Department of Electronics and Communication Engineering

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e-SRUSHTI

An Innovative Bucket...

Technical Magazine

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NARAYANA ENGINEERING COLLEGE :: NELLORE
(APROVED BY AICTE, NEW DELHI & PERMANENTLY AFFILIATED TO JNTU, ANANTHAPURAMU)

Vision of the Institute

To be one of the nation's premier Institutions for Technical and Management Education and a key contributor for technological and Socio-economic development of the nation.

Mission of the Institute

- To produce technically competent Engineers and Managers by maintaining high academic standards, world class infrastructure and core instructions.
- To enhance innovative skills and multi disciplinary approach of students through well experienced faculty and industry interactions.
- To inculcate global perspective and attitude of students to face real world challenges by developing leadership qualities, lifelong learning abilities and ethical values.

Vision of the Department

To produce technically competent and creative engineers who can cater to the industry and societal requirements in the field of Electronics & Communication Engineering

Mission of the Department

- To impart quality engineering education to students to enhance ability to pursue knowledge by providing core competency and state of the art infrastructure.
- To provide industry oriented learning for empowering and facilitating the learner through industry institute interaction and leadership qualities.
- To promote participation in research and extension activities for addressing the social needs by providing value based education along with life-long learning abilities.

Program Educational Objectives(PEOs)

PEO_1 : Attain professional excellence or gain higher degree to face challenges posed by industry and society.

PEO_2 : Address complex problems in a responsive and innovative manner.

PEO_3 : Gain reputation by functioning effectively to address social and ethical responsibilities.

Program Specific Outcomes (PSOs)

PSO_1 : Domain Specific Knowledge: Implement electronic systems related to Electronics Devices &Circuits, VLSI, Signal processing, Microcomputers, Embedded and Communication Systems to fulfill the solutions to real world challenges

PSO_2 : Hardware Product Development: Apply the software and hardware tools in Analog and Digital Electronic circuit design to address complex Electronics and Communication engineering problems.

Program Outcomes(POs)

PO-1:Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2:Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3:Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4:Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5:Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO-6:The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7:Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8:Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9:Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10:Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11:Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROFESSOR DESK

The Department of Electronics and Communication Engineering is committed to render-quality and professional pedagogy to pioneering engineers. The ECE department provides opportunity for the students to learn and fulfill the industry demands of Communication Engineering. The Department has state of ail equipment, in various laboratories which is necessary to blend the theoretical & practical aspects of engineering. The Department offers Under Graduate program in Bachelors of Technology. The Department has faculty members having expertise in wide variety of fields in Electronics & Communication. The department has a strong industry institution interaction.

The Department magazine exemplifies the voyage transverse and exhibits the technical skills of our students.

Congratulations to the editorial team for their determined efforts in bringing out this edition of technical magazine. On this occasion, I convey my good wishes to the Students.

Dr. K. Murali
Professor,
HOD of ECE.

BUMP TECHNOLOGY

Vision & Goal Behind Bump Technology:

The applications and possibilities for bump are enormous. Bump was born as a simple iPhone app for swapping contact information created by our three founders, but as our user base grew, so did our vision.

Functionality:

1. Transmit files, content, photographs, videos, personal or technical data or any other type of information or data (collectively, "Content") which is false, inaccurate, misleading, defamatory, or libelous;

2. Transmit any Content that you have no rights to, or for which transmission by you would constitute infringement of third party intellectual property rights;

3. Transmit identification documents or sensitive financial information of yourself or any other person;

4. Transmit any viruses, malicious code, Trojan horses, worms, corrupted files, or any other similar software that may damage the operation of another's computer, data or property, or transmit any other harmful or code technology;

5. Bully, intimidate, or harass any User or member of the public;

6.Transmit Content that is obscene, hateful, threatening, pornographic, or that contains nudity or graphic or gratuitous violence;

7. Use the Application, the Bump Services or the Site to do anything fraudulent, unlawful, misleading, malicious, or discriminatory7. Use the Application, the Bump Services or the Site to do anything fraudulent, unlawful, misleading, malicious, or discriminatory;

8. Engage in any unruly, disruptive, unprofessional, or offensive conduct while using the Application, the Bump Services or the Site;

9. Violate any laws, third party rights, or any of our Policies;

10. Engage in unlawful multi-level marketing, such as a pyramid scheme, using the Application, the Bump Services or the Site;

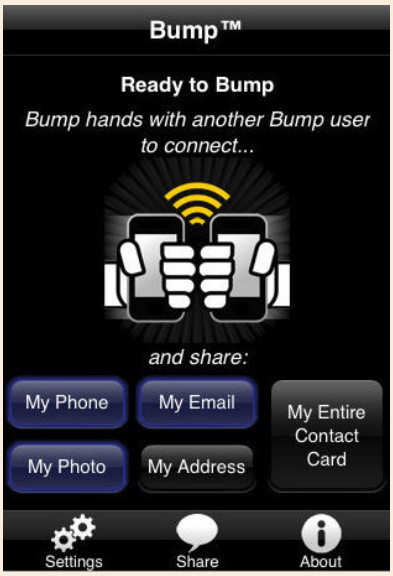
11.Transmit unauthorized commercial Content or commercial communications (such as spam) using the Application, the Bump Services or the Site

12. Collect third party or our content or information, or otherwise access the Application, the Bump Services or the Site using automated means (such as harvesting bots, robots, spiders, or scrapers) without our express advance written permission;

13. Use the Application, the Bump Services or the Site to collect Content from users for commercial or any other kind of use without first obtaining their consent and first making it clear you (and not us) are the one collecting their Content, and posting a privacy policy explaining what Content you collect and how you will use it;

14. Do anything that could disable, overburden, or impair the proper operation of the Application, the Bump Services or the Site, such as a denial of service attack;

15. Facilitate or encourage any violations of these TOS; and



Bump Services

Bump sends contact information, photos and files to another device over the internet.

Before activating the transfer, each user confirms what he or she wants to send to the other user.To initiate a transfer, two people physically bump their phones together. A screen appears on both users' smartphone displays, allowing them to confirm what they want to send to each other.

16. Use our Content or trademarks (including Bump and the Bump logo), or any confusingly similar marks (other than as part of your authorized use of the Application, the Bump Services or the Site), without our prior written permission.

We may remove and/or block transmission of any Content or information that you transmit using the Application, the Bump Services and/or Site if we believe it breaches the above representations and covenants. We may also, at our sole discretion, with immediate effect and without advance notice, restrict or terminate your access to the Application, the Bump Services and/or Site, upon your breach of any of the above representations and covenants. All judgments concerning the applicability of the above terms to your activity shall be at our sole and exclusive discretion.

Manufacturing Steps:

• Integrated circuits are created on the wafer

• Pads are metalized on the surface of the chips

• Solder dots are deposited on each of the pads

• Chips are cut

• Chips are flipped and positioned so that the solder balls are facing the connectors on the external circuitry

• Solder balls are then remelted (typically using hot air reflow)

• Mounted chip is "underfilled" using an electrically-insulating adhesive

Reasons for Bump Technologies:

1. Google gets more multitouch capabilities.

2. BumpTop could pave the way for a Google tablet

3. The Bump Technologies purchase is just one piece of Google's master plan.

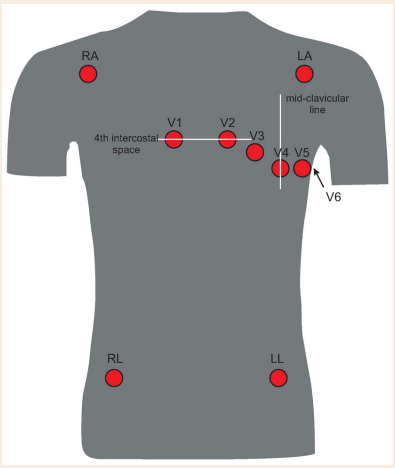
A. DIVYA
III E.C.E

ECG T-SHIRT

ECG T-shirt was devoloped with a portable recorder for unobtrusive and long-term multichannel ECG monitoring with active electrodes. A major drawback of conventional 12-lead ECGs is the use of adhesive gel electrodes, which are uncomfortable during long-term application and may even cause skin irritations and allergic reactions. Therefore, we integrated comfortable patches of conductive textile into the ECG T-shirt in order to replace the adhesive gel electrodes.

In order to prevent signal deterioration, as reported for other textile ECG systems, we attached active circuits on the outside of the T-shirt to further improve the signal quality of the dry electrodes.

Finally, we validated the ECG T-shirt against a commercial holter ECG with healthy volunteers during phases of lying down, sitting, and walking. The 12-lead ECG was successfully recorded with a resulting mean relative error of the RR intervals of 0.96% and mean coverage of 96.6%. Furthermore, the ECG waves of the 12 leads were analyzed separately and showed high accordance. The P-wave had a correlation of 0.703 for walking subjects, while the T-wave demonstrated lower correlations for all three scenarios (lying: 0.817, sitting: 0.710, walking: 0.403). The other correlations for the P, Q, R, and S-waves were all higher than 0.9. This work demonstrates that our ECG T-shirt is suitable for 12-lead ECG recordings while providing a higher level of comfort compared with a commercial Holter ECG.



ECG Measuring T-Shirt

Conclusion:

ECG T-shirt for 12-lead measurements with fully active and dry electrodes. A portable 12-lead ECG recorder was developed, which is compatible with the T-shirt. The system is portable and has a battery life of two days. To our knowledge, a 12-lead ECG which is compatible with the T-shirt. The system is portable and has a battery life of two days. To our knowledge, a 12-lead ECG T-shirt specifically with active electrodes has not been developed before. In a study with three volunteers, the functionality of the device was successfully compared with a commercial device in everyday scenarios. The relative error of the RR intervals was 0.96% with a mean coverage of 96.6%. The P-wave had a correlation of 0.703 for walking subjects, while the T-wave demonstrated lower correlations for all three scenarios (lying: 0.817, sitting: 0.710, walking: 0.403). The other correlations for the P, Q, R, and S-waves were all higher than 0.9. This work shows that a comfortable ECG T-shirt with active electrodes is suitable for 12-lead ECG recordings.

ECGs is the use of adhesive gel electrodes, which are uncomfortable during long-term application and. may even cause skin irritations and allergic reactions. Therefore, we integrated comfortable patches. of conductive textile into the ECG T-shirt in order to replace the adhesive gel electrodes. The garment wirelessly transmits the wearer's heart rhythm to a mobile device and can accurately identify an unusual heart rhythm that could cause a sudden cardiac arrest. The monitoring T-shirt uses a single lead ECG and movement-reducing hardware to offer more accurate readings during exercise. An ECG is often used alongside other tests to help diagnose and monitor conditions affecting the heart.

C. HIMAJA
III E.C.E

3-DIMENSIONAL PRINTING

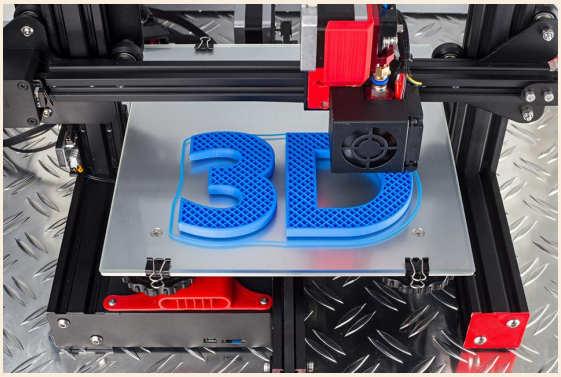
3D printing is a form of additive manufacturing technology where a three-dimensional object is created by laying down successive layers of material. It is also known as rapid prototyping, is a mechanized method whereby 3D objects are quickly made on a reasonably sized machine connected to a computer containing blueprints for the object.

This revolutionary method for creating 3D models with the use of inkjet technology saves time and cost by eliminating the need to design; print and glue together eparate model parts. Now, you can create a complete model in a single process using 3D printing. The basic principles include materials cartridges, flexibility of output, and translation of code into a visible pattern.

3D Printers are machines that produce physical 3D models from digital data by printing layer by layer. It can make physical models of objects either designed with a CAD program or scanned with a 3D Scanner. It is used in a variety of industries including jewelry, footwear, industrial design, architecture, engineering and construction, automotive, aerospace, dental and medical industries, education and consumer products.

Algorithm:

The algorithm used in the Inkjet 3-D Printing is depicted in the figure mentioned below.



3D Printing Technology

A 3-D prototype of a desired object is created in three basic steps and these steps are:

- Pre-Process
- 3-D Printing
- Post-Process

The 3D printer runs automatically, depositing materials at layers .003 thick. This is roughly the thickness of a human hair or sheet of paper. The time it takes to print a given object depends primarily on the height of the design, but most designs take a minimum of several hours. The average cost for printing a full color prototype is somewhere between 50 - 100 $.

3D printing has a bright future, not least in rapid prototyping (where its impact is already highly significant), but also in medicine the arts, and outer space. Desktop 3D printers for the home are already a reality if you are prepared to pay for one and/or build one yourself.

3D printers capable of outputting in color and multiple materials also exist and will continue to improve to a point where functional products will be able to be output. As devices that will provide a solid bridge between cyberspace and the physical world, and as an important manifestation of the Second Digital Revolution, 3D printing is therefore likely to play some part in all of our futures. By the early 2010s, the terms 3D printing and additive manufacturing evolved senses in which they were alternate umbrella terms for additive technologies, one being used in popular language by consumer-maker communities and the media, and the other used more formally by industrial end-use part producers, machine manufacturers, and global technical standards organizations. Until recently, the term 3D printing has been associated with machines low in price or in capability.3D printing and additive manufacturing reflect that the technologies share the theme of material addition or joining throughout a 3D work envelope under automated control.

E. KOWSHIK
III E.C.E

HYBRID SCOOTER

A Hybrid electric vehicle is a vehicle which relies not only on batteries but also on an internal combustion engine which drives a generator to provide the electricity and may also drive a wheel. It has great advantages over the previously used gasoline engine that drives the power from gasoline only.It is a major source of air pollution. The objective is to design and fabricate a two-wheeler hybrid electric vehicle powered by both battery and gasoline (PETROL). The combination of both the power makes the vehicle dynamic in nature over conventional automobiles.

Hybrid electric vehicles combine an electric motor, battery and power system with an internal combustion engine to achieve better fuel economy and reduce toxic emissions. Equipment and their cost analysis are done. It deals with the fabrication of the vehicle. The final stage would consist of increasing the efficiency of the vehicle in economic ways.

The objective of this project aims at better utilization of fuel energy and reduces dependence on non-renewable resources using latest technology. The implementation involves development of HEV that uses battery as well as gasoline power for propulsion of vehicle. A 'gasoline-electric hybrid vehicle' is an automobile which relies not only on gasoline but also on electric power source. In HEV, the battery alone provides power for low-speed driving conditions. During long highways or hill climbing, the gasoline engine drives the vehicle solely. Hybrid electric vehicles comprise of an electric motor, inverter, battery as electric drive and an internal combustion engine with transmission connected as gasoline-based drive. It has great advantages over the previously used gasoline engine that is driven solely from gasoline. This hybrid combination makes the vehicle dynamic in nature and provides its owner a better fuel economy and lesser environmental impact over conventional automobile.

The work discloses a hybrid system consisting of an Electric and Internal Combustion(IC) based power drives.

The front wheel is being propelled by battery and the rear wheel is powered by gasoline, i.e, it includes a single cylinder, air cooled internal combustion engine and a BLDC motor based electric power drive used for hybrid powering of the vehicle. The controller is designed to implement the switching between IC Engine and Electric motor depending on the power requirement and load conditions.

The vehicle at lower speed act as front wheel drive and at high speed gets switched to rear wheel drive automatically. Component 1 in below Figure shows the attachment of tyre with the hub motor (2). There is no need for any gear reduction since the torque produced is sufficient enough to drive the vehicle. The axel of the motor is connected to the suspension (3). Suspension is connected to the handle which is connected to the main chassis. Accessories such as headlamp (4), display (6) are included as user aid. A microcontroller (7) powered up from battery, performs the switching from electric to internal combustion or vice versa as per the requirement. It senses throttle position and controls the hub motor speed via controller circuit and the IC Engine via servo motor to control speed of rear wheel.

Due to space constraints, two batteries (16) are placed in front and two are placed near the fuel tank. Engine (10) is connected to the main chassis and seat (9) is situated above the engine. CVT is connected to the crank shaft of the engine to avoid any shocks while switching and it makes the controlling simpler and easier. In HEV, the battery alone provides power for low-speed driving conditions where internal combustion engines are least efficient. In accelerating, passing, or hill climbing where high power is required battery provides power to electric motor as an additional power to assist the engine.

This allows a smaller, more efficient engine to be used. A throttle position sensor (TPS) is a sensor used to monitor the position of the throttle in an internal combustion engine. It consists of a hall sensor. When the accelerator throttle angle changes magnetic field is created and it creates voltage across position

sensor terminal. Thus for various angles, various voltages are obtained. Displacement in the accelerator. The analog voltage generated is converted to digital through ADC and is given to microcontroller. If the speed corresponding to the angle deviation in accelerator is less than 30km/hr then the relay is switched on. The relay switching completes the circuit of the battery, inverter and hub motor; and vehicle is motioned by electric power. If the speed directed by accelerator is greater than 30km/hr, then the engine is started by closing the circuit of starting motor through a relay. The starting motor circuit is activated for five hundred milliseconds such that the vehicle is started. Once the vehicle starts the valve of engine for gasoline intake opens by servo motor. The amount of opening is controlled by the PWM generated by the microcontroller as directed by the accelerator.

Conclusion:

HEV is a vehicle that uses two sources of power-gasoline and battery. For low power application battery drive is used whereas for high power application where power requirement is very high gasoline engine is used. Gasoline drive is most efficient at high speed drive. Thus HEV‟s both mode of operation occurs at their maximum efficiency. But in gasoline engine low speed operation is not efficient. Its high-speed mode is only efficient. Therefore, it gives twice the mileage given by a normal vehicle. As this hybrid vehicle emits 50% less emission than normal vehicle it plays an important role for reducing pollution to certain extent without compromising with efficiency.

Hybrid Scooter

K. NIVEDITHA
III E.C.E

ELECTRONICS PILLS

“Electronic Pills - Collecting Data inside the body” After years of investment and development, wireless devices contained in swallowable capsules are now reaching the market. Israel-based Given Imaging and the researchers at the University of Buffalo in New York have developed ingestible capsules that record data from inside your body. These pills contain sensors or tiny cameras that collect information as they travel through the gastrointestinal tract before being excreted from the body a day or two later. These new electronic inventions transmit information such as acidity, pressure and temperature levels or images of the esophagus and intestine to your doctor's computer for analysis. Doctors often use invasive methods such as catheters, endoscopic instruments or radioisotopes for collecting information about the digestive tract. So device companies have been developing easier, less intrusive ways, to gather information. Digestive diseases and disorders can include symptoms such as acid reflux, bloating, heartburn, abdominal pain, constipation, difficulty swallowing or loss of appetite. New electronic inventions "One of the main challenges is determining just what is happening in the stomach and intestines." says Dr. Anish A. Sheth, Director of the Gastrointestinal Motility Program at Yale-New Haven Hospital. Doctors can inspect the colon and peer into the stomach using endoscopic instruments. But some areas cannot be easily viewed, and finding out how muscles are working can be difficult. Electronic pills are being used to measure muscle contraction, ease of passage and other factors to reveal information unavailable in the past.

Micro Electronic Capsule

A. MANASA
II E.C.E

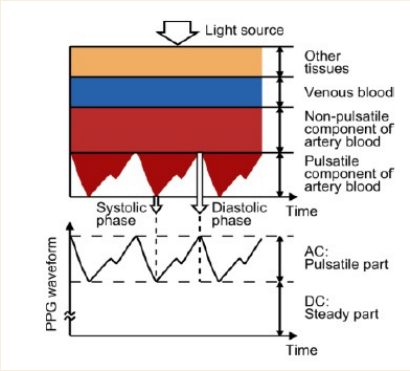
WEARABLE PHOTOPLETHYSMOGRAPHY SENSORS

It is important to monitor the perfusion of the circulation. The most important cardiopulmonary parameter is blood pressure, but monitoring it is complicated. A second important parameter is blood flow, which is related to blood pressure. We can monitor the blood perfusion in large vessels using ultrasound devices, but it is not practical to use these routinely. Several devices for monitoring blood perfusion have been developed but, unfortunately, it is difficult to find a practical device. However, the perfusion of blood flow and blood pressure can be determined easily using a pulse rate monitor. Wearable pulse rate sensors based on photoplethysmography (PPG) have become increasingly popular, with more than ten companies producing these sensors commercially. The principle behind PPG sensors is optical detection of blood volume changes in the microvascular bed of the tissue.

The sensor system consists of a light source and a detector, with red and infrared (IR) light-emitting diodes (LEDs) commonly used as the light source. The PPG sensor monitors changes in the light intensity via reflection from or transmission through the tissue. The changes in light intensity are associated with small variations in blood perfusion of the tissue and provide information on the cardiovascular system, in particular, the pulse rate. Due to the simplicity of this device, wearable PPG pulse rate sensors have been developed. This review describes the basic principles of PPG, previous and current developments in wearable pulse rate monitors with a light source, and the elimination of motion artifacts.

PhotoPlethysmoGraphy (PPG):

Light travelling though biological tissue can be absorbed by different substances, including pigments in the skin, bone, and arterial and venous blood. Most changes in blood flow occur mainly in the arteries and arterioles (but not in the veins). For example, arteries contain more blood volume during the systolic phase of the cardiac cycle than during the diastolic phase. PPG sensors optically detect changes in the blood flow volume.

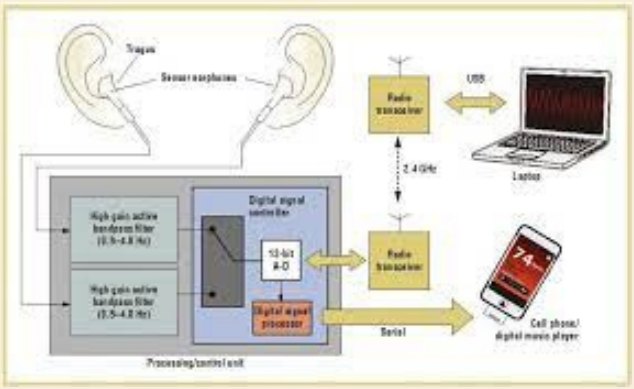


Blood Pressure Monitoring

Figure above shows an example of a photoplethysmography waveform, consisting of direct current (DC) and alternating current (AC) components. The DC component of the PPG waveform corresponds to the detected transmitted or reflected optical signal from the tissue, and depends on the structure of the tissue and the average blood volume of both arterial and venous blood. Note that the DC component changes slowly with respiration. The AC component shows changes in the blood volume that occurs between the systolic and diastolic phases of the cardiac cycle; the fundamental frequency of the AC component depends on the heart rate and is superimposed onto the DC component.

Conclusion:

Wearable PPG sensors have become very popular. Although a great deal of progress has been made in the hardware and signal processing, an acceptable wearable PPG sensor device has yet to be developed. Green light sources in PPG sensors minimize motion artifacts.



PhotoPlethysmoGraphic System

V. AMULYA NAYANA
II E.C.E

HELIO DISPLAY

Heliodisplay images are not holographic although they are free-space, employing a rear projection system in which images are captured onto a nearly invisible plane of transformed air.

The audience see a floating mid-air image or video. These projected images and video are actually two-dimensional but appear 3D since there is no physical depth reference.

Conventional displays have the benefit of being enclosed in a solid frame or case with lights shining directly towards the audience. Heliodisplay projections are suspended in thin air, so you will notice some waviness to the screen stability and the intensity and clarity of the image is subject to ambient light conditions and optimisation of display settings.

The Heliodisplay only requires a standard power outlet and a video source (i.e. computer, DVD, video etc). The system is compatible with most video sources currently available. Heliodisplay uses a standard monitor VGA connection; for TV or DVD viewing, it connects using a standard video cable. The Heliodisplay can be concealed (i.e. into furniture) and hidden away from sight and thereby creating an unobtrusive display.

It works as a kind of floating touch screen, making it possible to manipulate images projected in air with your fingers, and can be connected to a computer using a standard VGA connection. It can also connect with a TV or DVD by a standard RGB video cable.

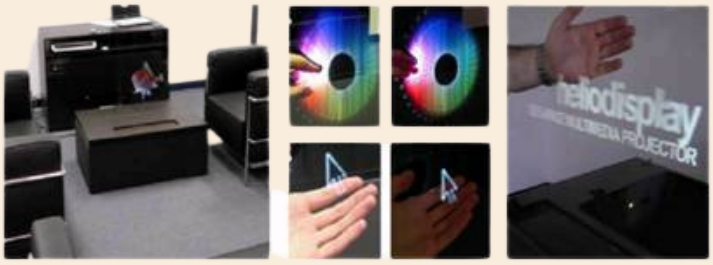


Image under various ambientlight conditions

Heliodisplay images are easily viewed in an office environment. Like any computer monitor or TV, images appear brighter the lower the ambient light. Also, just like viewing any computer monitor or TV, viewing a Heliodisplay image in direct sunlight is almost impossible.

Although Heliodisplay images are easily viewed in an office environment, this system is unique, and therefore has to compete with its surroundings, so contrast becomes paramount for optimal viewing. Dark background emphasizes the contrast of the image and is highly encouraged when designing a location to view the display.

Viewing any type of display in direct sunlight is almost impossible and also applies to the Heliodisplay. Like any rear projection system, the images are best seen within 70Viewing requires no glasses.

The Heliodisplay uses no additives or chemicals, only plain tap water (you can also use distilled water, ionized water or demineralised water if desired). The screen is safe for human interaction and will not cause any harm of any kind.

Helio Display

Requirements:

The Heliodisplay requires a power outlet, and a computer, TV, DVD or alternate video source. The current version of the Heliodisplay projects a 22" to 42" (depending on model) diagonal image that floats above the device. The Heliodisplay system is backward compatible and accepts most 2D video sources (PC,TV, DVD, HDTV, Video game consoles). For connection to a computer, the Heliodisplay uses a standard monitor VGA connection; for TV or DVD viewing, it connects using a standard RGB video cable.

Heliodisplay images are easily viewed in an office environment. Like any computer monitor or TV, images appear brighter the lower the ambient light. Also, just like viewing any computer monitor or TV, viewing a Heliodisplay image in direct sunlight is almost impossible.

The Heliodisplay is interactive, like a virtual touchscreen. A hand or finger can act as a mouse. No special glove or pointing device is required. Just as you use a mouse to move the cursor on a traditional computer monitor, you can use your finger to move the cursor around the Heliodisplay image (see: Images & Videos). The Heliodisplay connects to a computer (at least: Pentium III 400MHZ;25MB free disk space;Win2000/XP) through a USB port.

Operating the device will not change a room's environment, air quality or other conditions. Air comes into the device, is modified then ejected and illuminated to produce the image. Nothing is added to the air so there isn't any harmful gas or liquid emitted from the device. If a Heliodisplay were left running for a week in a hermetically sealed room, the only change to the room's environment would be from the electricity used to run the device. Although the Heliodisplay uses lasers, the images are not holographic.

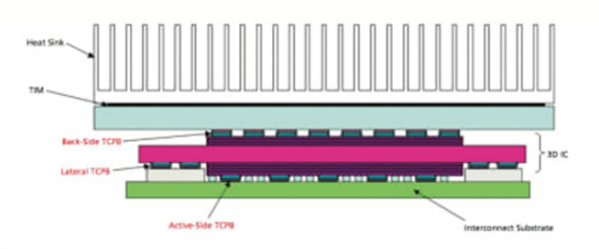
The image is display into two-dimensional space (i.e. planar). Heliodisplay images appear 3D when viewed from more than a few feet away because there is no physical depth reference. Images can be seen up to 75 degrees off aspect for a total viewing area of over 150 degrees-similar to an LCD screen. Viewing requires no special glasses or background/foreground screening.

Heliodisplay can operate as a free-space touchscreen when the equipment is ordered as an interactive unit with embedded sensors in the equipment. The original prototype of 2001 used a PC that sees the Heliodisplay as a pointing device, like a mouse. With the supplied software installed, one can use a finger, pen, or another object as cursor control and navigate or interact with simple content. As of 2010, no computer or drivers are required. The interactive version ("i") of the heliodisplay contains an embedded processor that controls these functions internally for single touch, or multiple touch interactivity using an equipment mounted arrangement but without the IR laser field found on the earlier versions.

E. AMULYA
II E.C.E

THE THERMAL COPPER PILLAR BUMP

The Thermal Copper Pillar Bump, also known as the thermal bump or TCPB, is a thermoelectric device made from thin-film thermoelectric material embedded in flip chip interconnects (in particular Copper Pillar Bumps) for use in electronics and optoelectronic packaging, including flip chip packaging of CPU and GPU integrated circuits (chips), laser diodes, and semi-conductor optical amplifiers (SOA). Unlike conventional solder bumps that provide an electrical path and a mechanical structure for connection to the package, thermal bumps act as solid-state heat pumps and add thermal management functionality on the surface of a chip or other electrical component. The diameter of a thermal bump is 238 μm (microns) and they are 60 μm high.

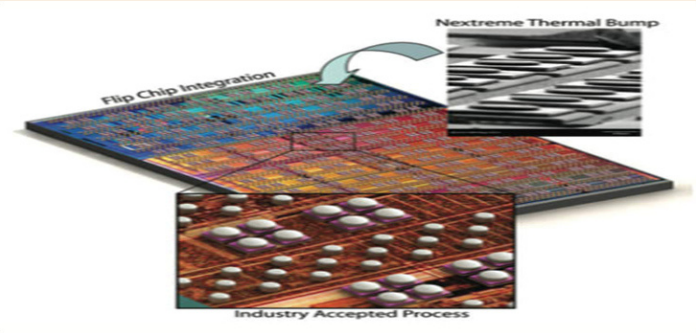


View of Thermal Copper Pillar Bump

Implementing Thermal Bumps in New Product Designs:

Thermal issues are dominating today's electronic product design landscape as never before. It is easy to see this in Intel's move to a multi-core architecture as a methodology to manage their thermal problems. Of course, less than optimal solutions lead to less than optimal results. Thermoelectric devices (TECs) have been used in the optoelectronics industry for thermal management, but have not found wide-spread acceptance in electronic product design.

General cooling: TECs can be evenly distributed across the surface of a chip to provide an evenly distributed cooling effect or they can be placed to locally cool a hot spot. In the former case, these devices are typically placed in the heat spreader or heat sink to provide cooling in the form of an active heat sink or heat spreader.



Thermal Copper Pillar Bump IC

Hotspot cooling:
In microprocessors, graphics processors, and other high-end chips, hotspots can occur as power densities vary significantly across a chip. These hotspots can severely limit the performance of the devices. Today this problem has been placed on the back burner through the use of multi-core architecture but it is inevitable that in a few years it will come back.

Precision temperature control:
Since thermoelectric devices can be used to either cool or heat the chip, depending on the direction of the current flow, they can be used to provide precision control of temperature for chips that must operate within specific temperature ranges irrespective of ambient conditions. This is a common problem for many opto-electronic components.

Power generation:
In addition to chip cooling, thermally active devices can also be applied to high heat-flux interconnects to provide a constant, steady source of power for energy scavenging applications. Such a source of power, typically in the mW range, can trickle-charge batteries for wireless sensor networks and other battery-operated systems.

Summary:
A new opportunity exists to begin next-generation electronic product design by including chip and module-level thermal management directly into the packaging process. In the same manner that silicon shrinks have made electronic products ubiquitous in our daily lives, so will shrinking the physical scale of thermal management materials

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CRYPTOCURRENCY

We have heard about the term "Cryptocurrency", which is blooming in the investment market today. The digital currency is taking the world to a new direction. According to a market research company, around 13,000 different cryptocurrencies exist in the market. Different countries have their different opinions on crypto-currency.

Cryptocurrency:

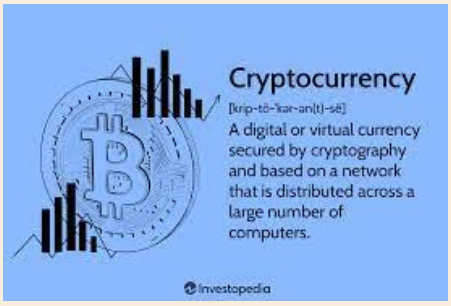
Cryptocurrency is a virtual currency, which means it does not exist physically like an Indian currency. It can be used as a medium of online exchange. The word "Cryptocurrency" is derived from the technique which is used to encrypt the network. There are two ways to gain crypto-currency. First by online investing, secondly, by mining crypto currency.

Various countries have accepted crypto-currency as legal tender whereas some countries had banned and considered crypto as illegal.However, the rules for cryptocurrency are not very clear in India, hence investing could be risky. Although crypto is legal but is not accepted as a legal tender in India.

Some Famous Cryptocurrency:

Bitcoin (BTC): Bitcoin is the first crypto-currency developed in 2009.It is one of the famous cryptocurrencies.It also makes use of Blockchain technology.

Ethereum (ETC): Vitalik Buterin created Ethereum in 2013. In terms of market capitalization, Ethereum or simply Ether stood second after Bitcoin. Ethereum 2.0, an upgraded series of Ethereum is also implemented.



Bitcoin - Form of Cryptocurrency

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