Yaantrika

Newsletter

Department of Mechanical Engineering

Volume 2 **Issue 2** **June2017**

Vision and Mission of the Institute

Vision

- To be one of the premier Institutes of Engineering and Management education in the country.

Mission

- To provide Engineering and Management education that meets the needs of human resources in the country.
- To develop leadership qualities, team spirit and concern for environment in students.

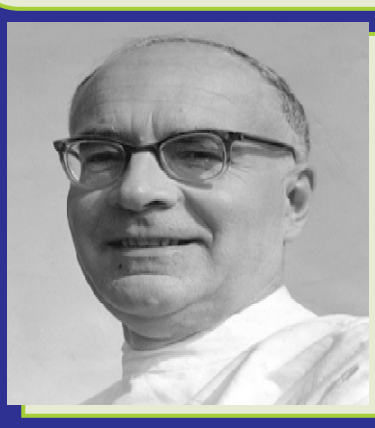
Vision and Mission of the Department

Vision

- To be a premier department for education in Mechanical engineering in the state of Karnataka, that moulds students into professional Engineers.

Mission

- To provide a teaching-learning process that prepares engineers to meet the needs of industry and higher learning.
- Provide environment for self learning to meet the challenges of changing technology and inculcate team spirit and leadership qualities to succeed in professional career.
- To instill professional ethics and concern for environment for the benefit of society.



Yaantrika" from the Department of Mechanical Engineering, is dedicated to Felix Heinrich Wankel.He was a German mechanical engineer and inventor after whom the Wankel engine is named.

What's inside…!

- ✓ *About Mechanical Department*
- ✓ *Articles by students*
- ✓ *Industrial visits*
- ✓ *Departmental activities*
- ✓ *Faculty achievements*
- ✓ *Students' achievements*

Vidyaya Amrutham Ashnuthe

B.N.M. Institute of Technology

(Approved by AICTE, Affiliated to VTU and ISO 9001:2008 certified Institution)

Post box no. 7087, 27th cross, 12th Main, Banashankari 2nd Stage, Bengaluru- 560070, INDIA

Ph: 91-80- 26711780/81/82 Email: principal@bnmit.in www. bnmit.0rg

FROM EDITOR'S DESK

Dear Readers,

Welcome to the June 2017 issue of our newsletter 'Yaantrika'

The team of Yaantrika, likes to give our readers an intellectually stimulating news. The newsletter endeavors to reflect the values and the quality of our esteemed Institution. The presentation of the entire newsletter shows the creative indulgence of our students

We would like to appreciate all the students who contributed articles for this issue. It is the willingness to put effort, share knowledge, concerns and special insights that have made this issue possible.

Knowledge is treasure which appreciates when we share and depreciates when accumulated. Never stop sharing knowledge and helping others.

ABOUT ME DEPARTMENT

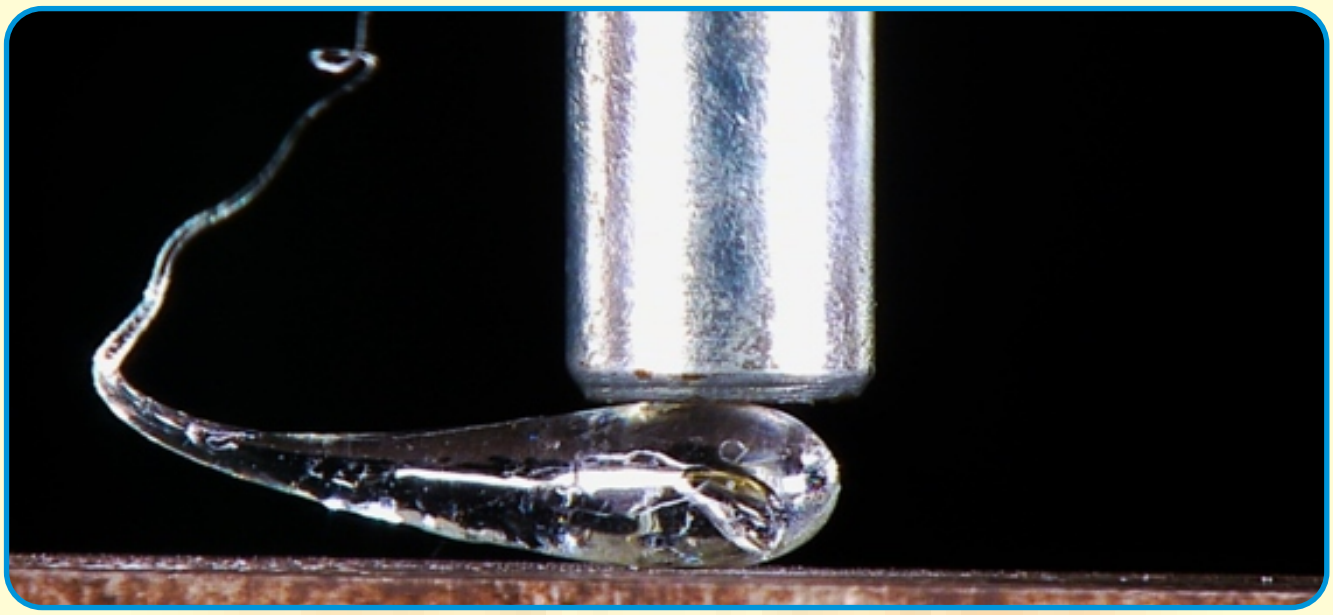
Department of Mechanical Engineering started in the Year 2011-2012with an intake of 60 students The department offers undergraduate program in Mechanical Engineering and is headed by Dr. Mukesh Patil. All the laboratories have been established procuring state of the art equipments. The department has a team of talented and well qualified staff members, with a blend of industrial and academic experience. Faculty members with Master's and Doctorate degree qualification having specialization in Machine Design, Thermal and Manufacturing Engineering are rendering their service to academics. The department is about to start a R&D centre from A.Y: 2017-18. Numerous research activities have been planned through the R&D centre.

Shri. Narayan Rao R. Maanay, receiving **Best Educationist Award of The Hindu Newspaper** from Honourable Higher Education Minster of Karnataka **Sri. BasavarajRayareddi** in the presence of **Dr. M.P. Poonia**, Vice-Chairman, AICTE and **Dr. M.S. Shamasundar**, Advisor, NAAC at Bengaluru on 26.03.2017.

BNM Institute of Technology is one among 16 engineering colleges in Karnataka to be ranked 100-150 by National Institute Ranking Framework (NIRF), Ministry of Human Resource Development, New Delhi, for the year 2017.

PRINCE RUPERT'S DROP

One of the lesser known anomalies ofscience is Prince Rupert's Drop.Prince Rupert's drops are produced by dripping molten glass immediately into cold water. The water rapidly cools and solidifies the glass on the outside of the drop, while the inner core remains molten. When the glass on the inside eventually cools it contracts inwards, producing significant compressive stresses on the surface of the drop while the core solidifies in a state of tensile stress.



The head of Prince Rupert's drop can be hit with a hammer or struck with an bullet without breaking it. But if you even Knick the tail the entire thing will explode. This is the anomaly of the Prince Rupert's drop.

Cause of hardness.

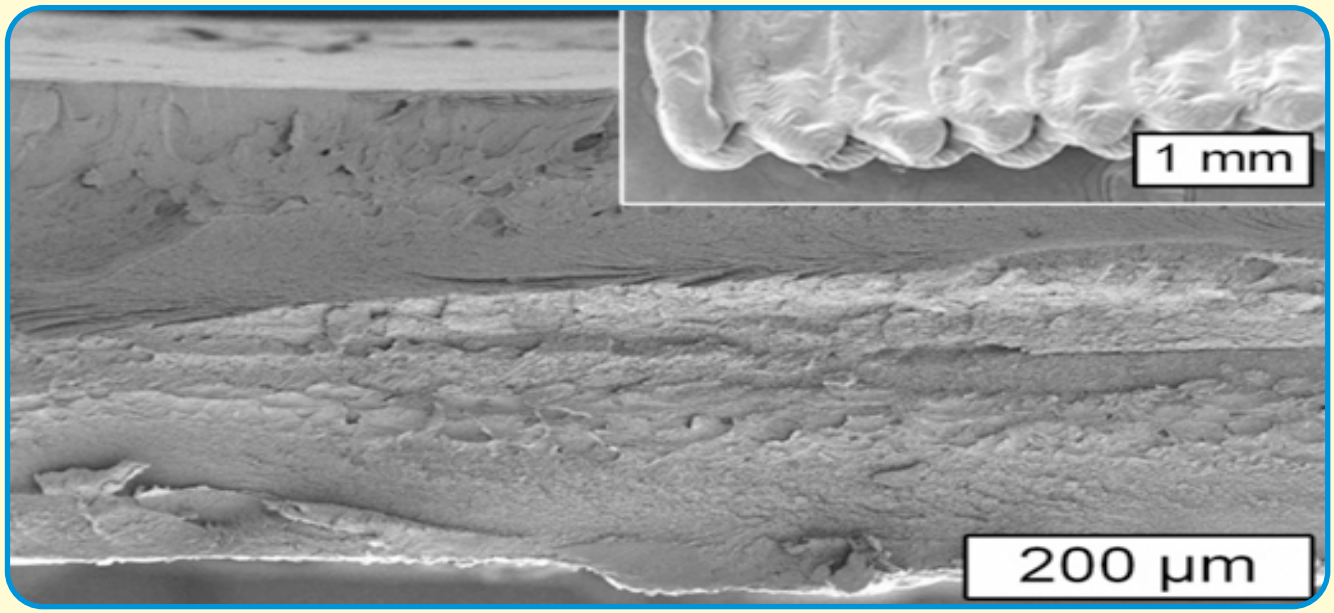
When the molten glass is suddenly dripped into the water the outside layer of the Prince Rupert's drop touches the water and immediately solidifies forming a tadpole like structure. Thislocks in the outside shape of the drop. The inside of the drop have ever is still a hot expanded liquid. As heat transfers to the water, the inside layer slowly begins to cool down and begins to pull in(Contraction) against the outside layer. As the outside layer is already solidified the inside layer compresses against itself. As the cooling glass cannot move the outside layer it begins to pull against itself causing it to be in extremely high tension. .It then Hardens in this state of tension to form the Prince Rupert's drop.

The outside is in extremelyhigh compressive stress and the inside is in extremely high tensile stress. If one link in this tension chain is ever cut, it breaks on along the line feeding of it own stored energy releasing Mechanical Strain energy. This wave of energy released is called a Failure front.

Velocity of Failure front = 1658 m/s

AMITH NARAYAN H.S
IV Semester

3-D PRINTING WITH CELLULOSE



World's most abundant polymer could rival petroleum-based plasticsas source of printing feedstock.
Cellulose is the most abundant organic polymer in the world," it is the most important component in giving woods its mechanical properties. And because it's so inexpensive, its bio renewable, biodegradable, and also very chemically versatile, it's used in a lot of products. Cellulose and its derivatives are used in pharmaceuticals, medical devices, as food additives, building materials, clothing — all sorts of different areas. And a lot of these kinds of products would benefit from the kind of customization that additive manufacturing [3-D printing] enables."
Meanwhile, 3-D printing technology is rapidly growing. Among other benefits, it "allows you to individually customize each product you make," Pattinson says.

Using cellulose as a material for additive manufacturing is not a new idea, and many researchers have attempted this but faced major obstacles. When heated, cellulose thermally decomposes before it becomes flow able, partly because of the hydrogen bonds that exist between the cellulose molecules. The intermolecular bonding also makes high-concentration cellulose solutions too viscous to easily extrude.

Instead, the MIT team chose to work with cellulose acetate — a material that is easily made from cellulose and is already widely produced and readily available. Essentially, the number of hydrogen bonds in this material has been reduced by the acetate groups. Cellulose acetate can be dissolved in acetone and extruded through a nozzle. As the acetone quickly evaporates, the cellulose acetate solidifies in place. A subsequent optional treatment replaces the acetate groups and increases the strength of the printed parts.

"After we 3-D print, we restore the hydrogen bonding network through a sodium hydroxide treatment," Pattinson says. "We find that the strength and toughness of the parts we get … are greater than many commonly used materials" for 3-D printing, including acrylonitrile butadiene styrene (ABS) and polylactic acid (PLA).

To demonstrate the chemical versatility of the production process, Pattinson and Hart added an extra dimension to the innovation. By adding a small amount of antimicrobial dye to the cellulose acetate ink, they 3-D-printed a pair of surgical tweezers with antimicrobial functionality.

"We demonstrated that the parts kill bacteria when you shine fluorescent light on them," Pattinson says. Such custom-made tools "could be useful for remote medical settings where there's a need for surgical tools but it's difficult to deliver new tools as they break, or where there's a need for customized tools. And with the antimicrobial properties, if the sterility of the operating room is not ideal the antimicrobial function could be essential," he says.

Because most existing extrusion-based 3-D printers rely on heating polymer to make it flow, their production speed is limited by the amount of heat that can be delivered to the polymer without damaging it.

This room-temperature cellulose process, which simply relies on evaporation of the acetone to solidify the part, could potentially be faster, Pattinson says. And various methods could speed it up even further, such as laying down thin ribbons of material to maximize surface area, or blowing hot air over it to speed evaporation. A production system would also seek to recover the evaporated acetone to make the process more cost effective and environmentally friendly.

Cellulose acetate is already widely available as a commodity product. In bulk, the material is comparable in price to that of thermoplastics used for injection moulding, and it's much less expensive than the typical filament materials used for 3-D printing, the researchers say. This, combined with the room-temperature conditions of the process and

DEEPAK SRINIVAS.N

IV Semester

TOP 6 ROBOTIC-MEDICAL APPLICATIONS

According to a recent report by Credence Research, the global medical robotics market was valued at $7.24 billion in 2015 and is expected to grow to $20 billion by 2023. A key driver for this growth is demand for using robots in minimally invasive surgeries, especially for neurologic, orthopedic, and laparoscopic procedures.

As a result, a wide range of robots is being developed to serve in a variety of roles within the medical environment. Robots specializing in human treatment include surgical robots and rehabilitation robots. The field of assistive and therapeutic robotic devices is also expanding rapidly. These include robots that help patients rehabilitate from serious conditions like strokes, empathic robots that assist in the care of older or physically/mentally challenged individuals, and industrial robots that take on a variety of routine tasks, such as sterilizing rooms and delivering medical supplies and equipment, including medications.

Below are six top uses for robots in the field of medicine today.

1. Telepresence

Physicians use robots to help them examine and treat patients in rural or remote locations, giving them a "telepresence" in the room. "Specialists can be on call, via the robot, to answer questions and guide therapy from remote locations," writes Dr. Bernadette Keefe, a Chapel Hill, NC-based healthcare and medicine consultant. "The key features of these robotic devices include navigation capability within the ER, and sophisticated cameras for the physical examination."

A robotic surgical system controlled by a surgeon from a console. Image: Wikimedia Commons

2. Surgical Assistants

These remote-controlled robots assist surgeons with performing operations, typically minimally invasive procedures. "The ability to manipulate a highly sophisticated robotic arm by operating controls, seated at a workstation out of the operating room, is the hallmark of surgical robots," says Keefe. Additional applications for these surgical-assistant robots are continually being developed, as more advanced 3DHD technology gives surgeons the spatial references needed for highly complex surgery, including more enhanced natural stereo visualization, combined with augmented

3. Rehabilitation Robots

These play a crucial role in the recovery of people with disabilities, including improved mobility, strength, coordination, and quality of life. These robots can be programmed to adapt to the condition of each patient as they recover from strokes, traumatic brain or spinal cord injuries, or neurobehavioral or neuromuscular diseases such as multiple sclerosis. Virtual reality integrated with rehabilitation robots can also improve balance, walking, and other motor functions.

4. Medical Transportation Robots

Supplies, medications, and meals are delivered to patients and staff by these robots, thereby optimizing communication between doctors, hospital staff members, and patients. "Most of these machines have highly dedicated capabilities for self-navigation throughout the facility," states ManojSahi, a research analyst with Tractica, a market intelligence firm that specializes in technology. "There is, however, a need for highly advanced and cost-effective indoor navigation systems based on sensor fusion location technology in order to make the navigational capabilities of transportation robots more robust." Upper limb rehabilitation. Image: Center for Applied Biomechanics and Rehabilitation Research, National Rehabilitation Hospital, Washington DC

5. Sanitation and Disinfection Robots

With the increase in antibiotic-resistant bacteria and outbreaks of deadly infections like Ebola, more healthcare facilities are using robots to clean and disinfect surfaces. "Currently, the primary methods used for disinfection are UV light and hydrogen peroxide vapors," says Sahi. "These robots can disinfect a room of any bacteria and viruses within minutes."

6. Robotic Prescription Dispensing Systems

The biggest advantages of robots are speed and accuracy, two features that are very important to pharmacies. "Automated dispensing systems have advanced to the point where robots can now handle powder, liquids, and highly viscous materials, with much higher speed and accuracy than before," says Sahi.

Future Models

Advanced robots continue to be designed for an ever-expanding range of applications in the healthcare space. For example, a research team led by Gregory Fischer, an associate professor of mechanical engineering and robotics engineering at Worcester Polytechnic Institute, is developing a compact, high-precision surgical robot that will operate within the bore of an MRI scanner, as well as the electronic control systems and software that go with it, to improve prostate biopsy accuracy.

To develop robots that can work inside an MRI scanner, Fischer and his team have had to overcome several significant technical challenges. Since the MRI scanner uses a powerful magnet, the robot, including all of its sensors and actuators, must be made from nonferrous materials. "On top of all this, we had to develop the communications protocols and software interfaces for controlling the robot, and interface those with higher-level imaging and planning systems," says Fischer. "The robot must be easy for a non-technical surgical team to sterilize, set up, and place in the scanner. This all added up to a massive systems integration project which required many iterations of the hardware and software to get to that point."

In other research, virtual reality is being integrated with rehabilitation robots to expand the range of therapy exercise, increasing motivation and physical treatment effects. Exciting discoveries are being made with nanoparticles and nanomaterials. For example, nanoparticles can traverse the "blood-brain barrier." In the future, nanodevices can be loaded with "treatment payloads" of medicine that can be injected into the body and automatically guided to the precise target sites within the body. Soon, ingestible, broadband-enabled digital tools will be available that use wireless technology to help monitor internal reactions to medications.

"Existing technologies are being combined in new ways to streamline the efficiency of healthcare operations," says Keefe. "While at the same time, emerging robotic technologies are being harnessed to enable intriguing breakthroughs in medical care."

RAHUL D S
VI Semester

TOWARDS QUIETER SEAS

Scientists from the U.S. National Oceanographic and Atmospheric Administration for more than a dozen years have been studying something that we humans normally don't sense: increasing underwater noise and its effect on marine mammals and other sea life.One of NOAA's findings is that underwater sound has been doubling every 10 years. Most of this sound is man-made, from the ever-expanding fleet of ships that ride our oceans. Researchers believe that intrusive sound is harming sea life. Whales in particular, are greatly affected by increasing undersea sounds, as they depend on hearing to find food and each other.

In response, the International Maritime Organization, part of the United Nations, has been deliberating on draft guidelines for the reduction of underwater noise from commercial ships.Technologies for quiet ships have been in use for military vessels, especially submarines, since World War II. The submarine, after all, has been called "the original stealth fighter" in a defense contractor's advertisement.

Designers of commercial ships began paying attention to noise about 20 years ago, with the design of quiet marine research vessels. The quieter the vessel, the less likely it is to disturb the populations of creatures that it is trying to study. This led the marine science community to push engineers, naval architects, and noise-control engineers to build quiet vessels for their work.

Most of the world's research vessels, or R/Vs, are configured in the same way. They typically range in length from 100 to 300 feet. Most have the same deck configuration with roughly one-third of the ship length dedicated to an open "working deck" in the aft part of the ship. Here stand multiple cranes, winches, and A-frames used to deposit and retrieve objects in the water.Inside the main deck of the ship are usually a collection of labs. Research vessels often distinguish these rooms as a "wet lab" for doing work on marine life or a "dry lab" for all other work.

Building an R/V that is acoustically quiet requires concerted effort by the owner, operator, naval architect, shipyard, and most certainly the noise-control engineer. The first concern is the propeller, which must be designed to avoid cavitation—the formation and implosion of cavities in a liquid. It occurs on both sides of the blades of a rapidly rotating propeller. Low-noise propellers are cavitation-free, at least up to certain speeds. They have largediameter blades with a high skew, and they spin relatively slowly. After the propeller, the noisiest problem is the diesel engine. Direct-drive configurations that link diesel engines to the propeller are noisy. The solution is using a diesel generator to power highqualityelectric motors that turn the propellers. It is easier to isolate the vibration of a generator than that of an engine driving a propeller. The use of high-quality electric motors (dc or ac) will also minimize hull vibration. Lesser vibration problems include refrigeration plants, air compressors, seawater cooling systems, large pumps, large ventilation fans, and hydraulic power units. All can be vibration isolated. High-transmission-loss bulkhead insulation can provide additional noise reduction. The insulation can consist of multiple layers of fiberglass or a single layer of heavier mineral wool. Another noise-control treatment, used extensively on submarines, is hull damping. This uses a spray-on material or a plastic tile that absorbs vibratory energy in the hull.

MEASURING UNDERWATER NOISE

Underwater noise is measured with an underwater microphone known as a hydrophone. The unit of measurement for underwater noise, or sound pressure level, is the same as for airborne SPL, the Pascal. As with airborne SPL, underwater noise is customarily reported in decibels. Airborne SPL uses 20 μPa as a reference pressure; underwater SPL uses 1 μPa. The measurement of the source level noise from any ship requires a very careful process first standardized in ANSI/ASA S12.64-2009, Quantities and Procedures for the Description and Measurement of Underwater Sound from Ships. This standard has three grades of measurement depending on the user's needs and accuracy. Either one or three hydrophones (depending on the grade) are lowered to specific water depths. The ship being measured will pass by the hydrophone at controlled conditions and speed at least 100 meters from the hydrophone array. The measured sound at the hydrophone is then adjusted based on the actual distance between the ship and hydrophone. This adjustment assumes the ship is a spherical point source with all sound coming from one point. The horizontal distance between the hydrophone and the ship is measured at the surface using GPS, radar, or laser range finder. The vertical distance from the water surface to the hydrophone is measured in situ when the hydrophone is deployed.

The Pythagorean Theorem is used to determine the total distance. This distance is then used to adjust upwardly the measured SPL as follows SPL (source) = SPL (measured) + 20 x Log (D) where D is the diagonal distance.

Many organizations around the U.S. shipbuilding industry have seen the need to address underwater noise. Standards organizations such as ISO, ANSI, and the Acoustical Society of America have been working overtime to develop standards for the measurement ofunderwater noise from ships, oil and gas exploration, pile driving, and other sources.

Does the future include regulations—not just guidelines—for underwater noise limits? It's hard to say, because if regulations come, they will be many years away. For today, this much is safe to say: underwater noise is not just the military's problem.

TEJAS SHARMA B N
6TH SEMESTER

INDUSTRIAL VISITS

One day industrial visit to 'Yuken India ltd.'on 25th February 2017 by IV Semester students.

One day industrial visit to 'Volvo Ltd.'on 27th May 2017 byVI Semester students.

DEPARTMENTAL ACTIVITIES

One Week Faculty Development Programme on "Recent advancement in Mechanical Engineering" was organized during 16th to 21st January 2017 by the department.

Classes were conducted from Feb-May 2017 by industry expert Shri.C N Prasad for VI Semester students on 'Advanced Production Engineering' topics.

Inauguration of IEI Students' Chapter

Issue of IEI Certificate by Er. Jasmail Singh, Honorary Secretary, IEI, Karnatakae

The Institution of Engineers (India) – BNMIT Students' Chapter under the department of Mechanical Engineering was inaugurated on 22nd February 2017 by **Er. Jasmail Singh.** Honorary Secretary, IEI, Karnataka State Centre. **Dr. EntiRanga Reddy,** Council Member, IEI, Mechanical Engineering Division Karnataka State Centre, **Sri. NarayanRao R. Manaay,** Secretary, BNMEI, **Prof. T. J Ramamurthy,** Director, BNMIT and **Dr. Krishnamurthy G.N,** Principal, BNMIT graced the occasion.

The 'IEI-BNMIT Student Chapter' organized a technical film show on "3D- Printing and Transparent IC Engines" on 8th March 2017. Akash Deep and Amith Narayan from IV semester addressed the students regarding the principle and operations

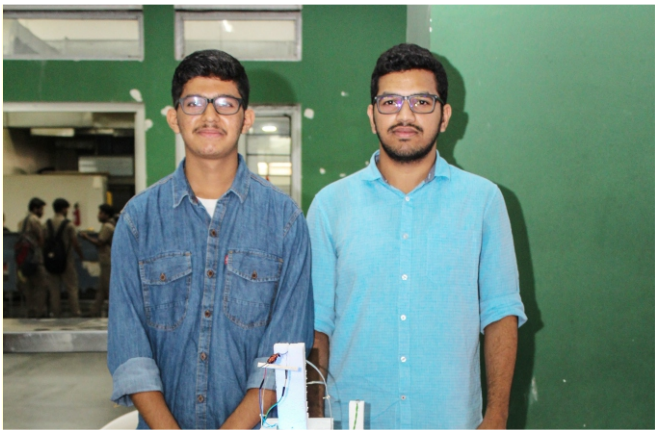
A Technical Talk on "CAD/CAM/CAE Software Application &Training "was conducted by SDS Pvt. Ltd. On 19th April 2017, as a part of 'IEI-BNMIT Student Chapter' activities

INNOVATIVE PROJECT LAB 2017

The department students set a record by bagging four prizes in the IPL finale.

The **Project Champions Award** was bestowed upon Shaik Mohammed Rizwan ,Shreyas S P, Reethan D L from VI Semester for their project 'Indigenously Built Prosthetic ARM using 3D printer', which was funded by the institution

The Best Project Award for IV semester was given to Abhishek B V, Aniruddha B V, Ganesh M Dixit, Nataraj N Badiger, for their project 'Easy Foot'



The Best Project Award for II semester was given to Akshar K Rand, Balaji F Savanoor for the project ‘Defosonic’

FACULTY ACHIEVEMENTS

- Prof.B. S. Anil Kumar completed the final viva-voce for his doctoral degree under VTU, Belgaum on 24th April,2017.He also presented a paper on " Computational Investigation of Flow Separation over NACA 23024 Airfoil at 3 million free stream Reynolds number using SpalartAllmaras Turbulence Model", International journal in the 61st congress of ISTAM, VIT University, Vellore, 11th to 14th December 2016.
- Shri.Saravanan.V has presented two papers in 2nd Biennial International Conference on Nascent Technologies in Engineering. Jan.2017 and First International & Eighteenth national ISME conference on Mechanical Engineering: Enabling Sustainable Development,also published a paper in International Journal of Research In Engineering And Technology.
- Shri.H S Kumaraswamy has presented a paper in International Conference on Materials, Manufacturing & Modeling. March 2017 and also published a paper in International Journal of Innovative Science and Research Technology, February 2017.
- Shri.Veeresh Bhusnur has published two papers in International Journal of Engineering Research & Advanced Technology, Feb 2017 and International Journal of Innovative Science and Research Technology,February 2017.
- Shri.Hemanth Kumar C has presented a paper in International Conference on Current trends in Engineering, Science & Technology. 2017 and published a paper in International Journal of Engineering Research & Advanced Technology, February 2017.
- Shri.Harish S has presented a paper in International Conference on Materials, Manufacturing & Modeling March 2017.
- Shri.Mahendra Kumar C has presented a paper in International Conference on Materials, Manufacturing & Modeling. March 2017.
- Shri.Madhu P has presented a paper in International Conference on Materials, Manufacturing & Modeling. March 2017.
- Shri.Arun Joshi has presented a paper in International Conference on Materials, Manufacturing & Modeling. March 2017.
- Shri.Vishnu P has presented a paper in International conference on advances in mechanical engineering sciences (ICAMES-2017), PES Mandya.

STUDENTS' ACHIEVEMENTS

Rahul Raj N. secured 10th rank in VTU for the academic year 2015-2016.

- **Praful S of VIII semester has been selected for pursuing PhD at IISc Bengaluru, with top ranking in GATE exam.**
  - **He is also selected for 'South Pole Expedition Team-2018' from IISc, Bengaluru.**
  - **He is a recipient of 'Raman Research Institute' fellowship for pursuing PhD.**
- **V.PrajwalRao of VIII semester has selected as 'Sub Lieutenant Permanent Commission- General Service (Executive) in Indian Navy.**
- **PruthvishriHegdeof VI semester was a runner up in state level inter collegiate memorial tournament, Kreedotsav 2017 held at BMS College of Engineering, Bengaluru from 3rd to 6th March 2017.**
- **Skanda Bhagavath of VIII semester has secured bronze medal in VTU intercollegiate inter zone cross country (Men& women) competition 2017-18, held at KIT, Tiptur from 4thto 5th April 2017.**
- **Aishwarya Kiran of VI semester has secured second place in 100 mts. running race and third place in shotput, held at BNMIT,annual athletic meet 2017.**
- **AishwaryaKiran,Aishwarya H.M,Pruthivshri and Prarthana of VI semesterhave secured second place in 4*100mts. relay held at BNMIT,annual athletic meet 2017.**
- **NischithN. of VI semester has got first place in 200mts. running race and second place in Javelin held at BNMIT,annual athletic meet 2017.**
- **Nischith N.,Kiran Kumar,Arun and Ganesh Dixit ofVI semesterhave secured first place in 4*100mts. relay held at BNMIT, annual athletic meet 2017.**
- **VIII semester and VI semester students were runners up in inter departmental Kabaddi(Men) held at BNMIT,annual athletic meet 2017.**
- **IISemester students have won inter department Football (Men),held at BNMIT,annual athletic meet 2017.**
- **Kiran Kumar C.and Nagpujit of IVsemesterhave won inter departmental Chess(Men), held at BNMIT,annual athletic meet 2017.**
- **IV semester and VI semester students were runners up in inter department Volley Ball(Men) held at BNMIT,annual athletic meet 2017.**
- **Akshar K R of II semester has secured Gold medal in INSEF Level-2 held at AIET, Moodbidri, from 20thto 21th May 2017.**

EDITORIAL TEAM

FACULTY
SUCHARITA MOHANTY
ASST. PROFESSOR

STUDENTS
PRAFUL S,VIII SEM
TEJAS SHARMA B N,VI SEM
DIPAK SRINIVAS,IV SEM 'A' & NAG PUJIT,IV SEM 'B'

For your kind suggestions& advices, kindly email to:mohantysucharita3@gmail.com