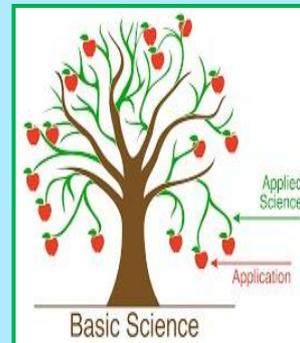


BNMIT *Sciencia*

Newsletter

Departments of Physics, Chemistry & Mathematics



Volume 1

Issue 1

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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.

Department of Physics

Vision

To be a department to address the needs of application of physics in Engineering.

Mission

- To provide knowledge of Engineering Physics needed for understanding engineering courses.
- To provide a platform to keep abreast with current happenings in Science & Technology.
- To engage faculty members in research, to enrich teaching-learning process.

Department of Chemistry

Vision

Impart concepts of engineering chemistry for students to comprehend its applications in engineering solutions.

Mission

- Provide understanding of applications of chemistry in engineering.
- Develop concern for environmental issues and responsibility for preserving green environment.
- To engage faculty members in research, to enrich teaching-learning process.

Department of Mathematics

Vision

Mould the students to acquire mathematical skills required for engineering education.

Mission

- Provide platform to acquire abilities to evaluate problems using analytical/numerical/graphical techniques.
- Provide a background for relating mathematical techniques to solve real life problems.
- To involve faculty in research which enriches teaching-learning process.

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B.N.M. Institute of Technology

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Message from the Editorial Team

Dear Readers,

Welcome to the first issue of our newsletter 'BNMIT Sciencia'.

The team of 'BNMIT Sciencia' is delighted to present the first issue of interesting and informative newsletter to our readers. The newsletter endeavors to reflect the values and the quality of our Institution. The presentation of the entire newsletter shows the innovative and creative indulgence of our students. A lot of thought and care has gone into the making of the newsletter.

We would like to express our appreciation to all those who have contributed articles in this issue. It is this willingness to make the effort to share knowledge, concerns and special insights that have made this issue possible.

About Departments

Department of Physics aims in training the future engineers with various aspects of fundamental physics, which makes them understand, develop and innovate, thus contributing to the advancement of technology. The Department has got well-established laboratory to provide good hands on experience of physics experiments to students, dedicated research laboratory and is actively engaged in research activities in the areas of Photo physics and Materials Science.

Department of Chemistry aims to impart high quality education by inspiring students to come out to compete globally. The Department has got well-equipped laboratory to provide individual attention to the students and also academically rich experienced and research oriented faculties in the areas of Corrosion, Medicinal Chemistry, Nano Technology and Pharmaceuticals.

Department of Mathematics is equipped with full fledged, experienced, highly academically oriented and research oriented faculties in the areas of Fluid Mechanics and Graph Theory. The Department has been witnessing excellent results consistently and every year a good number of students are scoring cent percent. It has fully fledged Research Centre, recognized by Visvesvaraya Technology University, Belagavi.

ARTICLE GALLERY

e-Management In Water Irrigation

Introduction:

e-management is an electronic device which calculates the amount of water required for lands which in turn suddenly reacts to the fluctuating evaporation rates and moisture by compensating for it by spraying water. In this system, the evaporation rate and moisture level both have been considered to make it more effective in working. Also it is possible to get live notifications or recordings to monitor the humidity in soil. In this device there is no complex interface or anything similar. Additionally there is no need to update the interface every time. It is very difficult to analyse the amount of water that is required for each plant per day manually. Therefore by using this we can easily analyse the requirement of water. This can be implemented into large forms such as paddy fields and areca nut farms etc.

This article mainly focuses on the way in which e-management can effectively be used to manage water resources of irrigation system and improve the yield of cultivation.



Implementation of e-Management in Agricultural Fields

The water requirement for agriculture varies based on the cultivated crop, its location and the weather season in a year.

The effective management of water for irrigation is very crucial in the near future owing to the continuous depletion of water resources. By making proper water management in cultivation, effective growth in yield can be seen with limited supply of water at right time and at right place.

The e-management device is implemented in agricultural fields in such a way that it calculates the amount of water required for each plant when the evaporation rate is increased and moisture rate is decreased, this gets activated and in turn waters the plants according to the requirements of each individual plant.

Benefits of e-Management

- Conservation of water.
- This is an autonomous management and there is no complex human interface.
- Cost effective.
- Analyses both environment and soil condition and reacts to balance the moisture level.
- This device can also be used for terrace gardening.
- Some plants requires constant humidity in soil, such plants also can be grown in terrace by connecting it with e-management device.
- It can be easily integrated into existing water irrigation system and does not require any constant supervision and less power is consumed.

Future Scope:

- 1 This device can be integrated with smart phones and other software technologies to make live notification of water level in reservoir and amount of water consumed by plants etc.
- 2 Government can introduce this system to manage vast irrigated lands for farmers to effectively manage their water resources to increase their yield.
- 3 This device can be integrated with drip and sprinkler irrigation systems.
- 4 This system can also be utilized in research activities in companies or organization to grow the plants in a controlled environment.

Akshar K R,

I semester ME

Futuristic Eye - Smart Contact Lenses

Introduction:

Smart contact lenses sound like science fiction. But there's already a race to develop technology for the contact lenses of the future — ones that will give you super-human vision and will offer heads-up displays, video cameras, medical sensors and much more. One of the coolest applications of smart contact lenses is the improvement of vision without glasses. In fact, these products are already being developed.



Diabetes is a huge and growing problem, affecting one in every 19 people on the planet; we may not be familiar with the daily struggle that many people with diabetes face. Uncontrolled blood sugar puts people at risk for a range of dangerous complications, including damage to the eyes, kidneys and heart. The blood sugar levels fluctuate throughout the day, they need to test levels often. Most diabetics do so using a finger stick, which can be painful and may dissuade them from doing it as often as they should, so here we have a safer and pain free alternative- Smart contact lenses.

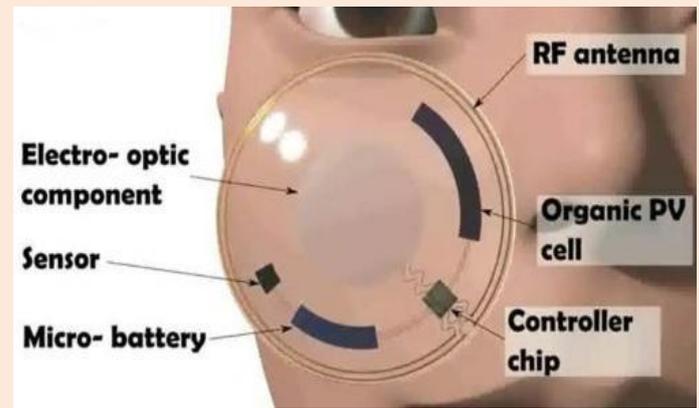
Glaucoma is the second most common cause for blindness. Smart contact lens aims to tackle glaucoma; it can tell if a patient's glaucoma is progressing especially quickly.

Digital contact lenses can be one of the medical technologies that will soon make diabetes and glaucoma an easily manageable condition besides, it has cameras, motion sensors and transmitters these will be able to overlay information on the physical world. The lenses would work with a connected phone allowing users to take photos and overlay information onto the real world, like a menu outside a restaurant for example.

Design of Smart Contact Lens

The lens consists of a wireless chip and a miniaturized glucose sensor. A tiny pinhole in the lens allows for tear fluid to seep into the sensor to

measure blood sugar levels. Both of the sensors are embedded between two soft layers of lens material.



Parts of a smart contact lens

The electronics lie outside of both the pupil and the iris so there is no damage to the eye. There is a wireless antenna inside of the contact that is thinner than a human's hair, which will act as a controller to communicate information to the wireless device. The controller will gather, read, and analyze data that will be sent to the external device via the antenna.

Medical Benefits of Smart Contact Lenses

- Assist people with diabetes by constantly measuring the glucose levels in their tears.
- Restore the eye's natural autofocus on near objects and clear vision to those who are farsighted (presbyopia).
- Lens consisting of graphene detects the entire infrared spectrum with visible and ultraviolet light – enhancing human vision by increasing the number of frequencies.

Future of Smart Contact Lenses

In terms of general health care, scientists hope to develop lenses which can accurately measure a person's cholesterol and even blood alcohol levels. This type of contact would map images directly in the wearer's field of vision without the use of glass.

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Ashmita Roy, Apoorva S, Bhumika V Raj,

Arshiya Firdouse and Disha Ramesh,

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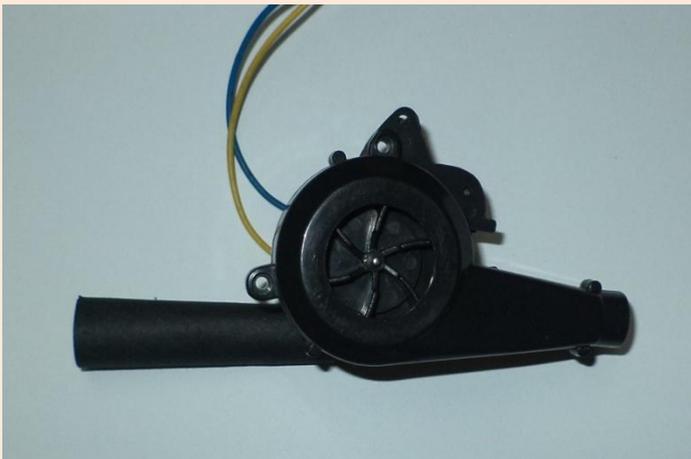
Micro Hydroelectric Power Generation

Introduction:

Generation of electricity from falling water can seem like magic, and that's led to lots of misconceptions. Here, we'll separate fact from fiction when it comes to what micro hydro systems can and cannot do. Residential-scale micro hydroelectric systems have the reputation of being the holy grail of home renewable-energy systems. Modern micro hydro equipment comes from proven technology based on designs that have changed very little over the decades. The causes and the effects of environmental problem arising from an unbalance approach and inappropriate technology such as large macro hydro power project are complex, interlocked and unmeasured. The only solution to these problems is to minimize the impacts by producing smaller power projects. This is where the micro hydro power generation plays a vital role, since they have low environmental impact and they produce low noise and pollution.

House water systems move large quantities of water through pipes from overhead tanks. Why not use that flow to generate electricity? Putting a hydroelectric generator in the pipes would take energy away from the flow, so you'd utilize the potential energy stored in water which would otherwise be wasted.

Product:



The equipment consists of a prime mover, dc dynamo and casing or body. The body consists of a nozzle at the inlet and a relatively large diameter outlet for free flow of water. It has space for the prime mover which can be placed inside and can rotate freely. The dc dynamo is fixed external to the body and is coupled to the prime mover using a shaft.

Advantages:

- Micro hydro power generation is an efficient energy source. Since the energy is generated by the water flow and no external source is required.
- It only takes a small amount of flow (as little as two gallons per minute) or a drop as low as two feet to generate electricity.
- It is a reliable electricity source since it produces continuous supply of electrical energy if there is continuous flow of water.
- Since it is continuous in producing electricity and not much complication in the system it is easy to maintain and the system is cost efficient.
- The main advantage of the system is its adaptability. It can be setup at any desired location due to its low cost and easy maintenance.

Limitations:

- Even though it is efficient, the output will be considerably low when compared to other resources if the flow of water is less.
- Hydro energy is reliable. But the word "micro" makes the difference. Hydro power at small scale usually doesn't give enough force to produce sufficient electricity.
- Since the power generated is less it can be used to light LED or charge small electronic equipments only.
- Since space is required under the tap, it cannot be installed in wash basins, unless the tap is changed.

Conclusion:

Micro-hydro power generators are more efficient for small scale energy production compared to other renewable sources of energy. Hence it can be used commercially as well as for house hold purpose with very low investment.

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Namratha V, Prahara D P,

Priyanka A & Priyanka R,

I semester ECE 'B'

3D – Holographic Projections

Introduction:

A hologram is a three-dimensional image, created with photographic projection. The term is taken from the Greek words holos (whole) and gramma (message). 3D holographic projection is one of the rapidly growing technologies. A 3D hologram projector works for Smart phone and is simple and is made up of transparent acrylic CD case, each side is a Trapezium of dimensions 1cm x 4.5cm x 5.5cm. Four such pieces are glued together to form a closed trapezoidal pyramid.



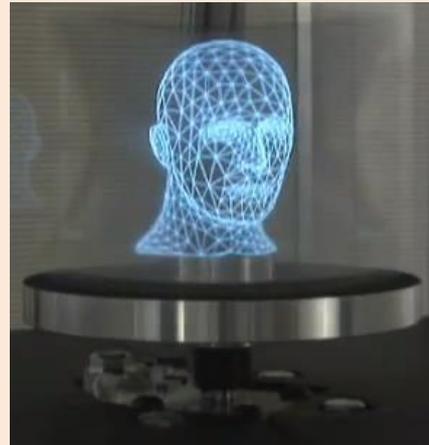
3D holographic projection technology helps project large-scale, high-resolution images on to free space, to accommodate multiple viewers independently and simultaneously. This technology has a tremendous effect on all fields of life including business, education, science, art, healthcare and a big future ahead. As this audio visual display continues to get high profile credibility, we are likely to see more companies advertising their products or marketing their business in this way. Whether it be large scale, big budget product launches or smaller retail POS systems, they are likely to become a common feature in the advertising world.

Principle: Physics of HOLOGRAPHY

The process of producing a holographic reconstruction is purely based on Interference and Diffraction. A simple hologram can be made by superimposing two plane waves from the same light source on a holographic recording medium. The two waves interfere giving a straight line fringe pattern whose intensity varies sinusoidally across the medium. The spacing of the fringe pattern is determined by the angle between the two waves and on the wavelength of the light. The recorded light pattern is a diffraction grating. When it is illuminated by only one of the waves used to create it, it reveals the information of the recorded hologram.

Future Prospects:

- Holography has been playing a major role in the technological development. In the present prospect we find the application of holography in data storage, security, and holographic interferometry, sensors, art and entertainment industry.
- While holography still remains as an important subject in the research institute with scope of further development.
- Holography is also being used to construct and reconstruct 3D projections of a human and animal body for easy post mortem research in the future and also to obtain endoscopic images without performing endoscopy by using applications of holographic images and lasers.



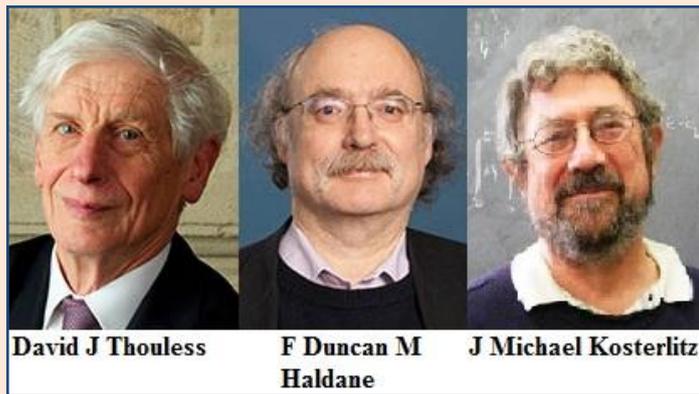
- Scientists have been doing research on holographic images to develop holographic friendly projecting televisions.
- Recently, holography has been upgraded to 7D animation in VOX cinemas to educate kids on animal behaviour, and also is a source of entertainment to project animated (wildlife and marine life) and horror cinemas as shown below.



*Ramya Prakash, Shravya A, Tina P,
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Physics: Strange Phenomena in Matter's

Flatlands



The Nobel Prize in Physics 2016 is awarded with one half to *David J. Thouless*, University of Washington, USA and the other half to *F. Duncan M. Haldane*, Princeton University, USA and *J. Michael Kosterlitz*, Brown University, USA for their “*Theoretical Discoveries of Topological Phase Transitions & Topological Phases of Matter*”.

This year's Laureates opened the door on an unknown world where matter can assume strange states. They have used advanced mathematical methods to study unusual phases, or states, of matter, such as superconductors, super fluids or thin magnetic films. Kosterlitz and Thouless have studied phenomena that arise in a flat world – on surfaces or inside extremely thin layers that can be considered two-dimensional, compared to the three dimensions (length, width and height) with which reality is usually described. Haldane has also studied matter that forms threads so thin they can be considered one-dimensional.

The three Laureates' use of topological concepts in physics was decisive for their discoveries. Topology is a branch of mathematics that describes properties that only change step-wise.

We now know of many topological phases, not only in thin layers and threads, but also in ordinary three-dimensional materials. Over the last decade, this area has boosted frontline research in condensed matter physics, not least because of the hope that topological materials could be used in new generations of electronics and superconductors, or in future quantum computers. Current research is revealing the secrets of matter in the exotic worlds discovered by this year's Nobel Laureates.

Source: Internet

Chemistry: Molecules became Machines



The Nobel Prize in Chemistry 2016 is awarded jointly to *Jean-Pierre Sauvage*, University of Strasbourg, France, *Sir J. Fraser Stoddart*, Northwestern University, USA and *Bernard L. Feringa*, University of Groningen, Netherland for the “*Design and Synthesis of Molecular Machines*” that are a thousand times thinner than a hair strand.

Molecular machines are squarely the creation of chemists-organic chemists in this case and, while tiny, they are monuments to human creativity. The chemists have a rich history of accomplishments in molecular construction, artfully putting together molecules found either in nature or in our imaginations a few atoms at a time. But molecular machines have the additional dimension of motion. In this regard, the Nobel Prize winners brought a moving pictures revolution to the field of organic chemistry. Movies starring molecular machines unveil a world where molecules are designed with autonomous functions, sometimes modulated by external stimuli such as light, metals, electrons, or protons. The Nobel Laureates paint a picture wherein these molecules work for us in next-generation computers, energy conversion materials, and delivery of drugs to cancer cells.

Now we can celebrate molecular machines for focusing attention on the mechanical bond with its unique properties and synthetic challenges. And on driving advances in spectroscopy that were needed to characterize interlocked or rotating ring systems in motion. Understanding the forces and energetics underlying a molecular machine's performance may shed light on how biological machines work, such as vesicle transport complexes, polyketide synthases, and the ribosome. Unlike their synthetic cousins, these natural molecular machines are difficult substrates for structure-activity relationship studies.

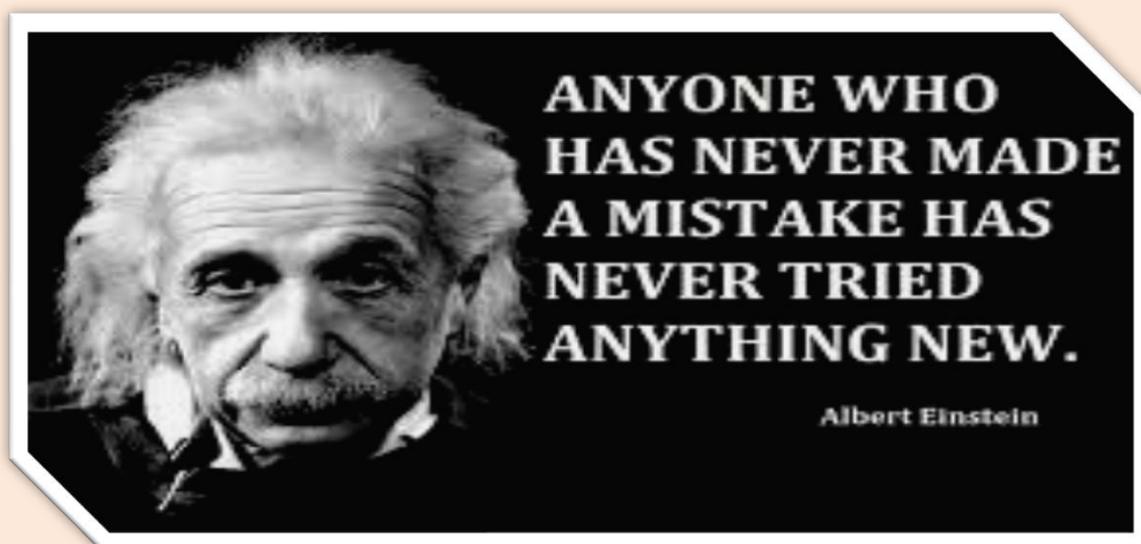
STUDENT'S ACHIEVEMENTS

Innovative Project Lab Winter - 2016 Competition for I Year BE students

The Best Project Award of Rs.5000/- was awarded to Akshar K R of I semester, Mechanical Engineering Department for his project entitled **“e-Management in Water Irrigation”**.



Akshar K R receiving award from Mr. Natarajan Chellappan, Head of AMS Transformation, Philips Account, Wipro, Bangalore



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