DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

e-SRUSHTI

An Innovative Bucket...

TECHNICAL MAGAZINE

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CONTENTS

NARAYANA ENGINEERING COLLEGE :: NELLORE
(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUA, Anathapuramu)
ACCREDITED WITH GRADE A+ NAAC

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)

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

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.

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.

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.

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

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.

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.

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

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

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.

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.

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

As a part of nurturing the students with qualities like teamwork, technical skills and a glimpse of the competitive world of engineering and technology we are encouraging students to publish articles in the frontier areas of electronics and communication engineering.

I am confident that all the faculty members and student community involved with this magazine have put their efforts in this in a way that the magazine both entertains and ignites the reader's mind.

I express my considerable appreciation to all the authors of the articles in this magazine. These contributions have required a generous amount of time and effort. It is this willingness to share knowledge, concerns and special insights with fellow beings that has made this magazine possible.

Dr. K.S. Sagar Reddy
Professor,
Dept. of ECE.

Smart Note Taker

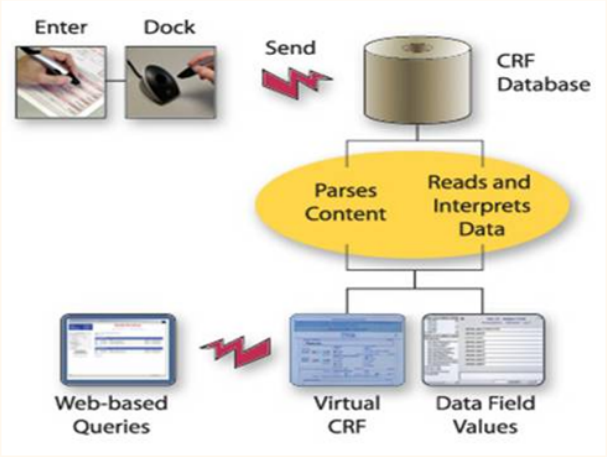
The Smart Note Taker is such a helpful product that satisfies the needs of the people in today's technologic and fast life. This product can be used in many ways. The Smart NoteTaker provides taking fast and easy notes to people who are busy one's self with something. With the help of Smart NoteTaker, people will be able to write notes on the air, while being busy with their work.

The written note will be stored on the memory chip of the pen, and will be able to read in digital medium after the job has done. This will save time and facilitate life. The Smart NoteTaker is good and helpful for blinds that think and write freely. Another place, where our product can play an important role, is where two people talks on the phone. The subscribers are apart from each other while their talk, and they may want to use figures or texts to understand themselves better. 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 network to all of the computers which are present in the room. By this way, the lectures are aimed to be more efficient and fun. This product will be simple but powerful. The product will be able to sense 3D shapes and motions that user tries to draw. The sensed information will be processed and transferred to the memory chip and then will be monitored on the display device. The drawn shape then can be broadcasted to the network or sent to a mobile device.

Technical Definition of the Product:

In order to meet the technical requirements of the product we need Operating System Like Windows or Linux in order to implement software part of the project, Displacement Sensors to recognize the displacement of the pen in three dimensions, parallel cable to communicate with computer, software to solve the displacement data and finds the individual coordinate displacements in three axes and transform the data into text format, analog to digital converter to process analog displacement data and convert them into digital format, switch to control the pen and Rechargeable battery.



SMART NOTE TAKER

D. DINESH
16711A0421

Tri gate Transistors

Tri-Gate transistors, the first to be truly three-dimensional, mark a major revolution in the Semiconductor industry. The semiconductor industry continues to push technological innovation to keep pace with Moores Law, shrinking transistors so that ever more can be packed on a chip.

However, at future technology nodes, the ability to shrink transistors becomes more and more problematic, in part due to worsening short channel effects and an increase in parasitic leakages with scaling of the gate-length dimension. In this regard Tri-gate transistor architecture makes it possible to continue Moore's law at 22nm and below without a major transistor redesign.

The physics, technology and the advantages of the device is briefly discussed in this paper. Since their inception in the late 1950s, planar transistors have acted as the basic building block of microprocessors. The scaling of planar transistors requires the scaling of gate oxides and source/drain junctions. However, as these transistor elements become harder to scale, so does the transistor gate length. The scaling of planar transistors is getting more difficult due to the worsening electrostatics and short-channel performance with reducing gate-length dimension.

In a multigate device, the channel is surrounded by several gates on multiple surfaces, allowing more effective suppression of "off state" leakage current. Multiple gates also allow enhanced current in the "on" state, also known as drive current. These advantages translate to lower power consumption and enhanced device performance.

Non-planar devices are also more compact than conventional planar transistors, enabling higher transistor density which translates to smaller overall microelectronics state, also known as drive current. These advantages translate to lower power consumption and enhanced device performance. Non-planar devices are also more

compact than conventional planar transistors, enabling higher transistor density which translates to smaller overall microelectronics A new transistor architecture that can significantly improve the electrostatics and short-channel performance is the tri-gate transistor, as shown in Figure.

This transistor, which can be fabricated either on the SOI substrate or standard bulk-silicon substrate, has a gate electrode on the top and two gate electrodes on the sides of the silicon body.

The top-gate transistor has physical gate length LG and physical gate width WSi, while the side-gate transistor has physical gate length LG and physical gate width HSi.

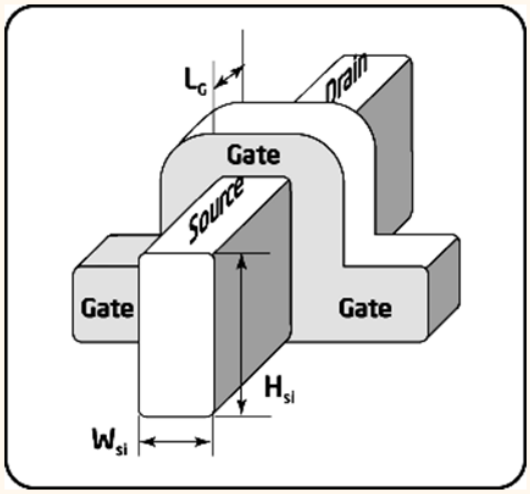
A multigate device or multiple gate field-effect transistor(MuGFET) refers to a MOSFET which incorporates more than one gate into a single device. The multiple gates may be controlled by a single gate electrode, wherein the multiple gate surfaces act electrically as a single gate, or by independent gate electrodes. A multigate device employing independent gate electrodes is sometimes called a Multiple Independent Gate Field Effect Transistor or MIGFET. Multigate transistors are one of several strategies being developed by CMOS semiconductor manufacturers to create ever-smaller micro

processors and memory cells, colloquially referred to as extending Moore's Law which states that the number of transistors on a chip will double about every two years. Intel has kept that pace for over 40 years, providing more functions on a chip at significantly lower cost per function.

Other complementary strategies for device scaling include channel strain engineering, silicon-on-insulator-based technologies, and high-k/metal gate materials.

In a multigate device, the channel is surrounded by several gates on multiple surfaces, allowing more effective suppression of "off-state" leakage current. Multiple gates also allow enhanced current in the "on" state, also known as drive current.

Tri-gate or 3-D are the terms used by Intel Corporation to describe their non-planar transistor architecture planned for use in future microprocessors. These transistors employ a single gate stacked on top of two vertical gates allowing for essentially three times the surface area for electrons to travel. . This allows up to 37% higher speed, and a power consumption at under 50% of the previous type of transistors used by Intel. Intel explains, "The additional control enables as much transistor current flowing as possible when the transistor is in the 'on' state (for performance), and as close to zero as possible when it is in the 'off' state (to minimize power), and enables the transistor to switch very quickly between the two states (again, for performance)." Further to increase the drive strength for increased performance, multiple fins are used.



3-D VIEW OF TRI GATE TRANSISTOR

MD. ESHRATH
16711A0483

Ultra Capacitors

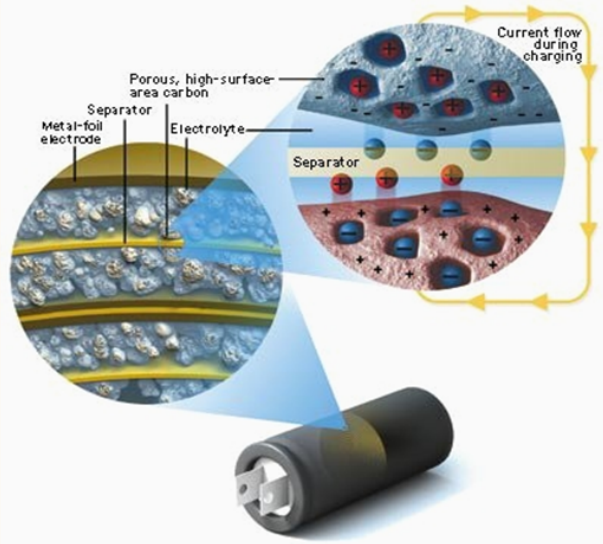
Almost everything we use requires a battery (computers, mobile cell phones, flashlights, hybrid electric cars, personal entertainment devices like Ipod, etc).

Recent work at MIT's Laboratory for Electromagnetic and Electronic Systems (LEES) offers the most economically viable alternative to conventional batteries in more than 200 years. The Ultracapacitor is both a battery and a capacitor.

Ultracapacitors could allow laptops and cell phones to be charged in a minute. Unlike laptop batteries, which start to lose their ability to hold a charge after a year or two (several hundred charge/discharge cycles), ultracapacitors have hundreds of thousands of charge/discharge cycles and could still be going strong long after the device is obsolete.

Ultra capacitors & Super Capacitors store electricity by physically separating positive and negative charges— different from batteries which do so chemically. The charge they hold is like the static electricity that can build up on a balloon, but is much greater thanks to the extremely high surface area of their interior materials.

An advantage of the ultracapacitor is their super fast rate of charge and discharge... which is determined solely by their physical properties. A battery relies on a slower chemical reaction for energy. A disadvantage of an ultracapacitor is that currently they store a smaller amount of energy than a battery does.



SUPER ULTRA CAPACITOR

Ultracapacitors are very good at efficiently capturing electricity from regenerative braking, and can deliver power for acceleration just as quickly. With no moving parts, they also have a very long lifespan - 500,000 plus charge/recharge cycles. Ultracapacitors are currently used for wind energy, solar energy, and hydro energy storage.

An ultra capacitor, also known as a double-layer capacitor, polarizes an electrolytic solution to store energy electro statically. Though it is an electrochemical device, no chemical reactions are involved in its energy storage mechanism. This mechanism is highly reversible, and allows the ultra capacitor to be charged and discharged hundreds of thousands of times.

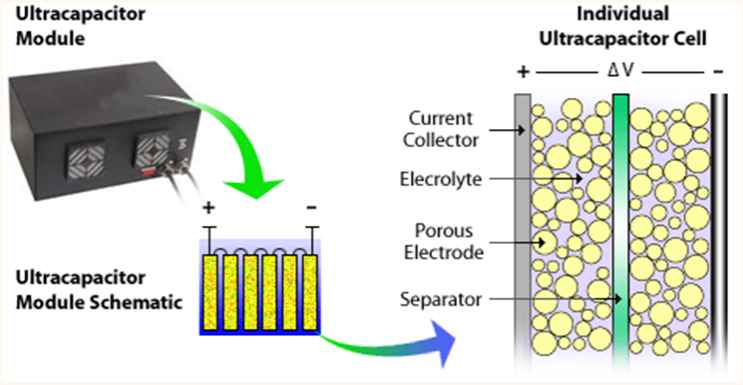
Once the ultra capacitor is charged and energy stored, a load (the electric vehicle's motor) can use this energy. The amount of energy stored is very large compared to a standard capacitor because of the enormous surface area created by the porous carbon electrodes and the small charge separation created by the dielectric separator.

An ultracapacitor can be viewed as two non reactive porous plates, or collectors, suspended within an electrolyte, with a voltage potential applied across the collectors. In an individual ultra-capacitor cell, the applied potential on the positive electrode attracts the negative ions in the electrolyte, while the potential on the negative electrode attracts the positive ions. A dielectric separator between the two electrodes prevents the charge from moving between the two electrodes.

Electrical energy storage devices, such as capacitors, store electrical charge on an electrode. Other devices, such as electrochemical cells or batteries, utilize the electrode to create, by chemical reaction, an electrical charge at the electrodes. In both of these, the ability to store or create electrical charge is a function of the surface area of the electrode. For example, in capacitors, greater electrode surface area increases the capacitance or energy storage capability of the device.

As a storage device, the ultracapacitor, relies on the microscopic charge separation at an electrochemical interface to store energy. Since the capacitance of these devices is proportional to the active electrode area, increasing the electrode surface area will increase the capacitance, hence increasing the amount of energy that can be stored. This achievement of high surface area utilizes materials such as activated carbon or

However, in both situations, there is an intrinsic limit to the porosity of these materials, that is, there is an upper limit to the amount of surface area that can be attained simply by making smaller and smaller particles. An alternative method must be developed to increase the active electrode surface area without increasing the size of the device. A much more highly efficient electrode for electrical energy storage devices could be realized if the surface area could be significantly increased.



SCHEMATIC DIAGRAM OF ULTRA CAPACITOR

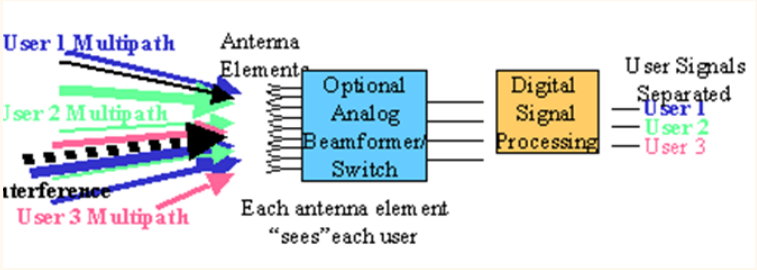
M. VINODH KUMAR
- 17715A0407

Smart Antenna

One of the most rapidly developing areas of communications is “Smart Antenna” systems. A smart antenna is an array of antenna elements connected to a digital signal processor. Such a configuration dramatically enhances the capacity of a wireless link through a combination of diversity gain, array gain, and interference suppression. Increased capacity translates to higher data rates for a given number of users or more users for a given data rate per user.

Multipath paths of propagation are created by reflections and scattering. Also, interference signals such as that produced by the microwave oven in the picture, are superimposed on the desired signals. Measurements suggest that each path is really a bundle or cluster of paths, resulting from surface roughness or irregularities.

The random gain of the bundle is called Multipath fading.



SMART ANTENNA WORKING SYSTEM

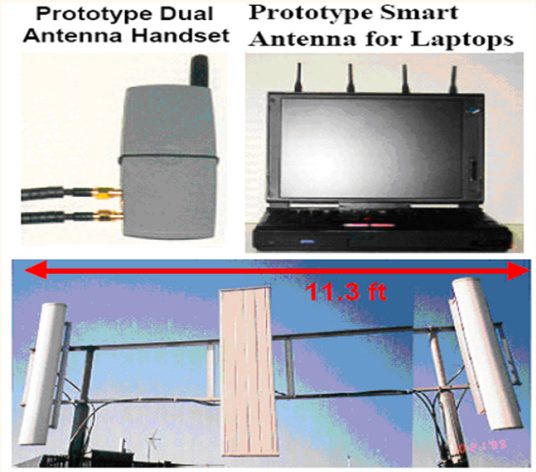
Working:
Each antenna element "sees" each propagation path differently, enabling the collection of elements to distinguish individual paths to within a certain resolution. As a consequence, smart antenna transmitters can encode independent streams of data onto different paths or linear combinations of paths, thereby increasing the data rate, or they can encode data redundantly onto paths that fade independently to protect the receiver from catastrophic signal fades, thereby providing diversity gain.

A smart antenna receiver can decode the data from a smart antenna transmitter this is the highest-performing configuration or it can simply provide array gain or diversity gain to the desired signals transmitted from conventional transmitters and suppress the interference.

No manual placement of antennas is required. The smart antenna electronically adapts to the environment by looking for pilot tones or beacons or by recovering certain characteristics (such as a known alphabet or constant envelope) that the transmitted signal is known to have.

The smart antenna can also separate the signals from multiple users who are separated in space (i.e. by distance) but who use the same radio channel (i.e. center frequency, time-slot, and/or code); this application is called Space-division multiple access (SDMA).

TD-SCDMA SMART ANTENNA



ROOFTOP BASE STATION ANTENNA

K. SANDEEP KUMAR
17711A0426

Micro Electronic Pill

A micro electronic pill is basically a multi channel sensor used for remote bio medical measurements using microtechnology this has been developed for the internal study and detection of diseases and abnormalities in the gastro intestinal GI tract where restricted access prevents the use of traditional endoscopy the measurement parameters for detection include real time remote recording of temperature, pH, conductivity and dissolved oxygen in the GI tract

This paper with the design of the micro electronic pill which mainly consists of an outer biocompatible capsule encasing 4 channel micro sensors a control chip, a discrete component radio transmitter and 2 silver oxide cells.

The invention of transistor enabled the first use of radiometry capsules, which used simple circuits for the internal study of the gastro-intestinal (GI) tract. They couldn't be used as they could transmit only from a single channel and also due to the size of the components. They also suffered from poor reliability, low sensitivity and short lifetimes of the devices. This led to the application of single-channel telemetry capsules for the detection of disease and abnormalities in the GI tract where restricted area prevented the use of traditional endoscopy.

They were later modified as they had the disadvantage of using laboratory type sensors such as the glass pH electrodes, resistance thermometers, etc. They were also of very large size. The later modification is similar to the above instrument but is smaller in size due to the application of existing semiconductor fabrication technologies. These technologies led to the formation of "MICROELECTRONIC PILL".

Microelectronic pill is basically a multichannel sensor used for remote biomedical measurements using micro technology. This is used for the real-time measurement parameters such as temperature, pH, conductivity and dissolved oxygen. The sensors are fabricated using electron beam and photolithographic pattern integration and were controlled by an application specific integrated circuit (ASIC).

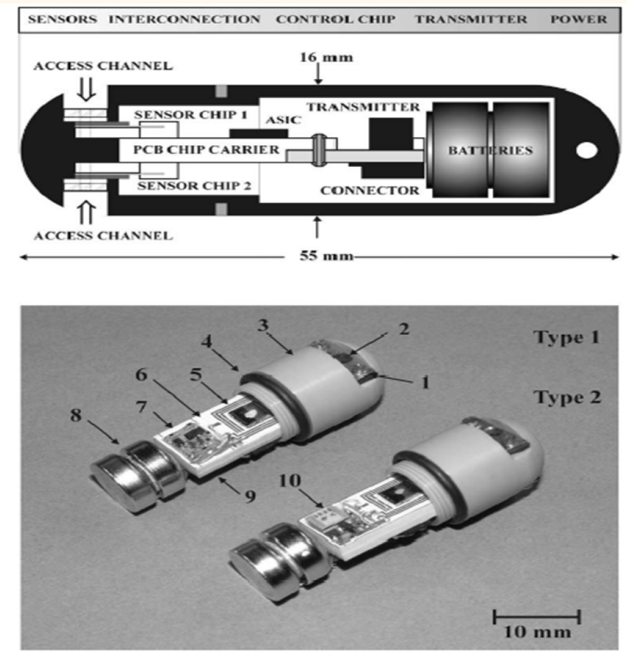
Microelectronic pill consists of 4 sensors (2) which are mounted on two silicon chips (Chip 1 & 2), a control chip (5), a radio transmitter (STD-type 1-7, type2-crystal type-10) & silver oxide batteries (8). 1-access channel, 3-capsule, 4-rubber ring, 6-PCB chip carrier.

An array consisting of both temperature sensor & pH sensor platforms were cut from the wafer & attached onto 100-µm- thick glass cover slip cured on a hot plate. The plate acts as a temporary carrier to assist handling of the device during level 1 of lithography when the electric connections tracks, electrodes bonding pads are defined. Bonding pads provide electrical contact to the external electronic circuit.

ASIC is the control chip that connects together the external components of the micro system. (ASIC) An integrated circuit designed to perform a particular function by defining the interconnection of a set of basic circuit building blocks drawn from a library provided by the circuit manufacturer.

ASIC is a novel mixed signal design that contains an analog signal conditioning module operating the sensors, 10-bit ADC & DAC converters & a digital data processing module. An RC relaxation oscillator (OSC) provides the clock signal.

Radio Transmitter is assembled prior to integration in the capsule using discrete surface mount components on a single-sided PCB. It's designed to operate at a transmission freq. of 40.01 MHz at 20˚C generating a signal of 10 kHz. BW. A second crystal stabilized transmitter was also used. This unit is similar to the free running STD transmitter, having a transmission freq. limited to 20.08 MHz at 20˚C, due to crystal used. Pills incorporating the STD transmitter are Type 1, where as the pills having crystal stabilized unit is Type 2. The transmission range was measured as being 1 m & the modulation scheme FSK, with a data rate of 1 kb/s.



CROSS SECTION VIEW OF MICRO ELECTRONIC PILL

P. MADHRUYA
17711A0455

Smart Dust

Smart dust requires mainly revolutionary advances in miniaturization, integration & energy management. Hence designers have used MEMS technology to build small sensors, optical communication components, and power supplies. Microelectro mechanical systems consists of extremely tiny mechanical elements, often integrated together with electronic circuitory. They are measured in micrometers, that is millions of a meter. They are made in a similar fashion as computer chips. The advantage of this manufacturing process is not simply that small structures can be achieved but also that thousands or even millions of system elements can be fabricated simultaneously. This allows systems to be both highly complex and extremely low-cost.

Micro-Electro-Mechanical Systems (MEMS) is the integration of mechanical elements, sensors, actuators, and electronics on a common silicon substrate through microfabrication technology. While the electronics are fabricated using integrated circuit (IC) process sequences (e.g., CMOS, Bipolar processes), the micromechanical components are fabricated using compatible "micromachining" processes that selectively etch away parts of the silicon wafer or add new structural layers to form the mechanical and electromechanical devices. MEMS realizes a complete System On chip technology.

Microelectronic integrated circuits can be thought of as the "brains" of a system and allow microsystems to sense and control the environment. Sensors gather information from the environment through measuring mechanical, thermal, biological, chemical, optical, and magnetic phenomena. The electronics then process the information derived from the sensors and through some decision making capability direct the actuators to respond by moving, positioning, regulating, and filtering, thereby controlling the environment for some desired purpose. Because MEMS devices are manufactured using batch fabrication techniques similar to those used for integrated circuits, unprecedented levels of functionality, reliability, and sophistication can be placed on a small silicon chip at a relatively low cost.

The deep insight of MEMS is as a new manufacturing technology, a way of making complex electromechanical systems using batch fabrication techniques similar to those used for integrated circuits, and uniting these electromechanical elements together with electronics. Historically, sensors and actuators are the most costly and unreliable part of a sensor-actuator-electronics system. MEMS technology allows these complex electromechanical systems to be manufactured using batch fabrication techniques, increasing the reliability of the sensors and actuators to equal that of integrated circuits. The performance of MEMS devices and systems is expected to be superior to macro scale components and systems, the price is predicted to be much lower.

Operation of the mote:

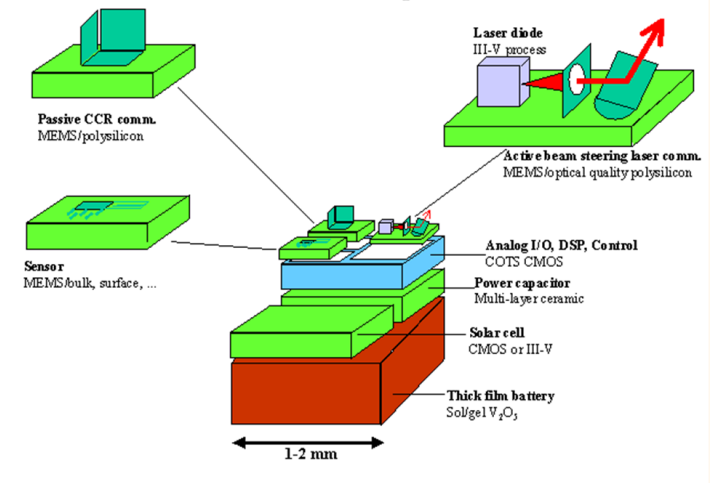
The Smart Dust mote is run by a microcontroller that not only determines the tasks performed by the mote, but controls power to the various components of the system to conserve energy. Periodically the microcontroller gets a reading from one of the sensors, which measure one of a number of physical or chemical stimuli such as temperature, ambient light, vibration, acceleration, or air pressure, processes the data, and stores it in memory. It also occasionally turns on the optical receiver to see if anyone is trying to communicate with it. This communication may include new programs or messages from other motes. In response to a message or upon its own initiative the microcontroller will use the corner cube retro reflector or laser to transmit sensor data or a message to a base station or another mote.

The primary constraint in the design of the Smart Dust motes is volume, which in turn puts a severe constraint on energy since we do not have much room for batteries or large solar cells.Thus, the motes must operate efficiently and conserve energy whenever possible. Most of the time, the majority of the mote is powered off with only a clock and a few timers running. When a timer expires, it powers up a part of the mote to carry out a job, then powers off.

A few of the timers control the sensors that measure one of a number of physical or chemical stimuli such as temperature, ambient light, vibration, acceleration, or air pressure. When one of these timers expires, it powers up the corresponding sensor, takes a sample, and converts it to a digital word. If the data is interesting, it may either be stored directly in the SRAM or the microcontroller is powered up to perform more complex operations with it. When this task is complete, everything is again powered down and the timer begins counting again.

Another timer controls the receiver. When that timer expires, the receiver powers up and looks for an incoming packet. If it doesn't see one after a certain length of time, it is powered down again. The mote can receive several types of packets, including ones that are new program code that is stored in the program memory.
This allows the user to change the behavior of the mote remotely. Packets may also include messages from the base station or other motes. When one of these is received, the microcontroller is powered up and used to interpret the contents of the message. The message may tell the mote to do something in particular, or it may be a message that is just being passed from one mote to another on its way to a particular destination. In response to a message or to another timer expiring, the microcontroller will assemble a packet containing sensor data or a message and transmit it using either the corner cube retroreflector or the laser diode, depending on which it has. The laser diode contains the onboard laser which sends signals to the base station by blinking on and off. The corner cube retroreflector , transmits information just by moving a mirror and thus changing the reflection of a laser beam from the base station.

This technique is substantially more energy efficient than actually generating some radiation. With the laser diode and a set of beam scanning mirrors, we can transmit data in any direction desired, allowing the mote to communicate with other Smart Dust motes.



COMPONENTS OF SMART DUST

S. SUDEEPTHI
17711A0497

Night Vision Technology

The word 'Night vision' itself means the ability to see in low light conditions. Humans have poor night vision compared to many other animals. With the proper night-vision equipment, you can see a person standing over 200 yards (183 m) away on a moonless, cloudy night!. Originally developed for military use, it has provided the United States with a strategic military advantage, the value of which can be measured in lives. Federal and state agencies now routinely utilize the technology for site security, surveillance as well as search and rescue. Night vision equipment has evolved from bulky optical instruments in light weight goggles through the advancement of image intensification technology.
Two technologies are used for night vision:-
(1)Thermal Imaging
This work by collection the tiny amounts of light including the lower portion of infrared light spectrum that are present but may be imperceptible to your eyes, and amplifying it to the point that we can easily observe the image.

This technology operates by capturing the upper portion of the infrared light spectrum, which is emitted as heat by the objects instead of simply reflected as light. Hotter object, such as warm bodies, emit more of this light than cooler objects likes trees or buildings.

Types of Night Vision:

There are two type night vision such as

- **Biological Night Vision**

In biological night vision, molecules of rhodopsin in the rods of the eye undergo a change in shape as light is absorbed by them. The peak rhodopsin build-up time for optimal night vision in humans is 30 minutes, but most of the adaptation occurs within the first five or ten minutes in the dark. Rhodopsin in the human rods is insensitive to the longer red wavelengths of light, so many people use red light to preserve night vision as it will not deplete the eye's rhodopsin stores in the rods and instead is viewed by the cones.

.Some animals, such as cats, dogs, and deer, have a structure called tapetumlucidum in the back of the eye that reflects light back towards the retina, increasing the amount of light it captures. In humans, only 10% of the light that enters the eye falls on photosensitive parts of the retina. Their ability to see in low light levels may be similar to what humans see when using first or perhaps second generation image intensifiers

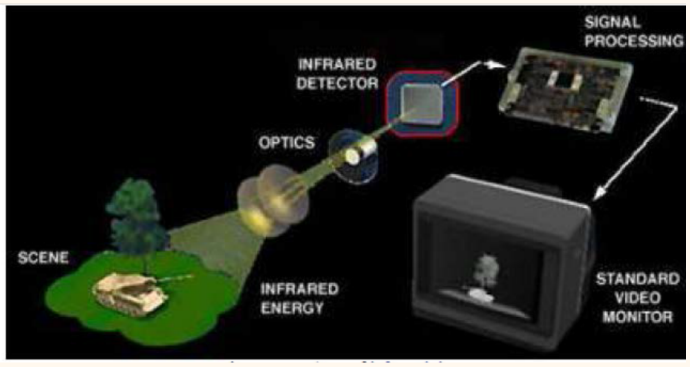
- **Technical Night Vision**

A night vision device (NVD) is an optical instrument that allows images to be produced in levels of light approaching total darkness. They are most often used by military and law enforce agencies but are available to civilian users.

Night vision can work in two very different ways, depending on the technology used.

- **Thermal Imaging**

A special lens focuses the infrared light emitted by all of the objects in view. The focused light is scanned by a phased array of infrared-detector elements. The detector elements create a very detailed temperature pattern called a thermogram.



NIGHT VISION TECHNOLOGY

It only takes about one-thirtieth of a second for the detector array to obtain the temperature information to make the thermogram. This information is obtained from several thousand points in the field of view of the detector array. The thermogram created by the detector elements is translated into electric impulses. The impulses are sent to a signal-processing unit, a circuit board with a dedicated chip that translates the information from the elements into data for the display.

The signal-processing unit sends the information to the display, where it appears as various colors depending on the intensity of the infrared emission. The combination of all the impulses from all of the elements creates the image.

Image Intensifier:

This method of night vision amplifies the available light to achieve better vision.Digram is given below. A conventional lens capture the ambient light. This lens focuses available light (photons) on the photocathode of an image intensifier tube.

The light energy causes electrons to be released from the cathode which are accelerated by an electric field to increase their speed (energy level). These electrons enter holes in a micro channel plate and bounce off the internal specially-coated walls which generate more electrons as the electrons bounce through. This creates a denser “cloud” of electrons representing an intensified version of the original image. A channel using a process called cascaded secondary emissions electrons pass through the micro- channels, they cause thousands of other electrons to be released in each.

Basically, the original electrons collide with the side of the channel, exciting atoms and causing other electrons to be released. These new electrons also collide with other atoms, creating a chain reaction that results in thousands of electrons. The final stage of the image intensifier involves electrons hitting a phosphor screen. The energy of the electrons makes the phosphor glow. The visual light shows the desired view to the user or to an attached photographic camera or video device. A green phosphor is used in these applications.

Night Vision Devices:

- **Scopes**

Normally handheld or mounted on a weapon, scopes are monocular (one eye-piece). Since scopes are handheld, not worn like goggles, they are good for when you want to get a better look at a specific object and then return to normal viewing conditions.

Fig:- scope (monocular)

- **Goggles**

While goggles can be handheld, they are most often worn on the head. Goggles are binocular (two eye-pieces) and may have a single lens or stereo lens, depending on the model. Goggles are excellent for constant viewing, such as moving around in a dark building.

Fig:-goggles worn on the head

- **Cameras**

Cameras with night-vision technology can send the image to a monitor for display or to a VCR for recording. When night-vision capability is desired in a permanent location, such as on a building or as part of the equipment in a helicopter, cameras are used. Many of the newer camcorders have night vision built right in.

NIGHT VISION CAMERAS

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Plasma Antenna Technology

The 'Plasma antenna technology' is introduced to solve the problems of radio antennas. On hearing the name 'plasma antenna' for the first time, we may get a wrong impression that it is something entirely different. But that is not the case. Plasma antenna is just another type of radio antenna which is currently under development. In this innovation, plasma is used as a replacement for the metal elements of the traditional antennas. It performs all the functions of the radio antennas. That is it can be used for transmission and reception of signals.Plasma antenna is a special type of antenna in which the metal conducting elements of a conventional antenna are replaced by plasma. It employs an ionized gas enclosed in a tube as the conducting element of antenna. When gas is electrically charged or ionized to plasma, it becomes conductive and allowing radio frequency signals to be transmitted or received. When gas is not ionized the antenna element ceases to exit. When voltage is applied to antenna electric field is produced which causes current to flow in antenna. Due to current flow, magnetic field is produced. It is more advantageous than other antenna due to ionized gas. It has higher efficiency and enhanced bandwidth.

Plasma Antennas:

On earth we live upon an island of "ordinary" matter. The different states of matter generally found on earth are solid, liquid, and gas. Sir William Crookes, anEnglish physicist identified a fourth state of matter, now called plasma, in 1879. Plasma is by far the most common form of matter. Plasma in the stars and in the tenuous spacebetween them makes up over 99% of the visible universe and Perhaps most of that which is not visible. Important to ASI's technology, plasmas are conductive assemblies of charged and neutral particles and fields that exhibit collective effects.Plasmas carry electrical currents and generate magnetic fields. When the Plasma Antenna Research Laboratory at ANU investigated the feasibility of plasma antennas as low radar cross-section radiating elements, Red centre established a network between DSTO ANU researchers, CEA Technologies, Cantec Australasia and Neo lite Neon for further development and future commercialization of

this technology .The plasma antenna R & D project has proceeded over the last year at the Australian National University in response to a DSTO (Defence Science and Technology Organisation) contract to develop a new antenna solution that minimizes antenna detectability by radar.

Since then, an investigation of the wider technical issues of existing antenna systems has revealed areas where plasma antennas might be useful. The project attracts the interest of the industrial groups involved in such diverse areas as fluorescent lighting, telecommunications and radar. Plasma antennas have a number of potential advantages for antenna design .When a plasma element is not energized, it is difficult to detect by radar. Even when it is energized, it is transparent to the transmissions above the plasma frequency ,which falls in the microwave region. Plasma elements can be energized and de–energized in seconds, which prevents signal degradation. When a particular plasma element is not energized, its radiation does not affect nearby elements. HF CDMA Plasma antennas will have low probability of intercept(LP) and low probability of detection(LPD) in HF communications.

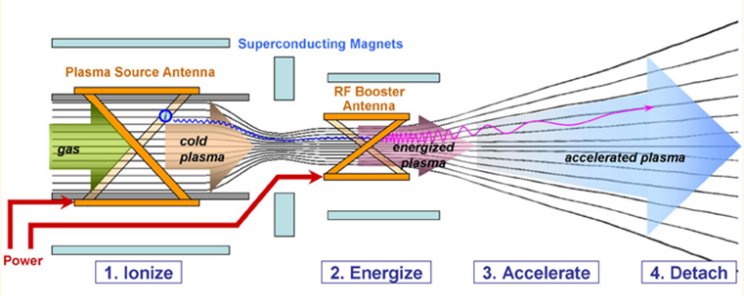
Plasma Antenna Technology:

Since the discovery of radio frequency ("RF") transmission, antenna design has been an integral part of virtually every communication and radar application. Technology has advanced to provide unique antenna designs for applications ranging from general broadcast of radio frequency signals for public use to complex weapon systems. In its most common form, an antenna represents a conducting metal surface that is sized to emit radiation at one or more selected frequencies. Antennas must be efficient so the maximum amount of signal strength is expended in the propagated wave and not wasted in antenna reflection .

Plasma antenna technology employs ionized gas enclosed in a tube (or other enclosure) as the conducting element of an antenna. This is a fundamental change from traditional antenna design that generally employs solid metal wires as the conducting element. Ionized gas is an efficient conducting element with a number of important advantages.

Since the gas is ionized only for the time of transmission or reception, “ringing" and associated effects of solid wire antenna design are eliminated. The design allows for extremely short pulses, important to many forms of digital communication and radars. The design further provides the opportunity to construct an antenna that can be compact and dynamically reconfigured for frequency, direction, bandwidth, gain and beam width. Plasma antenna technology will enable antennas to be designed that are efficient, low in weight and smaller in size than traditional solid wire antennas.

When gas is electrically charged, or ionized to a plasma state it becomes conductive, allowing radio frequency (RF) signals to be transmitted or received. We employ ionized gas enclosed in a tube as the conducting element of an antenna. When the gas is not ionized, the antenna element ceases to exist. This is a fundamental change from traditional antenna design that generally employs solid metal wires as the conductingelement. We believe our plasma antenna offers numerous advantages including stealth for military applications and higher digital performance in commercial applications.



PLASMA ANTENNA TECHNOLOGY

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Air Traffic Control System

Air traffic control systems are various aircraft navigation and communication systems that uses computers, radar, radios and other instruments and devices to provide guidance to flying aircraft. Trained personnel working as air traffic controllers at stations on the ground constantly monitor these systems and track the locations and speed of individual aircraft. Controllers can warn aircraft should they come too close to each other. The goal of air traffic control system is to minimize the risk of aircraft collisions while maximizing the number of aircraft that can fly safely at the same time. Air traffic control systems also provide updated weather information to airport around the country, so aircraft can take off and land safely. This information is important not only to airline passengers but also to industries that rely on aviation for the timely transport of goods, materials and personnel.

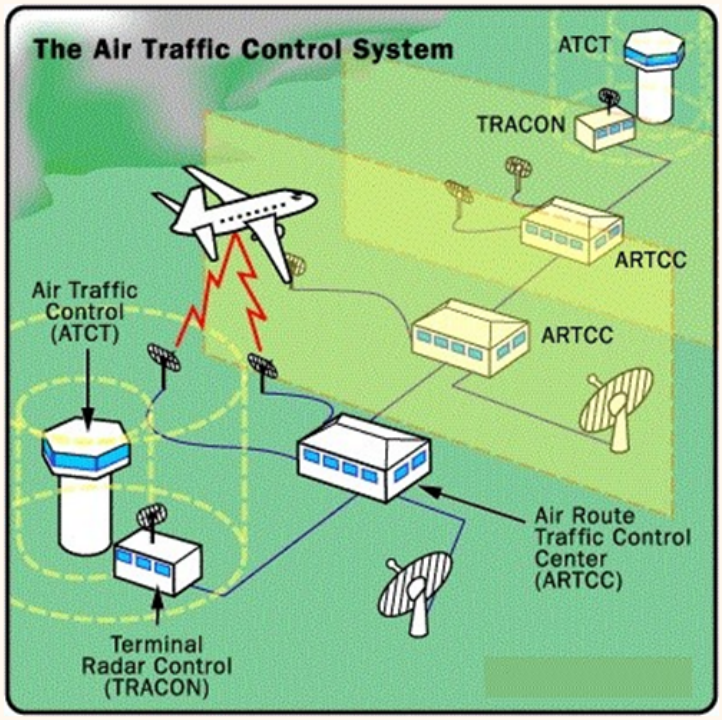
Air traffic control (ATC) is a service provided by ground-based controllers who direct aircraft on the ground and through controlled airspace, and can provide advisory services to aircraft in non-controlled airspace. The primary purpose of ATC worldwide is to prevent collisions, organize and expedite the flow of traffic, and provide information and other support for pilot's .In some countries, ATC plays a security or defensive role, or is operated by the military.

To prevent collisions, ATC enforces traffic separation rules, which ensure each aircraft maintains a minimum amount of empty space around it at all times. Many aircraft also have collision avoidance systems, which provide additional safety by warning pilots when other aircraft get too close.

In many countries, ATC provides services to all private, military, and commercial aircraft operating within its airspace. Depending on the type of flight and the class of airspace, ATC may issue instructions that pilots are required to obey, or advisories (known as flight information in some countries) that pilots may at their discretion, disregard. Generally the pilot in command is the final authority for the safe operation of the aircraft and may in an emergency, deviate from ATC instructions to the extent .

required to maintain safe operation of their aircraft. Air traffic control systems are various aircraft navigation and communication systems that use computers, radar, radios, and other instruments and devices to provide guidance to flying aircraft. Trained personnel working as air traffic controllers at stations on the ground constantly monitor these systems and track the locations and speeds of individual aircraft. Controllers can warn aircraft should they come close to each other. Air traffic control system is also used for the safe coordination of landing and takeoffs at airport.

The goal of air traffic control is to minimize the risk of aircraft collisions while maximizing the number of aircraft that can fly safely at the same time. Aircraft pilots and their onboard flight crews work closely with controllers to manage air traffic. Air traffic control systems also provide updated weather information to airport around the country, so aircraft can take off and land safely. This information is important not only to passengers but also to industries that rely on aviation for the timely transport of goods, materials and personnel



AIR TRAFFIC CONTROL SYSTEM

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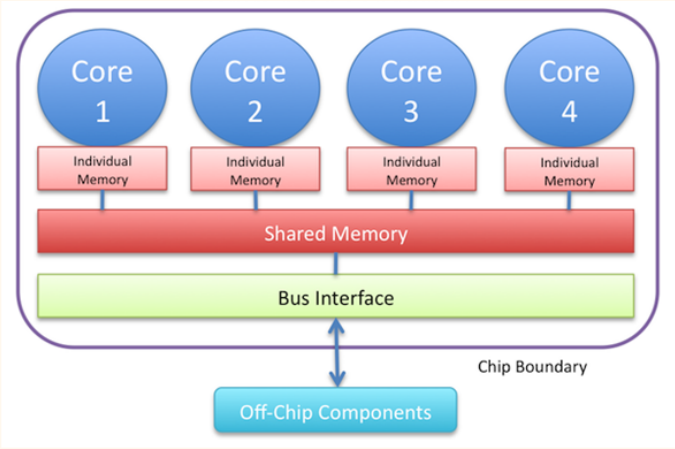
Multi-Core Processor

As multi-core architectures begin to emerge in every area of computing, operating system scheduling that takes the peculiarities of such architectures into account will become mandatory. Due to architectural differences to traditional multi-processors, such as shared caches, memory controllers and smaller cache sizes available per computational unit, it does not suffice to simply schedule tasks on multi-core processors in the same way as on SMP systems. Furthermore, current research motivates architectural changes in CPU design, such as multicore processors with asymmetric core performance and so called many-core architectures that integrate up to 100 cores in one package.

Such architectures will exhibit a fundamentally different behaviour with regard to shared resource utilization and performance of non parallelizable code compared to current CPUs. It will be the responsibility of the operating system to spare the programmer as much platform-specific knowledge as possible and optimize overall performance by employing intelligent and configurable scheduling mechanisms.

multi-core scheduling:

The scheduling process on such multi-core processors wouldn't differ much from conventional scheduling – intuitively the run-queue would just have to be replaced by n run-queues, where n is the number of cores and processes would simply be scheduled to the currently shortest run-queue (with some additional process-priority treatment, maybe). While that might seem reasonable, there are some properties of current multi-core architectures that speak strongly against such a naïve approach. First, in many multi core architectures, each core manages its own level 1 cache. By just naïvely rescheduling interrupted processes to a shorter queue which belongs to another core (task migration), parts of the processes cache working set may become unnecessarily lost and the overall performance may slow down. This effect becomes even worse if the underlying architecture is not a multi-core but a NUMA system where memory access can become very costly if the process is scheduled on the "wrong" node.



MULTI CORE PROCESSOR

SK. THASEEN
19715A0408

Heart Beat Monitor

Health monitoring systems become a hot topic and important research field today. Research on health monitoring were developed for many applications such as military, homecare unit, hospital, sports training and activity emergency monitoring system. In this paper, we developed the wearable and real-time monitoring system of some critical vital signs for elderly people, because Thai people who ages over 60 years old encounter accidental incidents over 60 percent. That system may help doctor or people in family monitor the emergency alarm from patient or elderly people.

The vital signs of health status that are the important parameter in health monitoring system consist of blood pressure, heart rate, oxygen saturation, body temperature and respiratory rate. In this model, two parameters of the vital signs heart rate and oxygen saturation in blood are considered. That vital sign can measure by using device namely; pulse oximeter. The pulse oximetry data are important for doctor to monitor patient's health condition.

Microcontroller Based Wireless Temperature And Heart Beat Read Out suitable for operation in a small office/home environment. This system is easy to operate, with Visual LCD. Many individuals and organizations may, for various reasons, wish to use electronic surveillance techniques at some time or another. The idea is to use off-the-shelf RF Tx/Rx modules. The weather keeps us continually occupied. Some people have even made it their profession. At home too, we like to measure all kinds of things related to our climate. That is why weather stations are available in all types and sizes. If we want to know the temperature inside and outside then purpose-built indoor/outdoor thermometers are available. In the past the outside sensor of these weather stations was connected with a wire, it is now fairly standard to use RF transmission for this data.

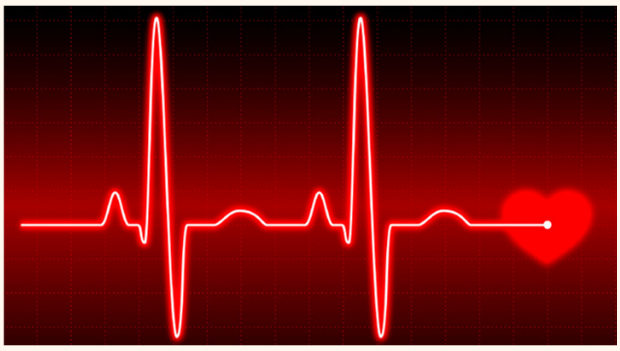
This Wireless transmitters units usually make use of the 315-MHz band. These modules, once a rare commodity, are now widely and cheaply available. In this particular discussion, we shall be using ASK (Amplitude Shift Keying) based TX/RX pair operating at 315 MHz. The transmitter module accepts serial data at a maximum of 2400bps. They are directly interfaced to a microcontroller. At the RX end, the receiver microcontroller receives the signal via the RF receiver module, decodes the serial data and reproduces the original data in the temperature and Heat Beat format.

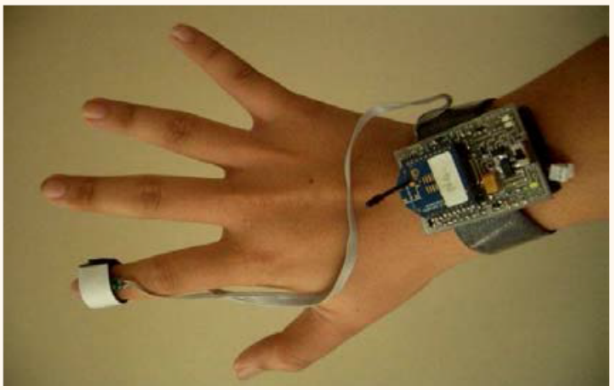
Wireless technology was developed in many applications that becoming a part of human activities such as agriculture, military, medical care, smart home system etc. Distinctly, wireless sensor networks (WSN) play a crucial role in such a monitoring system application, for the reason that WSN can offer some advantages over other types of wireless systems, especially its scalability, power management and flexibility of architecture. As a matter of fact, there are two popular standards in the wireless personal area network (WPAN), namely, Bluetooth and ZigBee. This model was focused on the capability of wireless sensor networks as an efficient tool to monitor health in term of pulse oximetry data for demonstration. This situation makes it difficult to develop and challenge because many applications in WSNs developed for fixing the position of member in wireless personal area network (WPAN).

This model adopted the ZigBee for using as a real-time health monitoring system on a patient.

Pulse Oximeter Transmitter Module:

A typical oximetry sensor has a pair of light emitting diode (LEDs). The two types of light emitting diode consist of infrared and red light. The infrared has a wavelength of 905 nm and red light has a wavelength of 660 nm. A pair of light emitting diodes (LEDs) facing with a photo detector module on patient's finger. The photo detector module used is PDI-E832, which combines the two types of light detection in one module for minimizing the size of sensor probe. The entire optical device was assembled on Velcro strip with metal wire frame for easy to be worn by the patient. Figure below depicts block diagram of sensor module unit. The system consists of a microcontroller unit, two series of Li-Ion cells, power supply circuit, photo-detector module, ZigBee module, digital to analog converter IC, operating amplifier IC, driver circuit for red LED and infrared LED, couple of lightemitting diode (LEDs).





HEART BEAT MONITOR

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18711A04A9