DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

e-SRUSHTI

An Innovative Bucket...

TECHNICAL MAGAZINE

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CONTENTS

NARAYANA ENGINEERING COLLEGE :: NELLORE

AUTONOMOUS

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)

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, andanalyze 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 & Communication Engineering (ECE) has consistently maintained an exemplary academic record.

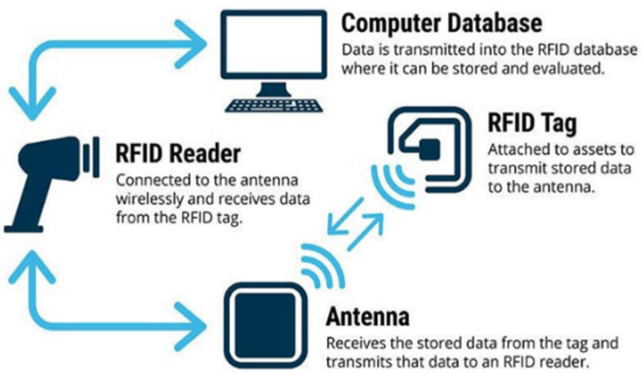
The greatest asset of the department is its highly motivated and learned faculty. The available diversity of expertise of the faculty with the support of the other staff prepares the students to work in global multicultural environment. The graduates of the Electronics & Communication Stream have been selected by some of the world's leading corporations & as well as by most of the leading Indian counter parts.

I congratulate all my team members for their constant effort in launching this Magazine. We are also thankful to our Management and Principal for their support and encouragement.

Dr. M. Chandra Mohan Reddy
Professor,
Dept. of ECE.

RFID Technology

Radio Frequency Identification (RFID) is a technology that uses radio waves to passively identify a tagged object. It is used in several commercial and industrial applications, from tracking items along a supply chain to keeping track of items checked out of a library. RFID systems have three components that make them work: an antenna, a transceiver, and a transponder (tag). The part of the tag that encodes the data is called the RFID inlay. When you combine the antenna and the transceiver, you have a RFID reader, also known as an interrogator.
Fixed readers, when the reader and antenna are installed in a specific place where RFID tags pass. For example, you can check out at Amazon Go without going to a cashier. You just walk through an RF zone and the reader receives the tag data. Mobile readers, which are handheld devices that can be carried anywhere.
The RFID tracking process can be broken down into below four phases:
·Information is stored on a RFID tag and is attached to an item like your product
·An antenna recognizes the signal of a nearby RFID tag
·A reader is connected wirelessly to the antenna and receives the information stored on a tag
·The reader then sends the data to a database, where it is stored and evaluated.
The advantage of passive tags are Small size, Light weight, Affordability, Long shelf life (up to 20+ years). Passive tags are used to scan at a distance from a few inches to a few feet.
RFID technology automates data collection and vastly reduces human effort and error. RFID supports tag reading with no line-of-sight or item-by-item scans required. RFID readers can read multiple RFID tags simultaneously, offering increases in efficiency.



Basic RFID System

There are three main types of RFID systems: low frequency (LF), high frequency (HF) and ultra-high frequency (UHF). Microwave RFID is also available. Frequencies vary greatly by country and region.

·**Low-frequency RFID systems** These range from 30 KHzto 500 KHz, though the typical frequency is 125 KHz. LF RFID has short transmission ranges, generally anywhere from a few inches to less than six feet.

·**High-frequency RFID system** These range from 3 MHzto 30 MHz, with the typical HF frequency being 13.56 MHz. The standard range is anywhere from a few inches to several feet.

·**UHF RFID systems** These range from 300 MHz to 960 MHz, with the typical frequency of 433 MHz and can generally be read from 25-plus feet away.

·**Microwave RFID systems** These run at 2.45 Ghzand can be read from 30-plus feet away.

Some common uses for RFID applications include:

- inventory control
- cargo and supply chain logistics
- vehicle tracking
- access control in security situations
- shipping
- healthcare
- manufacturing
- retail sales
- tap-and-go credit card payments

There are several guidelines and specifications for RFID technology, but the main standards organizations are:

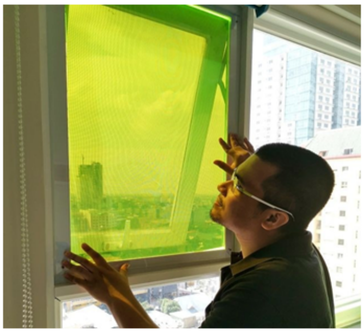
- International Organization for Standardization (ISO)
- Electronics Product Code Global Incorporated (EPCglobal)
- International Electrotechnical Commission (IEC)

Each radio frequency has associated standards, including ISO 14223 and ISO/IEC 18000-2 for LF RFID, ISO 15693 and ISO/IEC 14443 for HF RFID, and ISO 18000-6C for UHF RFID.

RFID systems are becoming increasingly used to support internet of things deployments. Combining the technology with smart sensors and/or GPS technology enables sensor data including temperature, movement and location to be wirelessly transmitted.

M. KAVYA JAHNAVI ,
III B.TECH, ECE-A ,19711A0465

AUREUS The Next Future



Aureus on Windows

Aureus is a thin transparent , biodegradable and folding solar panel. Aureus is a new material made from waste crop ,which Converts UV light into renewable energy. Especially it is made from biowaste of plants, fruits and vegetables. It is a foldable thin transparent solar panel that can be folded like a paper and moved anywhere.

We can stick this foldable material panel on multistorey buildings ,upon windows, on our clothes, bikes which produce electricity from UV light.

In this high energy ultraviolet rays of sun can be converted into visible light. Solar films can be used to convert this light energy into electricity.. Luminescent particles (derivable from certain fruits and vegetables) is used as the core technology on both devices. When hit by UV light, the particles absorb and re-emit visible light along the edges due to internal reflectance. PV cells are placed along the edges to capture the visible light emitted. The captured visible light are then converted to DC electricity. Aureus can function even when not directly facing the sun, it can rely on UV scattering through clouds and by UV light bouncing along walls, pavements, other buildings. This will enable the construction of a Vertical Solar Farm even with a small lot area. This is highly applicable for skyscrapers in urban settings allowing access to clean renewable electricity.

It can be used on our clothes, bikes and on doors also. It works on rainy daysand even on cloudy days as it need only UVlight.

Aureus Film

MALLINENI GAYATHRI
II ECE-A ,20711A0481

E-Textile

Smart Textile with Embedded Electronic Components

Electronic textiles or e-textiles are fabrics that enable electronic components such as batteries, lights, sensors, and microcontrollers to be embedded in them. They are not to be confused with smart textiles, which are fabrics that have been developed with new technologies that provide added value. Many smart clothing, wearable technology, and wearable computing projects involve the use of e-textiles.

Electronic textiles are distinct from wearable computing because the emphasis is placed on the seamless integration of textiles with electronic elements like microcontrollers, sensors, and actuators. Furthermore, e-textiles need not be wearable. For instance, e-textiles are also found in interior design.

The related field of fibretronics explores how electronic and computational functionality can be integrated into textile fibers.

Distinct Generations of the Technology

Cientifica Research examines the markets for textile-based wearable technologies, the companies producing them, and the enabling technologies. Based on their report, the
wearables identifies into three distinct generations of textile wearable technologies:

1. "First-generation" attach a sensor to apparel. This approach is currently taken by sportswear brands such as Adidas, Nike, and Under Armour
2. "Second-generation" products embed the sensor in the garment, as demonstrated by current products from Samsung, Alphabet, Ralph Lauren, and Flex.
3. In "third-generation" wearables, the garment is the sensor. A growing number of companies are creating pressure, strain, and temperature sensors for this purpose.

BHAVITHA THIRUPATI
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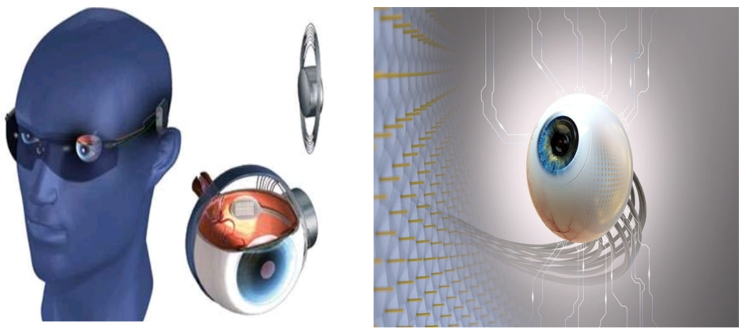
Artificial Eye

The human eye is a sophisticated instrument: images enter through a curved lens at the front of the sphere and pass through its gooey, vitreous liquid before reaching the light-sensitive retina—which relays the signal to the optic nerve that carries the picture to the brain. Engineers have attempted to replicate this structure for about a decade. Now a new artificial eye successfully mimics the natural instrument's spherical shape. Researchers hope this achievement could lead to sharper robotic vision and prosthetic devices. A paper on the development was published on Wednesday in Nature.

The research built on the fact that perovskite, a conductive and light-sensitive material used in solar cells, can be used to create extremely thin nanowires several thousandths of a millimeter in length. These wires mimic the structure of the eye's long, thin photoreceptor cells, says study co-author Zhiyong Fan, an electronic and computer engineer at the Hong Kong University of Science and Technology. "But the difficulty is: How can we fabricate an array of the nanowires in a hemispherical substrate to form this hemispherical retina?" he adds. Constructing a curved retina is important because light only hits it after passing through a curved lens. "When you try to image something, the image that forms after the lens is actually curved," says Hongrui Jiang, an electrical engineer at the University of Wisconsin–Madison, who reviewed the new paper but was not directly involved in the work. "If you have a flat sensor, then the image cannot be focused very sharply." The retina is curved, but electronic light sensors are rigid and flat.

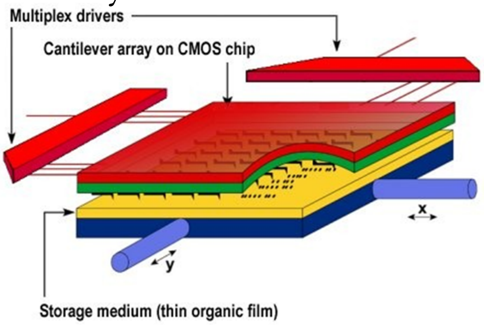


Artificial Eye Ball

E.RAJESH,
III B.TECH, ECE-A ,19711A0426

Millipede

"Millipede" is a new (AFM)-based data storage concept that has a potentially ultrahigh density, terabit capacity, small form factor, and high data rate. Its potential for ultrahigh storage density has been demonstrated by a new thermo mechanical local-probe technique to store and read back data in very thin polymer films. With this new technique, 3040-nm-sized bit indentations of similar pitch size have been made by a single cantilever/tip in a thin (50-nm) polymethylmethacrylate (PMMA) layer, resulting in a data storage density of 400500 Gb/in.



Millipede Chip Fabrication

High data rates are achieved by parallel operation of large two-dimensional (2D) AFM arrays that have been batch-fabricated by silicon surface-nMcromachining techniques. The very large scale integration (VLSI) of micro/nanomechanical devices (cantilevers/tips) on a single chip leads to the largest and densest 2D array of 32 x 32 (1024) AFM cantilevers with integrated write/read storage functionality ever built. Initial areal densities of 100200 Gb/in.2 have been achieved with the 32 x 32 array chip, which has potential for further improvements.

In addition to data storage in polymers or other media, and not excluding magnetics, we envision areas in nanoscale science and technology such as lithography, high-speed/large-scale imaging, molecular and atomic manipulation, and many others in which Millipede may open up new perspectives and opportunities.

Applications:

The current 32 x 32 array chip is just one example of the many possible designs of a data-storage system; the design and concept depend strongly on the intended It is important to note that the same data capacity can be achieved, for example, using large arrays with small cantilever pitch/scan range or, conversely, using small arrays with a larger scan range. In addition, terabit data capacity can be achieved by one large array, by many identical small ones operating in parallel, or by displacing a small array on a large medium.

C. RAMYA SREE
18711A0424

Under Ground Electric Transmission

Underground cables have different technical requirements than overhead lines and have different environmental impacts. Due to their different physical, environmental, and construction needs, underground transmission generally costs more and may be more complicated to construct than overhead lines.

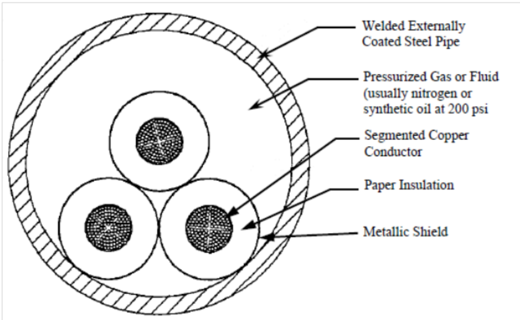
High Pressure Fluid Filled Pipe

The design and construction of underground transmission lines differ from overhead lines because of two significant technical challenges that need to be overcome. These are: 1) providing sufficient insulation so that cables can be within inches of grounded material; and 2) dissipating the heat produced during the operation of the electrical cables. Overhead lines are separated from each other and surrounded by air. Open air circulating between and around the conductors cools the wires and dissipates heat very effectively. Air also provides insulation that can recover if there is a flashover.

There are two main types of underground transmission lines currently in use. One type is constructed in a pipe with fluid or gas pumped or circulated through and around the cable in order to manage heat and insulate the cables. The other type is a solid dielectric cable which requires no fluids or gas and is a more recent technological advancement. The common types of underground cable construction include:

- High-pressure, fluid-filled pipe (HPFF)
- High-pressure, gas-filled pipe (HPGF)
- Self-contained fluid-filled (SCFF)
- Solid cable, cross-linked polyethylene (XLPE)

A high-pressure, fluid-filled (HPFF) pipe-type of underground transmission line, consists of a steel pipe that contains three high-voltage conductors. Figure below illustrates a typical HPFF pipe-type cable. Each conductor is made of copper or aluminum; insulated with high-quality, oil-impregnated kraft paper insulation; and covered with metal shielding (usually lead) and skid wires.



Cross Sectional View of XLPE

High-Pressure, Gas-Filled Pipe-Type Cable

The high-pressure, gas-filled (HPGF) pipe-type of underground transmission line is a variation of the HPFF pipe-type, described above. Instead of a dielectric oil, pressurized nitrogen gas is used to insulate the conductors. Nitrogen gas is less effective than dielectric fluids at suppressing electrical discharges and cooling. To compensate for this, the conductors' insulation is about 20 percent thicker than the insulation in fluid-filled pipes. Thicker insulation and a warmer pipe reduce the amount of current the line can safely and efficiently carry. In case of a leak or break in the cable system, the nitrogen gas is easier to deal with than the dielectric oil in the surrounding environment.

Self-Contained, Fluid-Filled Pipe-Type

The self-contained, fluid-filled (SCFF) pipe-type of underground transmission is often used for underwater transmission construction. The conductors are hollow and filled with an insulating fluid
that is pressurized to 25 to 50 psi. In addition, the three cables are independent of each other. They
are not placed together in a pipe.

Each cable consists of a fluid-filled conductor insulated with high-quality kraft paper and protected by a lead-bronze or aluminum sheath and a plastic jacket. The fluid reduces the chance of electrical
discharge and line failure. The sheath helps pressurize the conductor's fluid and the plastic jacket keeps the water out. This type of construction reduces the risk of a total failure, but the construction costs are much higher than the single pipe used to construct the HPFF or HPGF systems.

Solid Cable, Cross-Linked Polyethylene

The cross-linked polyethylene (XLPE) underground transmission line is often called solid dielectic cable.

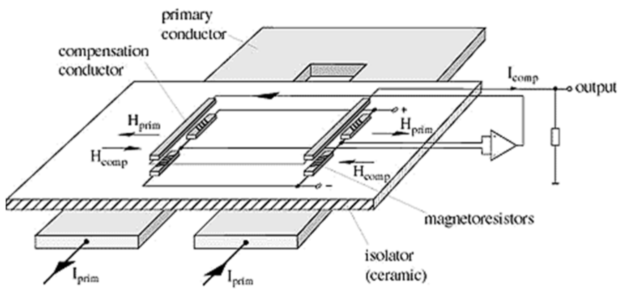
The solid dielectric material replaces the pressurized liquid or gas of the pipe-type cables. XLPE cable has become the national standard for underground electric transmission lines less than
200 kV. There is less maintenance with the solid cable, but impending insulation failures are much more difficult to monitor and detect.

K. SUMANIKA
18711A0451

Universal Magneto Resistive Current Sensor

Magnetic field sensors based on the magneto resistive effect can be easily fabricated by means of thin film technologies with widths and lengths in micrometer range. For best performance, these sensors must have a very good linearity between the measured quantity and the output signal. Even when improved by the barber poles, the linearity magneto resistive sensor is not very high, so the compensation principle used on hall sensors is also applied here. An electrically isolated aluminum compensation conductor is integrated in the same substrate above the Permalloy resistors.

The current flowing through this conductor generates a magnetic field exactly compensates that of the conductor to be unmeasured. In this way the MR element always work at the same operating point; their nonlinearity therefore becomes irrelevant. The temperature dependence is also almost completely eliminated. The current in the compensation conductor is strictly proportional to the measured amplitude of the field; the voltage drop across a resistor forms the electrical output signal.



Magneto Resistive Curent Sensor

Magneto resistive sensors, as are hall elements are very well suited or the measurement of electric currents. In such applications it is important that external magnetic fields do not distort the measurement. This achieved by forming a full bridge are specially separated. The barber poles have the same orientation in the two arms, so that only a field difference between the two positions is sensed. This configuration is insensitive to external homogenous perturbation fields. The primary conductor is U shaped under the substrate, so that the magnetic fields acting on the two arms of the bridge have the same amplitude but opposite directions. This way the voltage signals of the two half-bridges are added.

The sensors require neither a core nor a magnetic shielding, and can therefore be assembled in a very compact and cheap way. The output is calibrated by a laser trimming process or by a digital calibration.

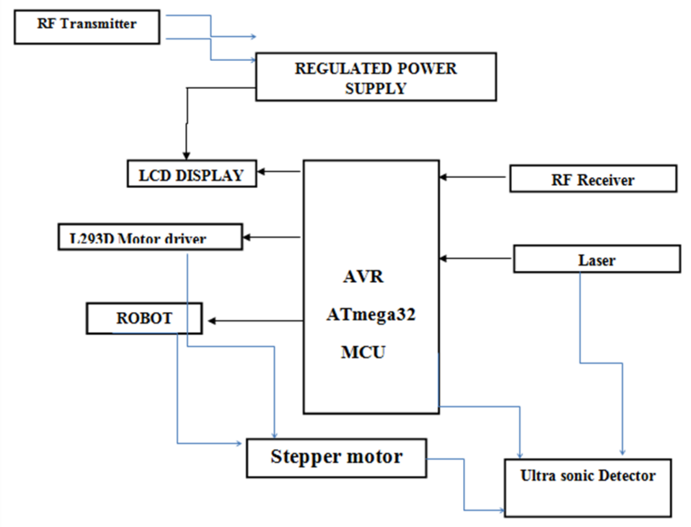
P. JAYAKRISHNA BHARADWAJ
18711A0481

Microcontroller Based Missile Detection and Destroying

This model is to design and construct automatic missile detection and destroying system. The system is designed to detect the target (missile) moving in multiple directions. The destroying system moves automatically in the direction of missile and fires it upon fixing the target. This system consists of a SONAR based object tracking system that continuously monitors the target. Upon detecting the target it sends the target's location to a Central Control System. The Central Control System takes the action of moving the firing mechanism in the direction of target missile. Upon fixing the direction, it sends the control command to firing system to attack the target. This model is divided in three part RF Transmitter, RF Receiver, and microcontroller.

The main objectives of this model are:

1. Monitoring the moving target.
2. Real time monitoring of target
3. Works in any lighting conditions.
4. Automatic target attacking.
5. Controlling the robot using RF TX and RX



Block Diagram of Automatic Missile Detection

Missile Destruction by firing

This ultrasonic proximity detector comprising independent, battery or AC powered transmitter and receiver section make use of a pair of matched ultrasonic piezo ceramic transducers each operating at around 40 kHz. This circuit is used to get reflected signals of 40 KHz from the a missile to feed that to a program to the microcontroller to switch on appropriate load while the program is executed at the microcontroller end. When the AVR microcontroller receives the signal from ultrasonic receiver it activates the door gun by triggering the gate of MOSFET through a transistor. The power supply consists of a step down transformer 230/12V, which steps down the voltage to 12V AC. Then this is converted to DC using a Bridge rectifier. The ripples are then removed using a capacitive filter and it is then regulated to +5V using a voltage regulator 7805 which is required for the operation of the microcontroller and other components.

OpAmps are used for amplification of the weak signals received upon reflection from the obstacle, by the receiving ultrasonic transducer sent by the transmitting one, to switch on appropriate load while the program is executed at the microcontroller end.The model consists of the ultrasonic transmitter and receiver each of which works for the frequency of 40 kHz.

At the receiver side the received signal is amplified and given to the microcontroller which is used as to operate the relay driver (ULN2003) for operating the relay to drive the loads.

Target acquisition and tracking are frequent domains of active sensing methods such as RADAR, Ultra-sound, or LASER scanning. The ability to track targets at manipulation range can significantly reduce the cost and complexity of manipulator control. Ultrasonic sensors, in particular, provide an ideal platform for experimental development in range detection. They are cheap, readily available, and increasingly possessed of high-resolution sensors. Its various Applications range from robotic security systems to environments such as production lines where distance measurement and obstacle measurement and manipulation of objects are routine tasks with potential for wide-scale automation and defense.

SK. RAHAMTHUNISA
18711A0498

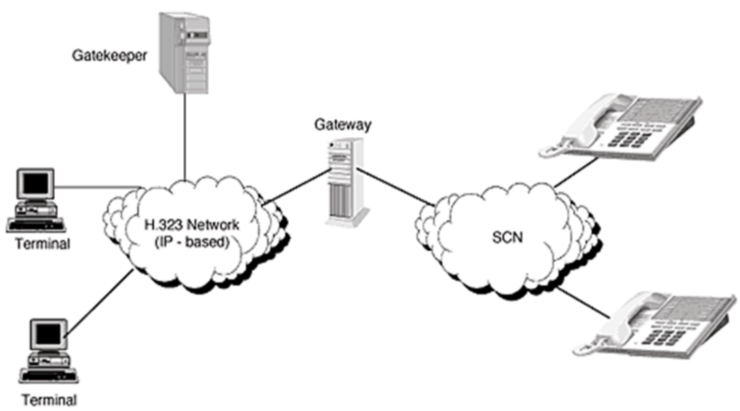
H 323 Technology

The H.323 standard provides a foundation for audio, video, and data communications across IP-based networks, including the Internet. By complying with H.323, multimedia products and applications from multiple vendors can interoperate, allowing users to communicate without concern for compatibility. H.323 will be the keystone for LAN-based products for consumer, business, entertainment, and professional applications.

H.323 is an umbrella recommendation from the International Telecommunications Union (ITU) that sets standards for multimedia communications over Local Area Networks (LANs) that do not provide a guaranteed Quality of Service (QoS). These networks dominate today's corporate desktops and include packet-switched TCP/IP and IPX over Ethernet, Fast Ethernet and Token Ring network technologies. Therefore, the H.323 standards are important building blocks for a broad new range of collaborative, LAN-based applications for multimedia communications.

The H.323 specification was approved in 1996 by the ITU's Study Group 16. Version 2 was approved in January 1998. The standard is broad in scope and includes both stand-alone devices and embedded personal computer technology as well as point-to-point and multipoint conferences. H.323 also addresses call control, multimedia management, and bandwidth management as well as interfaces between LANs and other networks.

H.323 is part of a larger series of communications standards that enable videoconferencing across a range of networks. Known as H.32X, this series includes H.320 and H.324, which address ISDN and PSTN communications, respectively



H323 - Key to LAN based Products

Importance of H.323:

The H.323 Recommendation is comprehensive, yet flexible, and can be applied to voice-only handsets and full multimedia video-conferencing stations, among others. H.323 applications are set to grow into the mainstream market for several reasons.

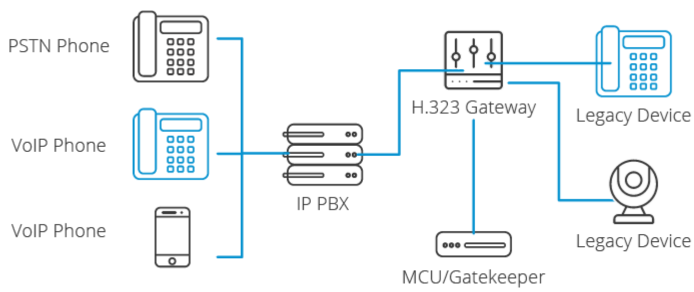
H.323 sets multimedia standards for the existing infrastructure (i.e. IP-based networks). Designed to compensate for the effect of highly variable LAN latency, H.323 allows customers to use multimedia applications without changing their network infrastructure.

IP LANs are becoming more powerful. Ethernet bandwidth is migrating from 10 Mbps to 100 Mbps, and Gigabit Ethernet is making headway into the market. By providing device-to-device, application-to-application, and vendor-to-vendor interoperability, H.323 allows customer products to interoperate with other H.323- compliant products.

PCs are becoming more powerful multimedia platforms due to faster processors, enhanced instruction sets, and powerful multimedia accelerator chips. H.323 provides standards for interoperability between LANs and other networks.

Network loading can be managed. With H.323, the network manager can restrict the amount of network bandwidth available for conferencing. Multicast support also reduces bandwidth requirements.

H.323 has the support of many computing and communications companies and organizations, including Intel, Microsoft, Cisco, and IBM. The efforts of these companies will generate a higher level of awareness in the market.



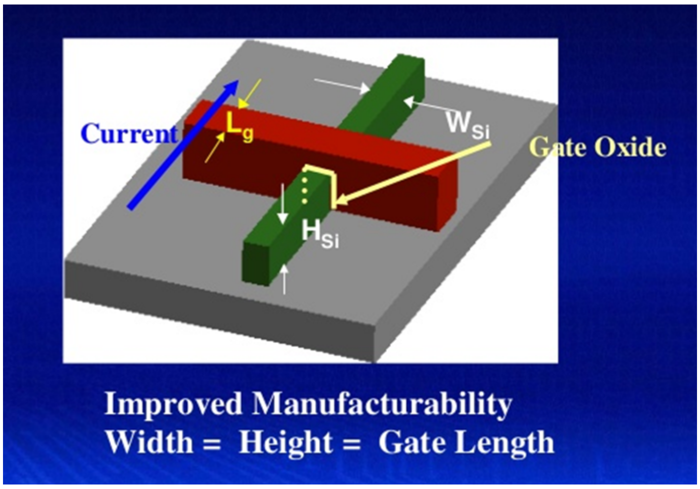
Multimedia Communication over LAN

V. KALYANI
18711A04B4

Integrated CMOS Tri-Gate Transistors

Tri-Gate fully-depleted CMOS transistors have been fabricated with various body dimensions. These experimental results and 3-D simulations are used to explore the design space for full depletion, as well as layout issues for the Tri-Gate architecture, down to 30nm gate lengths. It is found not only that the Tri-Gate body dimensions are flexible and relaxed compared to single- gate or double- gate devices, but that the corner plays a fundamental role in determining the device I- V characteristics. The corner device not only turns on at lower voltages due to the proximity of two adjacent gates, but the DIBL of this part of the device is much smaller than the rest of the transistor. The shape of the sub threshold I-V characteristics and the degree of DIBL control, as well as the early device turn-on are also greatly affected by the degree of body corner rounding. Examination of layout issues shows that the fin-doubling approach from using a spacer printing technique results in an increase in drive current of 1.2 times that of a planar device for a given width, though the shape of the allowed Tri-Gate fins has certain restrictions.

The tri-gate transistor isn't entirely a new announcement, as the company has been talking about the technology at various events since September of 2002. Presenting at the 2006 Symposia on VLSI Technology and Circuits in Honolulu, Hawaii, Intel followed up with more details and first test results, which indicated that the tri-gate transistor, often also referred to as “3D transistor” may in fact be a technology that will make it into production one day.

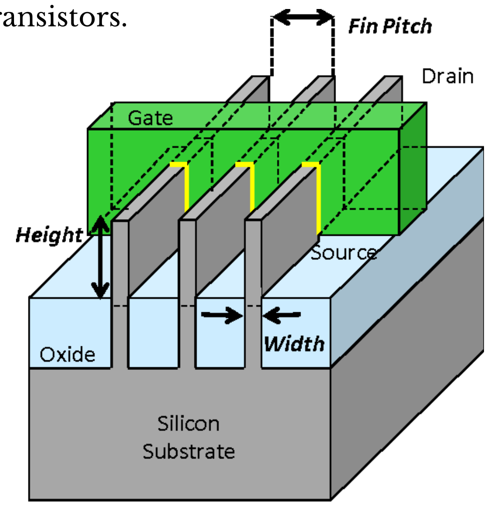


Tri-gate Transistor Structure

The tri-gate transistor isn't entirely a new announcement, as the company has been talking about the technology at various events since September of 2002. Presenting at the 2006 Symposia on VLSI Technology and Circuits in Honolulu, Hawaii, Intel followed up with more details and first test results, which indicated that the tri-gate transistor, often also referred to as “3D transistor” may in fact be a technology that will make it into production one day.

With the amount of transistors doubling every 18 – 24 months company is inclined more and more to reduce the transistor size which essentially lies on reducing the source, drain, gates size. Reducing the gate size created several challenges such as increasing current leakage in “off” states of a transistor – causing the overall power consumption of a semiconductor device to climb. Power consumption has been a major consideration in Chip design technology. First tri-gate transistors apparently have been manufactured and Mayberry claimed that 65 nm versions offer a 45% increase in speed or 50 x reductions in “off”-current when compared to regular planar transistors. All this is pretty interesting. Lets wait and see how far companies reduce the size and power consumption in future.

Tri-gate or 3-D are terms used by Intel Corporation to describe their non planar transistor architecture planned for use in future microprocessor technologies. These transistors employ a single gate stacked on top of two vertical gates allowing for essentially three times the surface area for electron to travel. Intel reports that their tri-gate transistors reduce leakage and consume far less power than current transistors.



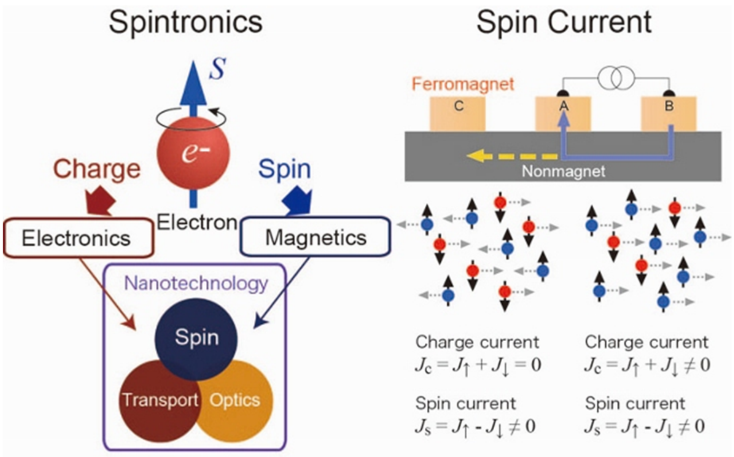
3-D view of Tri-gate Fabrication

KOPPOLU PRADEEPTHI,
IV ECE-A 17711A0431

Spintronics

In the weird world of quantum mechanics the fundamental, particle, electron possesses a property Called 'spin'. It is not the sort of spin used in common everyday speech but, the angular momentum or the rotational momentum of a subatomic particle that creates its own tiny magnetic field. By exploiting this spin property, in a field called spintronics, computer scientists and physicists have the potential to revolutionise the basis of computer processing and storage technologies.

'Spintronics' can be a fairly new term for you but the concept isn't so very exotic this technological discipline aims to exploit the subtle and mind-bending esoteric quantum properties of the electron to develop a new generation of electronic devices. The word itself is a blend of electronics with spin, the quantum property it exploits. Like so many words applied to the subatomic realm, you can refer spin figuratively as a convenient label for a property that has no equivalent in gross matter.



Every electron exists in one of two states, namely, spin-up and spin-down, with its spin either +1/2 or -1/2 (refer Figs 1 and 2). In other words, an electron can rotate either clockwise or anticlockwise around its own axis with constant frequency. The two possible spin states naturally represent '0' and '1' states in logical operations. And just because of this it is possible to make a sandwich of gold atoms between two thin films of magnetic material that acts as, a filter or a valve permitting only the electrons in one of the two states to pass. The filter can be changed from one state to the other using a brief and tiny burst of current.

Semiconductor spintronics devices combine advantages of semiconductor with the concept of magnetoelectronics. This category of devices includes spin diodes, spin filter, and spin FET. To make semiconductor based spintronic devices, researchers need to address several following different problems. A first problem is creation of inhomogeneous spin distribution.

It is called spin-polarisation or spin injection. Spin-polarised current is the primary requirement to make semiconductor spintronics based devices. It is also very fragile state. Therefore, the second problem is achieving transport of spin-polarised electrons maintaining their spin-orientation. Final problem, related to application, is relaxation time. This problem is even more important for the last category devices. Spin comes to equilibrium by the phenomenon called spin relaxation. It is important to create long relaxation time for effective spin manipulation, which will allow additional spin degree of freedom to spintronics devices with the electron charge. Utilizing spin degree of freedom alone or add it to mainstream electronics will significantly improve the performance with higher capabilities.

A net spin polarization can be achieved either through creating an equilibrium energy split between spin up and spin down. Methods include putting a material in a large magnetic field (Zeeman effect), the exchange energy present in a ferro-magnet or forcing the system out of equilibrium. The period of time that such a non-equilibrium population can be maintained is known as the spin lifetime.

In a diffusive conductor, a spin diffusion length can be defined as the distance over which a non-equilibrium spin population can propagate. Spin lifetimes of conduction electrons in metals are relatively short (typically less than 1 nanosecond). An important research area is devoted to extending this lifetime to technologically relevant timescales.

The mechanisms of decay for a spin polarized population can be broadly classified as spin-flip scattering and spin dephasing. Spin-flip scattering is a process inside a solid that does not conserve spin, and can therefore switch an incoming spin up state into an outgoing spin down state. Spin dephasing is the process wherein a population of electrons with a common spin state becomes less polarized over time due to different rates of electron spin precession. In confined structures, spin dephasing can be suppressed, leading to spin lifetimes of milliseconds in semiconductor quantum dots at low temperatures.

Superconductors can enhance central effects in spintronics such as magnetoresistance effects, spin lifetimes and dissipationless spin-currents.

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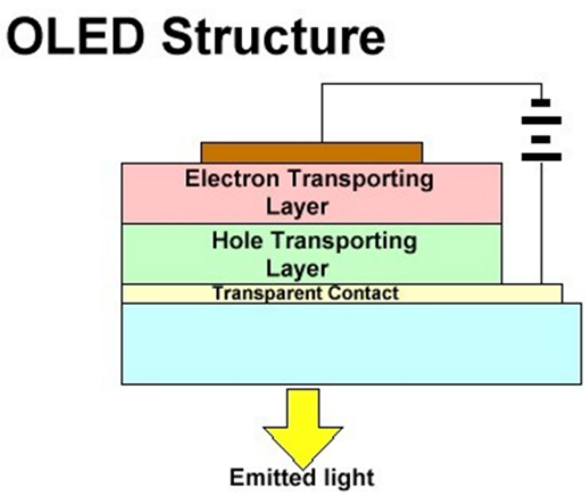
Organic Light Emitting Diode

Organic Light Emitting Diode is a scalable nano level emerging technology in Flat Panel Displays and as a White Light Source with efficient features. This paper focuses on OLED structure, principle aspects, fabrication methodology and different techniques to replace current white light sources like Incandescent bulbs, Fluorescent tubes, and even display techniques like Liquid Crystal Displays, Plasma technologies. OLEDs can be fabricated using Polymers or by small molecules. OLED matrix displays offer high contrast, wide viewing angle and a broad temperature range at low power consumption. These are Cheaper, Sharper, Thinner, and Flexible. OLEDs have a potential of being white-light sources that are

- Bright, power-efficient and long lived, by emitting pleasing white light
- Ultra-thin, light weight, rugged, and conformable
- Inexpensive, portable

OLEDs are energy conversion devices (electricity-to-light) based on Electroluminescence. Electro-luminescence is light emission from a solid through which an electric current is passed. OLEDs are more energy-efficient than incandescent lamps. The luminous efficiency of light bulbs is about 13 - 20 lm/W but the latest experimental green emitting OLEDs already have luminous efficiency of 76 lm/W, though at low luminance. The development is on track for OLEDs to effectively compete even with fluorescent lamps, which have the luminous efficiency of 50 - 100 lm/W. One big advantage of OLEDs is the ability to tune the light emission to any desired color, and any shade of color or intensity, including white. Achieving the high Color Rendition Index (CRI) near 100 (the ability to simulate the most pleasing white color, sunlight), is already within the reach of OLEDs. Another advantage of OLEDs is that they are current-driven devices, where brightness can be varied over a very wide dynamic range and they operate uniformly, without flicker.



CRT is still continuing as top technology in displays to produce economically best displays. The first best look of it is its Cost. But the main problems with it are its bulkiness, Difficulties in Extending to Large area displays as per construction. Even though Liquid Crystal Displays have solved one of problem i.e. size, but it is not economical. So in this present scenario the need for a new technology with both these features combined leaded to invention of OLED.OLED which is a thin, flexible, Bright LED with self luminance which can be used as a display device. The main drawback of LCD display is its Less viewing angle and highly temperature depending which moves us towards a new technology. Thus OLED promises for faithful replacement of current technology with added flavors like Less Power Consumption and Self Luminance .Both Active matrix TFT's and Passive matrix Technologies are used for display and addressing purposes for high speed display of moving pictures and faster response. Already some of the companies released Cell Phones and PDA's with bright OLED technology for color full displays. Organic Light Emitting Diodes (OLEDs) are thin-film multi-layer devices consisting of a substrate foil, film or plate (rigid or flexible), an electrode layer, layers of active materials, a counter electrode layer, and a protective barrier layer At least one of the electrodes must be transparent to light. The OLEDs operate in the following manner: Voltage bias is applied on the electrodes, the voltages are low, from 2.5 to ~ 20 V, but the active layers are so thin (~10Å to 100nm) that the electric fields in the active layers are very high, of the order of 105 – 107 V/cm. These high, near-breakdown electric fields support injection of charges across the electrode / active layers interfaces. Holes are injected from the anode, which is typically transparent, and electrons are injected from the cathode. The injected charges migrate against each other in the opposite directions, and eventually meet and recombine. Recombination energy is released and the molecule or a polymer segment in which the recombination occurs, reaches an exited state. Excitons may migrate from molecule to molecule. Eventually, some molecules or a polymer segments release the energy as photons or heat. It is desirable that all the excess excitation energy is released as photons (light). The materials that are used to bring the charges to the recombination sites are usually (but not always) poor photon emitters (most of the excitation energy is released as heat). Therefore, suitable dopants are added, which first transfer the energy from the original excitons, and release the energy more efficiently as photons. In OLEDs, approximately 25% of the excisions are in the singlet

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