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DEPARTMENT OF **MECHANICAL ENGINEERING** **MECHITECH MAGAZINES** **2022**





SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE

DEPARTMENT OF MECHANICAL ENGINEERING

B.E. MECHANICAL ENGINEERING



VISION

- Produce competent Mechanical Engineering professionals with scientific temper, values, ethics, team spirit and capabilities to face new challenges.

MISSION

- Provide conducive learning environment with state-of-the-art infrastructure facilities, laboratories and teaching learning systems.
- Produce skilled Mechanical Engineers with skills towards employability, leadership, communication skills with social responsibilities and ethical values.
- Inculcate Professional skills to function as proficient engineers and designers capable of building sustainable equipment and infrastructure for the society.
- Promote research and development activities in the rapidly changing technologies related to Mechanical Engineering and allied areas.

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MESSAGE FROM HOD

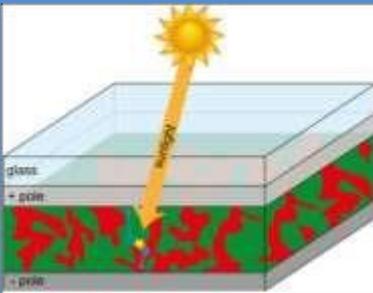
Mechanical Engineering is evergreen, dynamic, skill as well as knowledge-oriented Department. Students of this department always show their revolutionary attitude through activities. Department technical magazine, “TYRE KINGDOM” will be effective platform to show case the research and other academic thought of the students and faculties as individual sand team. We also welcome articles form from our alumni, academicians from other institute and industries to enrich our academic endeavors.

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PLASTIC SOLAR CELL TECHNOLOGY

Plastic solar cells consist of a plastic layer on glass or a flexible foil. In the lab, we use glass plates with a transparent electric contact [the positive (+) pole]. On top of this contact, we put the ink for the active layer—the most important layer of plastic solar cells. This layer is where sunlight is converted into charge, which is the part of the solar cell that converts sunlight to electricity. This ink contains two polymers, a long green one and a shorter red one. The polymers form a mixed layer, as shown in Figure. On top of that layer, we put a metal layer, which functions as the negative (−) pole. We then turn the whole stack of layers upside down such that sunlight can shine through the glass into the active layer.

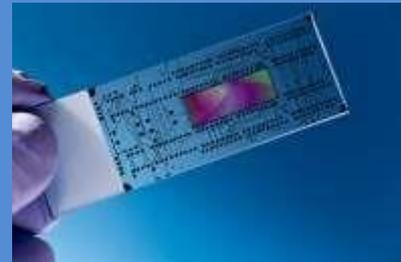


The drawn structure of red and green polymers in Figure 1 is exactly what we want! There is a lot of interface—the boundary between two materials, or area of contact, between the two polymers. This is necessary, because sunlight creates electrical charges only at the areas where the two polymers are in contact. When the light is absorbed (the yellow star), positive (+) and negative (−) electrical charges are generated. Normally, the + and − attract each other and the energy is lost. In plastic solar cells, the red and green polymers make sure the charges can be separated. The positive and negative charges then move to the + and − poles. Now, light is converted to moving charges, which is electricity! Think about how useful this is – we use free sunlight and two cheap plastics to make electrical energy!

BIO CHIP

Biochip is a collection of miniaturized test sites (microarrays) arranged on a solid substrate that permits many tests to be performed at the same time in order to achieve higher throughput and speed. Typically, a biochip's surface area is no larger than a fingernail. Like a computer chip that can perform millions of mathematical operations in one second, a biochip can perform thousands of biological reactions, such as decoding genes, in a few seconds.

A genetic biochip is designed to "freeze" into place the structures of many short strands of DNA (deoxyribonucleic acid), the basic chemical instruction that determines the characteristics of an organism.



Effectively, it is used as a kind of "test tube" for real chemical samples. A specially designed microscope can determine where the sample hybridized with DNA strands in the biochip. Biochips helped to dramatically accelerate the identification of the estimated 80,000 genes in human DNA, an ongoing world-wide research collaboration known as the Human Genome Project. The microchip is described as a sort of "word search" function that can quickly sequence DNA.

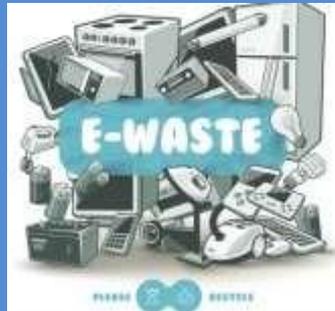
In addition to genetic applications, the biochip is being used in toxicological, protein, and biochemical research. Biochips can also be used to rapidly detect chemical agents used in biological warfare so that defensive measures can be taken.

E-WASTE

E-waste is electronic products that are unwanted, not working, and nearing or at the end of their useful life. Computers, televisions, VCRs, stereos, copiers, and fax machines are everyday electronic products.

The ongoing challenge of how best to dispose of used and unwanted electronics isn't a new one and dates back at least to the 1970s. But a lot has changed since then, particularly the number of electronics being discarded today.

We also have something else today: a term for this issue. After several terms got suggested, including —Digital rubbish, a consensus formed around the simple word —e-waste.



E-waste is any electrical or electronic equipment that's been discarded. This includes working and broken items that are thrown in the garbage or donated to a charity reseller like Goodwill. Often, if the item goes unsold in the store, it will be thrown away. E-waste is particularly dangerous due to toxic chemicals that naturally leach from the metals inside when buried. Today, though, a growing amount of e-waste is not considered to be products that have stopped working or become obsolete. Technological advances are coming at us at such a dizzying speed that a lot of electronic devices that still work fine are the ones considered obsolete. Think of the many VCR players that got replaced when the DVD player hit the market, and now the DVD players getting replaced by Blu-ray players. If a product is powered electronically and someone thinks they can create a better version, that contributes to e-waste.

SMART NOTE TAKER

This smart note taker is mostly used in NPTEL lectures. "Smart Note Taker" is the technology that satisfies the needs of people who want to take fast and easy notes. In this article, I am going to present What is Smart Note Taker and where we can use it in a detailed manner.

The smart note taker provides facility to people who want to make notes quickly. It can be used in many ways. This technology provides people with a facility of writing notes in the air while being busy in their work. The written notes are stored in the memory chip of pen and will be able to read in a digital medium after the conversation. This reduces time and facilitates life.



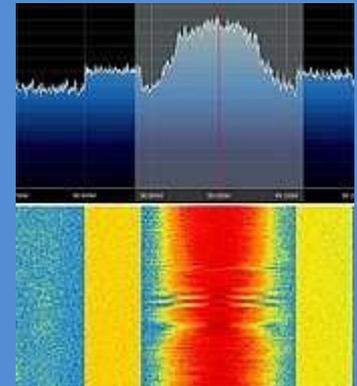
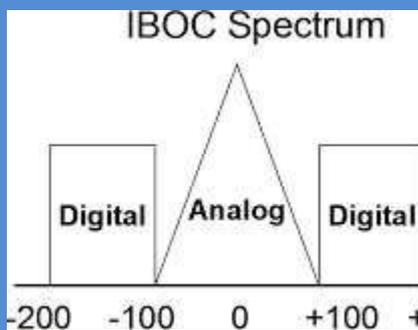
Applications of Smart NoteTaker:

Apart from this, it is also proved to be very useful for blinds who think and write freely. It is also very useful in telephonic conversations between two people where there is a need for note-taking. It's also useful especially for instructors in presentations. The instructors may not want to present the lecture in front of the board. The drawn figure can be processed and directly sent to the server computer in the room. The server computer then can broadcast the drawn shape through the network to all of the computers which are present in the room. Through this way, the lectures are aimed to be more efficient and fun. This product will be simple but powerful.

IBOC TECHNOLOGY

In-band on-channel (IBOC) is a hybrid method of transmitting digital radio and analog radio broadcast signals simultaneously on the same frequency. The name refers to the new digital signals being broadcast in the same AM or FM band (in-band), and associated with an existing radio channel (on-channel).

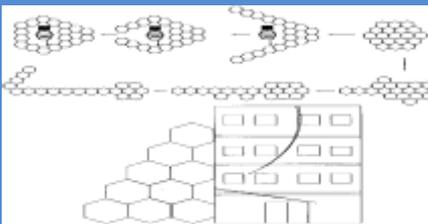
By utilizing additional digital subcarriers or sidebands, digital information is "multiplexed" on existing signals, thus avoiding re-allocation of the broadcast bands. IBOC relies on unused areas of the existing spectrum to send its signals. This is particularly useful in North America style FM, where channels are widely spaced at 200 kHz but use only about 50 kHz of that bandwidth for the audio signal. In most countries, FM channel spacing may be as close as 100 kHz, and on AM it is only 10 kHz. While these all offer some room for additional digital broadcasts, most attention on IBOC is in the FM band in North American systems; in Europe and many other countries, entirely new bands were allocated for all-digital systems.



Digital radio standards generally allow multiple program channels to be multiplexed into a single digital stream. In North American FM, this normally allows two or three high-fidelity signals in one channel, or one high-fidelity signal and several additional channels at medium-fidelity levels that are much higher quality than AM. For even greater capacity, some existing subcarriers can be taken off the air to make additional bandwidth available in the modulation baseband.

METAMORPHIC ROBOTS

Metamorphic robots are designed so that they can change their external shape without human intervention. One general way to achieve such functionality is to build a robot composed of multiple, identical unit modules. If the modules are designed so that they can be assembled into rigid structures, and so that individual units within such structures can be relocated within and about the structure, then self-reconfiguration is possible. These systems claim to have many desirable properties including versatility, robustness and low cost. Each module has its own computer, a rich set of sensors, actuators and communication networks. However, the practical application outside of research has yet to be seen. One outstanding issue for such systems is the increasing complexity for effectively programming a large distributed system, with hundreds or even thousands of nodes in changing configurations. Poly Bot has been developed through as third generation at the Xerox Palo alto Research Center. Conro robot built at the information sciences institute at the University of Southern California are examples for metamorphic robots.

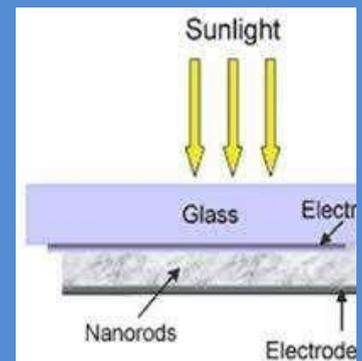
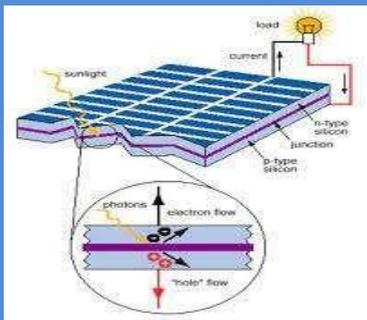


Versatility stems from the many ways in which modules can be connected, much like a child's Lego bricks. It can shape itself to a dog, chair or to a house by reconfiguration. The same set of modules could connect to form a robot with a few long thin arms and a long reach or one with many shorter arms that could lift heavy objects. For a typical system with hundred of modules, there are usually millions of possible configurations, which can be applied to many diverse tasks. Modular reconfiguration robots with many modules have the ability to form a large variety of shapes to suit different tasks. Figure 2 shows robot in the form of a loop rolling over a flat terrain. Figure shows an earthworm type to slither through obstacles.. Finally Figure 4 shows a spider form to stride over bumpy or hilly terrain.

IR PLASTIC SOLAR CELL

A photovoltaic cell (Solar Cell) is a device that works on the principle of Photovoltaic Effect which converts energy of sunlight directly into the electrical energy. This Photovoltaic Effect is the physical and chemical phenomenon. When these cells are exposed to sunlight then their electrical properties such as resistance, voltage and current are vary. Solar panels are formed by combining the number of solar cells by making electrical building blocks of photovoltaic structures. The single junction common silicon plastic solar cell can produce a maximum 0.5 to 0.6 volts (approx.) open-circuit voltage. The three basic attributes required for the operation of a PV cell:

- Generating electron -hole pairs and light absorption process.
- The process to separate opposite types charge carriers.
- Those extracted charge carriers are placed into external circuit.

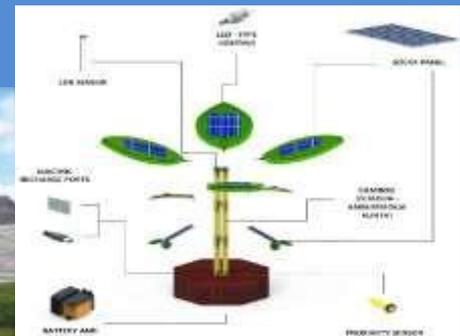


Basically conventional type solar cells Photovoltaic (PV) cells are made of special materials called semiconductors such as silicon, which is currently the most commonly used. Basically, when light strikes the cell, a certain portion of it is absorbed within the semiconductor material. This means that the energy of the absorbed light is transferred to the semiconductor. The energy knocks electrons loose, allowing them to flow freely.

SOLAR TREE

Solar trees are intended to bring visibility to solar technology and to enhance the landscape and architecture they complement, usually in a commercial or public context. An objective of many solar tree installations is to promote awareness, understanding, and adoption of renewable energy. They are not typically used as a primary source of energy for a property—that role is accomplished by rooftop solar systems. Solar trees are complementary to rooftop solar systems, or other green building measures, symbolizing these larger investments and their environmental benefit.

Solar trees may build awareness and interest in solar technology and also provide shade and meeting places. In botanical context phyllotaxy is the arrangement of leaves over a stem. Likewise the arrangement of solar panels in a solar tree has to ensure maximum efficiency in harnessing the solar energy ; one panel should not be covered by the shade of the upper panels. A simple design to ensure that is spiral phyllotaxy

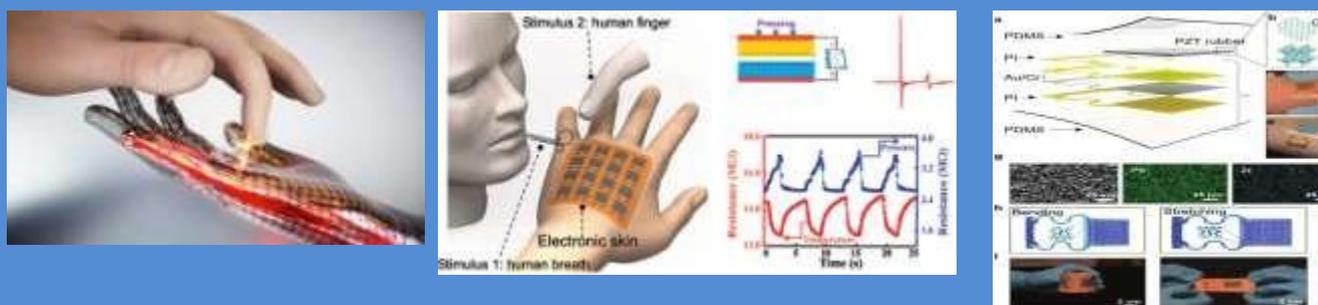


Solar tree is made of metal structure and have solar panels at the top instead of branches of real tree. Main body of solar tree is a simple hollow tube closed at one end to enable the attachment of the upper, smaller rod which should carry the upper panel. This panel is placed high above the other panels at a vertical angle. The angle provides a constant area for the sunlight regardless of the sun trajectory during the day. The height at where it is placed enables a greater panel area which will not cover the lower placed panels. The innovation is suitable for use in off-the-grid remote areas or in places that need point-sourced light like car parks and street lighting. Besides, with grid connectivity or battery store, the solar tree can also supply electricity wherever needed.

ELECTRONIC SKIN

Electronic skin refers to flexible, stretchable and self-healing electronics that are able to mimic functionalities of human or animal skin. The broad class of materials often contain sensing abilities that are intended to reproduce the capabilities of human skin to respond to environmental factors such as changes in heat and pressure.

Advances in electronic skin research focuses on designing materials that are stretchy, robust, and flexible. Research in the individual fields of flexible electronics and tactile sensing has progressed greatly; however, electronic skin design attempts to bring together advances in many areas of materials research without sacrificing individual benefits from each field. The successful combination of flexible and stretchable mechanical properties with sensors and the ability to self-heal would open the door to many possible applications including soft robotics, prosthetics, artificial intelligence and health monitoring.

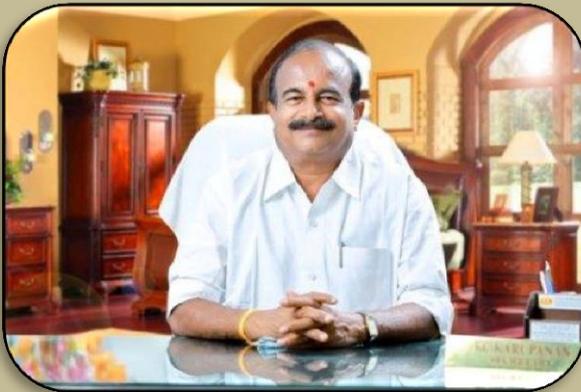


Recent advances in the field of electronic skin have focused on incorporating green materials ideals and environmental awareness into the design process. As one of the main challenges facing electronic skin development is the ability of the material to withstand mechanical strain and maintain sensing ability or electronic properties, recyclability and self-healing properties are especially critical in the future design of new electronic skins.

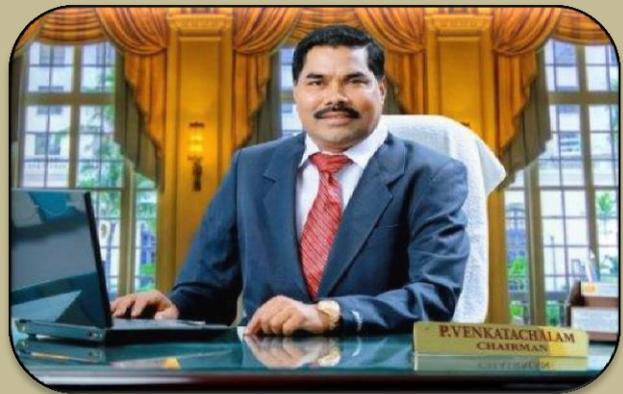
About the Institution

Shree Venkateshwara Hi-tech Engineering College, gifted with a serene atmosphere is located at Othakuthirai, near Gobichettipalayam, Erode. The College was founded by Shree Venkateshwara Educational and Charitable Trust in the year 2008 with the divine aim of educating the students of rural background. The College inculcates in students technical and innovative skills catering to the dire need of the present scenario. It imparts professionalism and critical thinking in them for a dynamic engineering career. It also sensitizes students to uphold academic excellence and become technically competent.

PATRON



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I feel it a privilege to launch the seventh and eighth edition of News Letter. I appreciate everyone who has taken sustained efforts in bringing out this edition successfully.