to their preferences. It acts as glue between students and faculties to bind them together through the various platforms. From this year we are planning certain more activities like demonstration of best BTPs and other projects developed by the students during the course of the year. And not to forget AME publishes the happenings in the department in this monthly newsletter. So just feel free to contribute anything that you think others should know as a Mechanical Engineering student.

New Appointment

Summer 2007 witnessed the appointment of one new faculty member in our department. Dr. Shantanu Bhattacharya has done his B.E. from Delhi College of Engineering and M.S. from Texas State University in Mechanical Engineering after which he joined Purdue University for PhD in Biomedical Engineering. His research area is the all new nanotechnology and Micro-electro-mechanical devices. AME team got a chance to interview him synopsis of which is covered in this issue. He can be contacted at bhattacs@iitk.ac.in

Announcements

Talk on Nano-Devices on 2nd Aug

Have you been bored of long hours of coding job at your internship? Are you seeking opportunity to do something different? Here is your cup of tea then. AME is organizing a talk on nano-devices for enhanced cooling and explosive sensing by Dr. Debjyoti Banerjee of Texas University. He will also discuss about the **internship and scholarship opportunities** at Texas University for 3rd and 4th year Mechanical Engineering students. Dr. Banerjee has been closely associated with the development of commercial micro fluidic devices called "Inkwells" which are based on the concept of Dip Pen Nanolithography or DPN. Nanolithography is used in etching of silicon surfaces to develop ICs. So, come to **L9 at 3:00 pm on 2nd Aug** if you have the zeal to know what nano-nose and nano-tongue can do for us and even if you are considering your options in nanotechnology to explore this new small world.

National Design Competition

Golden jubilee celebration committee of Mechanical engineering Research Institute is organizing a National Design Competition for Engineering Students. The problem with terms & conditions are as follows:

"DESIGN OF A COMPACT TRUCK UNLOADER"

It will unload dry sand from a loaded truck. The Unloader will be of compact design, light weight and truck mounted type and will be driven by the power from the truck engine.

Terms & Conditions:

The Design is to be submitted in one hard copy and a soft copy with complete manufacturing details including assembly/ sub-assembly/ part drawings, and a report containing design calculations and operating instructions.

Last Date for the submission of Design is **31st October**.

The prize money for the competition is **Rs.25000/-**, Rs.20000/-, Rs.15000 for 1st, 2nd, 3rd respectively. Details regarding this can be found on AME website.

PUZZLE: If you have 12 balls among which one is defective. How will you find out the defective ball measuring thrice only? Note that you don't know if the defective ball is lighter or heavier.



Going Micro and Nano: what can MEMS and Nanotechnology do

In his famous 1959 talk famous physicist Richard P Feynman had told, "I would like to describe a field, in which little has been done, but in which an enormous amount can be done about the field of manipulating and controlling things on a small scale. As soon as I mention this, people tell me about miniaturization, and how far it has progressed today. They tell me that there is a device on the market by which you can write the Lord's Prayer on the head of a pin. It is a staggeringly small world that is below. In the year 2000, when they look back at this age, they will wonder why it was not until the year 1960 that anybody began seriously to move in this direction. Why cannot we write the entire 24 volumes of the Encyclopedia Britannica on the head of a pin?" The power of small was visible even when room sized computers got shrunk to modern Laptops and palmtops and going further to IPODS and PDAs but the recent upsurge in the nanotechnology has changed the entire way of viewing engineering disciplines. Perhaps this is the reason that the Dean of MIT in one of his address at Purdue University said "let us club all the engineering disciplines together and divide it into four main fields - Bio, Nano, Macro and Info." It is easy to see that the potentially infinite application of nanotechnology is the reason for such restructuring. The important aspect of the nanotechnology is that it directly affects humanity. Think of a world in which you will know in advance about food pathogens are present in food samples that you consume. Patients will take an injection which may selectively remove cancer cells. Soldiers can selectively monitor and destroy enemy location with a click on their laptops. These are not the fiction stories of H. G. Wells but similar technological research is being carried out in different parts of the world. Miniaturized electronically interfaced bio-monitors are already commercially available that detect blood glucose at the pinch of a micro-liter size blood sample. The story does not end here only. Micro mixers that are being developed can achieve mixing tiny droplets of fluids with huge order of greater efficiency than normal mixing. Think of the implications it may have in developing drug delivery systems for the human body.

So going small is very much promising but where does a Mechanical Engineer stand in between all of this? Well, there comes the MEMS or Micro-electro-mechanical Systems which apply the basic mechanical principles at micron/ submicron scales. How else do you think one is going to make teeny-tiny micro-factories on a single chip? So the gears, screws and turning mechanisms come into picture. Examples of MEMS developed till date are accelerometers, bacterial confinement chambers, microaircrafts, microengines, microturbines etc. More enthusiastic people have even started to develop a whole Lathe Machine on a chip which can then be used for Lathe operations at micro level. Materials are another area where Mechanical Engineering integrates with nanotechnology. Thermionic reactions of Aluminium which requires no Oxygen are known to produce large amount of heat per atom due to large interface at the nanoscale. The challenging part is to tailor schemes and devices that would provide this assembly. And MEMS will do the job for us.

What next? Is it so easy to go small and small up to atoms? Well, Heisenberg does not seem to suggest so. The uncertainty principle restricts our access to the wonderful world of atoms. Forget nano, even at the micro level many of our familiar laws and empirical relations fail to yield. Low Reynolds number flows are typical example of studying micro flows. So, there is still another major area to be worked upon to formulate the laws for this micro/ nano world. Even if we forget nano for a while we are at trouble. All the fluid flow in human body is governed by the laws at micro level. So going small is the need of hour and MEMS and nanotechnology will be our spaceships for the quest of this Universe and that room at the bottom.

Dr. Shantanu Bhattacharya's interview excerpts

Experienced Talk :What Seniors have to say

AME interviewed Himanshu Tewary of Y3 batch who was also the coordinator of counselling service before he left the campus after convocation. Here is the excerpt from the same.

AME: Congratulations on clearing IIM Ahmadabad, IIM Calcutta as well as for the impressive job offer that you have got from ITC.

Himanshu: Thank you very much.

AME: Where have you planned to join and why so?

Himanshu: I have decided to pursue higher studies in IIM Ahmadabad. The job that I had been offered in ITC is managerial in nature so I have decided to fine tune these skills first in IIM Ahmadabad first and then go for such a job.

AME: When did you decide about your future career direction like you will go to management and not higher studies in mechanical engineering?

Himanshu: When I was doing my internship in ITC that time my decision became firm that I will not go for higher studies. But the choice between management and job was not clear cut and I decided only after getting offer from both sides.

AME: Tell us about the type of interview that you faced in CAT.

Himanshu: The interview in CAT is different from normal job interview in the sense that you will never realize that it is going to end. In all of my 3 IIM interviews I was surprised when they told me to go. They asked me just some informal type question and it was over within 15 minutes. Actually no hard skill is tested in these interviews.

AME: As a coordinator of counselling service what do you think is the reason for decrease in interaction among the students?

Himanshu: There are several reasons like large number of students, more academic pressure and internet is big reason.

AME: What would you like to say to your junior Mechanical Engineers?

Himanshu: Decide in the 2nd year itself what do you want to do in future and accordingly plan if you want to do an internship in industry or university. If you want to go for higher studies try to develop contacts abroad during your internship. Study about the company before sitting for the placement of a company. Enjoy your life at IIT Kanpur.

Contributions are invited from all UG and PG students. Send in your entries to aranjan@iitk.ac.in