ELECTRONICS & COMMUNICATION ENGINEERING

TECH CONNECT

December,2018

LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING

MYLAVARAM

Contents

The main objective of this magazine is to only educate the student community to advances in technology and has no commercial benefit in this.

1.SPACE JUNK

Today all our comforts starting from the television we see to the latest updates we get in our smart phones everything is from an artificial body placed in orbit round the Earth known as satellite. It's really hard to overstate how much our modern world relies on them. With commercial space companies making rocket launches and more affordable by the day, and nanotechnology giving a cube-sats you can hold in your hand , we are entering the gold age of satellite technology. But just as we gain a new benefit with each new object we place in low earth orbit (Remote sensing satellites are commonly found here orbiting at about 500 to 600 km above the ground) , we're also adding to the odds of collision. This danger is called Kesseler Syndrome, and it was highlighted in the film gravity. We send many satellites in to the space to make our work much better and easy and this has become the very basic reason for all the clutter in space and this waste is known as SPACE JUNK OR ORBITAL DEBRIS.

When objects travelling at 17,500 miles per hour collide, bad things happen – mainly a cascading effect of more and more collisions, creating more and more space debris. Obviously this is a threat to the crew of the International Space Station, but if it starts to take out too many satellites, it could also significantly threaten our way down here on Earth. And if it gets really out of control, it could eventually make space launches completely impossible. Currently , there are 2,000 satellites orbiting the planet Earth and an estimated 500,000 pieces of space junk ranging in size from about a fingernail up to the size of a bowling ball. They are made up of items such as used up-rocket spaces , loose fragments from rocket explosions and collisions , launch canisters, dust and paint flakes. Objects or tools lost during a space repair and space walks, such as cameras , garbage bags, wrench, pilers and even an astronaut's glove are now part of extra terrestrial litter. Abandoned satellites are also considered as space junk.

Space junk is harmless until it collides with something else, such as a space vehicle. A real time example is that if a wrench slips from the hand of an astronaut while he is busy doing his routine repair job in space it then goes in to the orbit and travels around 6 miles a second. At this speed if it hits any space vehicle which contain some human passengers it causes a big threat for their lives as well as the junk in space is also raised. So we can say that the larger the space vehicle, the greater the risk that it could be hit by space junk.

Some space junk fall down to the earth when it slows down enough by the drag of the atmosphere , luckily most objects are small enough to burn up and vaporize as they fall through the atmosphere-but not all. This is why scientists try to deliberately program large objects in to a deep-dive down through the atmosphere over the ocean. Right now , some of the scientists are trying to figure out how best to deal with the giant Earth observation space craft called Envisat, that stopped communicating in April 2012.The 26 meter long satellite has been described as a "Ticking Bomb" and is one of the largest space junk threats in low earth orbit.

Only now, after the awareness of space junk and its consequences, some governments are insisting that any new satellites must be programmed to come down within 25 years so that they don't contribute to the orbital debris problem. The present debris can be removed with the help of artificial hand with has come to existence these days.

~Ch.Srivalli(17761A04B0)

2.Space Colonization: The Quite Revolution

One of the major environmental concerns of our time is the increasing consumption of Earth's resources to sustain our way of life. As more and more nations make the climb up from agricultural to industrial nations, their standard of life will improve. This further leads to competition among more and more people for the same resources. While NASA spinoffs and other inventions can allow us to be thriftier with Earth's resources, we nevertheless must come to grips with the problem that humanity is currently limited to one planet.

Space colonization is also called space settlement, or extra-terrestrial colonization is a permanent human habitation off the planet Earth.

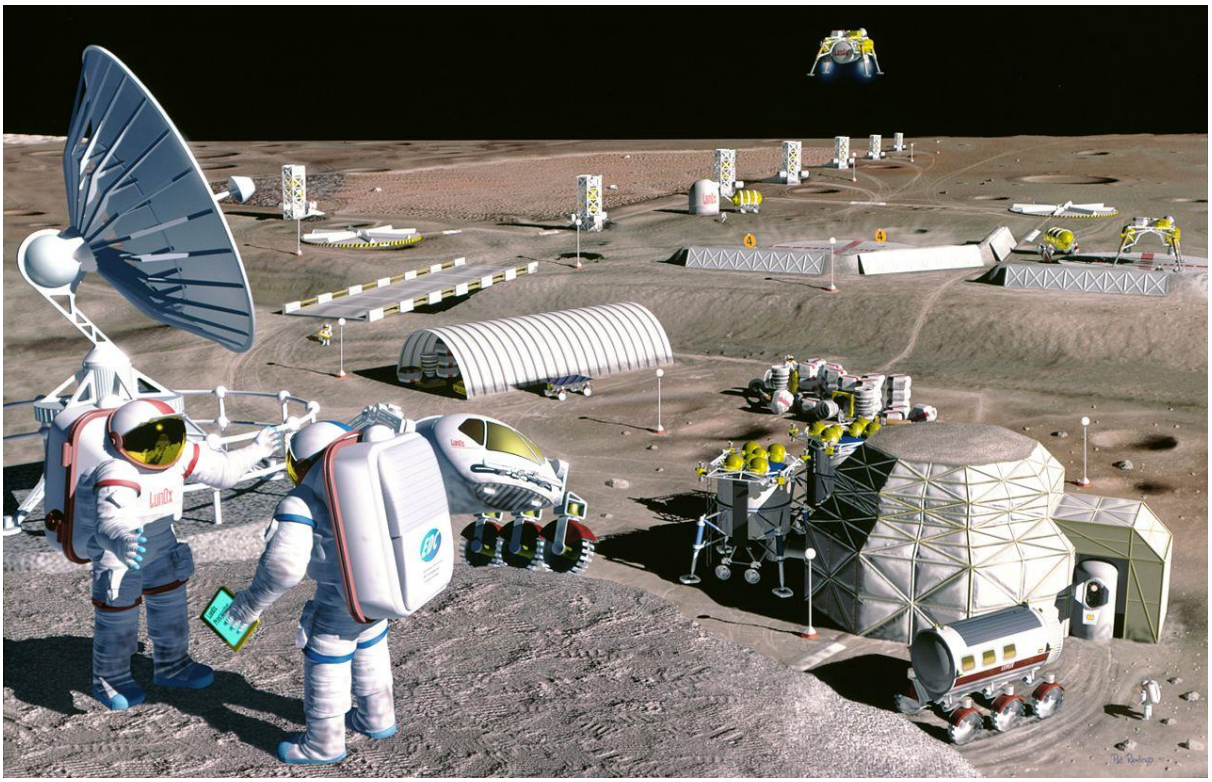


Fig: Conception of a colony on the Moon

Space colonies could be the answer to this problem, if we can solve the medical problems posed by microgravity (also called weightlessness) and the high levels of radiation to which the astronauts would be exposed after leaving the protection of the Earth's atmosphere. The colonists would mine the Moon and the minor planets and build beamed power satellites that would supplement or even replace power plants on the Earth. The

colonists could also take advantage of the plentiful raw materials, unlimited solar power, vaccuum, and microgravity in other ways to create products that we cannot while inside the cocoon of Earth's atmosphere and gravity. In addition to potentially replacing our current Earth-polluting industries, these colonies may also help our environment in other ways. Since the colonists would inhabit completely isolated manmade environments, they would refine our knowledge of the Earth's ecology.

This vision, which was purely science fiction for years and years, caught the imagination of the public in the Seventies, leading to the establishment of the organization known today as the National Space Society.

Fig: Artist Les Bossinas' 1989 concept of Mars mission

~M.Poojitha (16761A0434)

3.3D-printed glucose biosensors

A 3D-printed glucose biosensor for use in wearable monitors has been created. The work could lead to improved glucose monitors for millions of people who suffer from diabetes.People with diabetes most commonly monitor their disease with glucose meters that require constant finger pricking. Continuous glucose monitoring systems are an alternative, but they are not cost effective. Researchers have been working to develop wearable, flexible electronics that can conform to patients' skin and monitor the glucose in body fluids, such as in sweat. To build such sensors, manufacturers have used traditional manufacturing strategies, such as photolithography or screen printing. While these methods work, they have several drawbacks, including requiring the use of harmful chemicals and expensive cleanroom processing. They also create a lot of waste.Using 3D printing, the WSU research team developed a glucose monitor with much better stability and sensitivity than those manufactured through traditional methods.

The researchers used a method called direct-ink-writing (DIW) that involves printing "inks" out of nozzles to create intricate and precise designs at tiny scales. The researchers printed out a nanoscale material that is electrically conductive to create flexible electrodes. The WSU team's technique allows a precise application of the material, resulting in a uniform surface and fewer defects, which increases the sensor's sensitivity. The researchers found that their 3D-printed sensors did better at picking up glucose signals than the traditionally produced electrodes.

Because it uses 3D printing, their system is also more customizable for the variety of people's biology.3D printing can enable manufacturing of biosensors tailored specifically to individual patients" Because the 3D printing uses only the amount of material needed, there is also less waste in the process than traditional manufacturing methods."This can potentially bring down the cost.

For large-scale use, the printed biosensors will need to be integrated with electronic components on a wearable platform. But, manufacturers could use the same 3D printer nozzles used for printing the sensors to print electronics and other components of a wearable medical device, helping to consolidate manufacturing processes and reduce costs even more, 3-D printed glucose sensor will be used as wearable sensor for replacing painful finger pricking. Since this is a non-invasive, needleless technique for glucose monitoring, it will be easier for children's glucose monitoring. The team is now working to

integrate the sensors into a packaged system that can be used as a wearable device for long-term glucose-monitoring.

~P.Navya (17761A04G4)
~D.SWAPNA(17761A04D6)

4.Bluetooth 5

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.400 to 2.485 GHz from fixed and mobile devices. Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 30,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics The latest version of the Bluetooth standard introduces a number of improvements that will be of value to many applications. The main changes, which will be discussed in this article, are higher speed, increased range, mesh networking, and improved support for advertising and beacons. Bluetooth 5 remains backwards compatible with earlier versions and also provides better coexistence with other wireless networks. The increased range and faster data rates do not require any more power but cannot be used at the same time. In other words, Bluetooth 5 gives the designer choices for how to optimize between data rate, range and energy use.

Higher speed

Bluetooth 5's enhanced data rate (EDR) supports higher transmission speeds of up to 2Mbps without increasing output power. This means less energy is used to send the same amount of data. Most devices will be flash-based, enabling them to take advantage of this increased speed to perform firmware updates. This is important for security and feature updates, particularly for IoT nodes. The higher data rate will also be valuable for applications where rapid response times are required, such as controlling ohines robotics.

Increased range

Bluetooth 5 has a theoretical range of up to 400 meters for line of sight connections, which probably means about 120 meters in a more realistic environment. This is about four times the range of the previous version at the same power consumption. However, this can only be achieved at lower data rates, so there is a choice between high speed or greater range. For many low-energy applications, the 500 kbps or 125k bps modes will provide sufficient bandwidth.

Mesh networking

Bluetooth was originally defined as a star network where all nodes connect via a central hub. This limits the size and range of the network. A large network would require multiple

hubs with some other, possibly wired, communication between them, which adds to the cost and complexity. Bluetooth 5 introduces support for mesh networking where all nodes can communicate directly with one another, see Figure 1. Messages can be passed through intermediate nodes. This extends the network beyond simple point-to-point wireless connectivity and provides almost unlimited range throughout and even between buildings.

Mesh networking is already supported by other wireless systems such as Zigbee and has been implemented by some manufacturers of Bluetooth devices using proprietary extensions to the standard.

Bluetooth 5 uses a "flooding" mesh. This means that every packet received by a node is copied to all the other connected nodes until it reaches the destination and effective way of spreading information across the mesh network. Every packet will have multiple paths to the destination, which increases reliability. Control can be distributed throughout the mesh using what the Bluetooth SIG calls a "scene"

Improvements to beacons and advertising

Bluetooth 5 provides better support for "connectionless" applications that use beacons, which function without needing to pair with another device. The improved range is useful for beacon applications. The speed increase isn't as relevant because it is usually the discovery/connection time, rather than the raw data rate, that is important
The basic broadcast packet size is increased to 255 bytes and packets can be chained to create extended advertising data payloads. This means the beacon can transmit more useful amounts of data and new types of data. However, Bluetooth has only three advertising channels and these could soon become congested with advertising packets if they all had large data payloads. These is a new periodic advertisement mode which allows for more synchronized broadcasting of data between devices.

Improved coexistence

There are multiple wireless connectivity solutions all operating in the 2.4 GHz band including cordless phones, baby monitors, Wi-Fi, Zigbee and LTE cellular networks. Bluetooth 5 improves the ability to coexist with these. As well as avoiding channels already in use by Wi-Fi it adds "slot availability masks" that avoid interference with cellular networks. Bluetooth 5 also has an improved channel-sequencing algorithm (CSA

#2) to improve the pseudo-randomness of next hop channel sequencing. This will improve operation in the presence of Wi-Fi and other Bluetooth devices.

The improvements in Bluetooth 5 will enable a new range of applications for beacons. For example retail outlets and exhibitions can use beacons to automatically register people's presence and deliver information about the items the visitor is looking at, including a link with more details or special offers..Bluetooth 5 will also be able to compete in IoT applications, such as smart lighting, which are already dominated by alternatives such as Zigbee.

~D.SWAPNA(17761A04D6)

5.E-Waste

E - waste a popular informal name for Electronic products using the end of their "Useful life". Commonly Electronic products are included in it they are;

- Mobile phones
- Wireless Devices
- Computers
- Videogames hardware
- Televisions etc.

Consequences of E-Waste:-

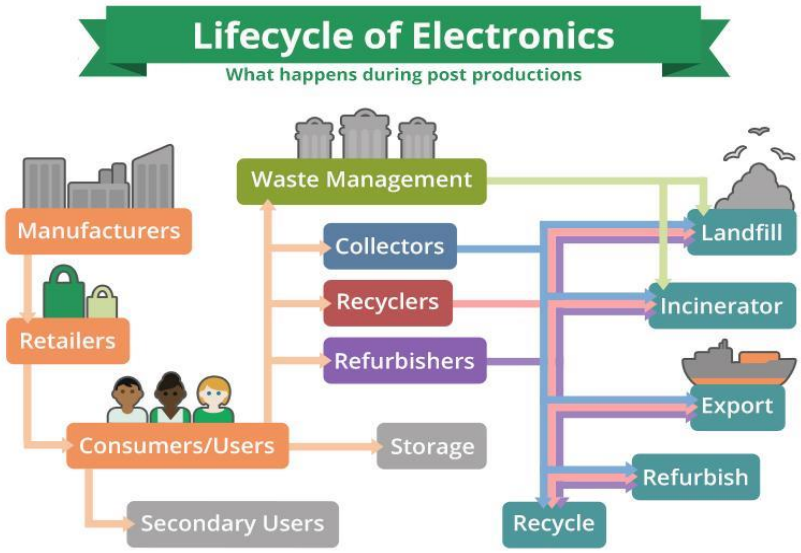
E-Waste can contains hazardous materials such as lead, mercury and Hexavalent chromium in circuit board, batteries and colour cathode ray tube, Television's. In addition brominated flame retardants, now mostly banned in Europe due to their toxicity and persistence are commonly added to plastic's used in electronics. If improperly handled, these toxics can be released into the Environment, potentially placing our health and Subsistence resources at risk.

substance	Type of waste	Health impact
Lead (Pb)	Solder, Lead-acid batteries, Cathode ray tubes, Cabling, printed circuit boards and fluorescent tubes.	Damage the brain, nervous systems and cause blood disorders.
Nickel (Ni)	Batteries, computer housing, cathode ray tube and printed circuit board.	Cause allergic reaction and lung cancers.
Antimony (Sb)	Cathode ray tube glass, plastic computer housing and cabling.	Cause stomach pain, vomiting and diarrhea.
Arsenic (As)	LED's.	Causes skin disease and lung cancers.
Cadmium (Cd)	Rechargeable NiCd batteries, semiconductor chips, IR detectors and printer inks.	Damage kidneys.
Mercury (Hg)	Batteries, backlight lamps/bulbs, flat panel displays, switches & thermostats.	Damage the brain & kidneys.
Barium (Ba)	Spark plugs, fluorescent lamps and cathode ray tube gutters in vacuum tubes.	Cause brain swelling, muscle weakness, damage to the heart and lever.

Components of E-Waste:-

The Environmental impact of the processing of different Electronic waste components

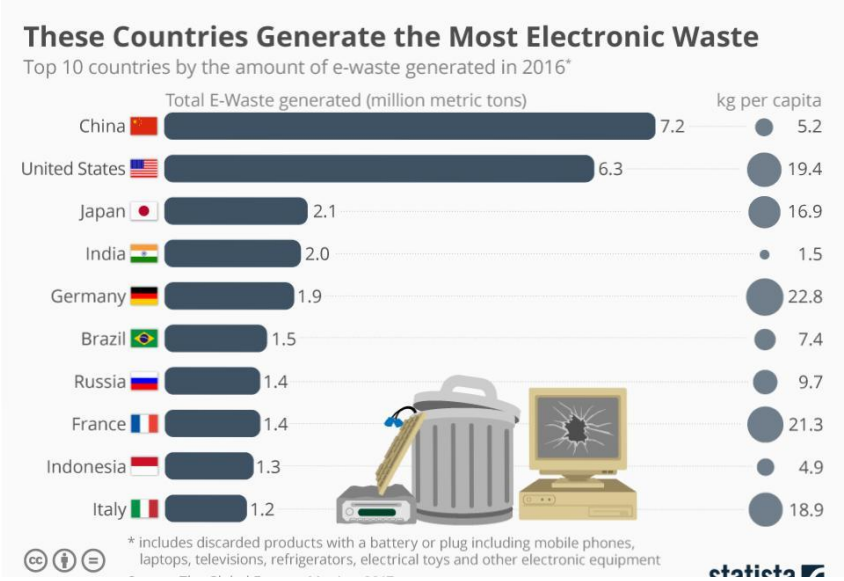
E-Waste Component	Process Used	Potential Environmental Hazards
Cathode ray tubes (used in TVs, computer monitors, ATM, video cameras, and in any more).	Breaking and removal of yoke, then dumping.	Lead, barium and other heavy metals leaching into the ground water and release of toxic phosphor
Printed circuit board	De-soldering and removal of computer chips; open burning and acid bath to remove final metals after chips are removed.	Air emissions as well as discharge into rivers of glass dust, tin, Lead, Brominated dioxin, beryllium cadmium, mercury.
Chips and other gold plated components	Chemical stripping using nitric and hydrochloric acid and burning of chips	Hydrocarbons, heavy metals, brominated substances discharged directly into rivers acidifying fish and flora.
Plastics from printers, keyboards, monitors, etc.	Shredding and low temperature melting to be reused	Emissions of brominated dioxins, heavy metals and hydrocarbons.
Computer Wires	Open burning and stripping to remove copper	Hydrocarbons ashes released into air, water and soil



Electronic waste, commonly known as e-scrap and e-waste is the trash we generate from surplus, broken and obsolete electronic devices. E-waste or electronics recycling is the process of recovering materials from old devices to use in new products.

- Only 41 countries have official e-waste statistics. In countries where there is no nation e-waste legislation in place, e-waste is probably categorized as other or general waste.
- Between 2014 and 2017 the percentage of world population covered by e-waste legislation increased from 44% to 66%.
- Every year, between 20 and 50 million tons of e-waste are tossed into landfills, and just 10% to 18% of total worldwide e-waste generation is recycled but according to EPA, current E-Waste recycling rate is just 12.5%

Statistics of E-Waste generated countries



Conclusion:-

- It is our duty to protect our Environment from the hazardous waste to better life of further generation.
- Recycling of e-waste can also protectable to whole ecosystem.
- Today's electronic gadgets are tomorrows E-Waste.

References:-

- Global E-Waste management and services, Hyderabad.
- Journal of E-Waste management .
- E-Waste: Environmental problems and current management journal of Engineering science and technology review3 2010.

~Waste is not a waste until we waste it

Recycle the present and save the future

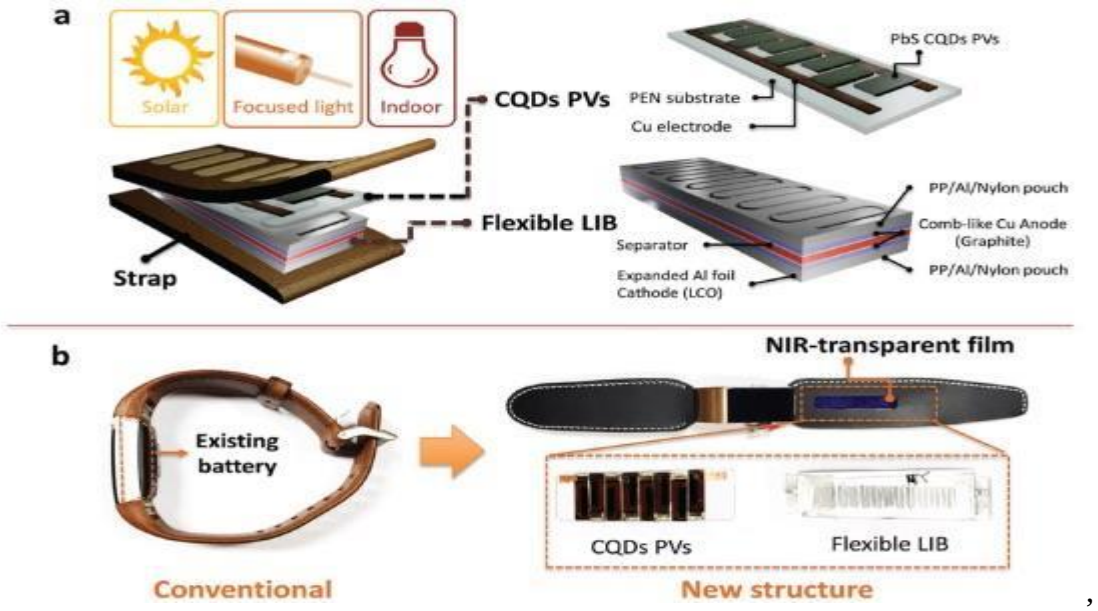
~P.Sathwik(17761A0447)

6. Wireless self charging system using NIR band and CQDs

Now a days charging is becoming more commonplace, especially for wearable electronic devices. Researchers from Korea Advanced Institute of Science and Technology (KAIST) have developed a wireless self-charging platform for low-power wearable electronic devices in which Near Infra Red (NIR) light is converted into electrical energy using Colloidal Quantum Dots (CQDs). This technology can be applied to flexible, wearable charging systems without any attachments.

CQDs are promising materials for manufacturing semiconductors. In particular, lead sulfide (PbS)-based CQDs have optical tunability from the visible to infrared wavelength region. As a result, they can be used in various devices such as lighting, photovoltaic's (PVs), and photo detectors. Research on CQD-based optoelectronic devices has increased their power conversion efficiency (PCE) to 12%.

The research team had decided to apply CQD PVs, which have high quantum efficiency in NIR band to self-charging systems on wearable devices. They employed a stable and efficient NIR energy conversion strategy.



Fig(a) Conceptual NIR-driven self-charging system including a flexible CQD PVs module and an interdigitatedly structured LIB.

Fig(b) Photographic images of a conventional wearable healthcare bracelet and a self-charging system-integrated wearable device

The system was comprised of a PbS CQD-based PV module, a flexible interdigitated lithium-ion battery, and various types of NIR-transparent films. The team removed the existing battery from an already commercialized wearable healthcare bracelet and replaced it with the self-charging system. They confirmed that the system worked and had high photo stability and efficiency.

This technology will be a novel platform for energy conversion and that its application can be further extended to various fields, including mobiles, IoT (Internet of Things), and drones.

~Mrs.M.V.L.Bhavani(Assistant Professor ,Department of ECE)

7.Recent Advances in High-speed Underwater Acoustic Communication

Digital communications through underwater acoustic (UWA) channels differ substantially from those in other media, such as radio channels, due to severe signal degradations caused by multipath propagation and high temporal and spatial variability of the channel conditions. However, to achieve high data rates on the severely band-limited UWA channels, bandwidth-efficient modulation techniques must be considered, together with array processing for exploitation of spatial multipath diversity. The new generation of underwater communication systems, employing bandwidth-efficient phase-coherent modulation techniques, has a potential of achieving at least an order of magnitude increase in data throughput. The available bandwidth in an UWA communication channel is severely limited by transmission loss which increases with both frequency and range. For example, a long range system for operating over several tens of kilometers is limited to few kHz of bandwidth; a medium-range system operating over several kilometers has a bandwidth on the order of ten kHz, while only a short range system, operating over several tens of meters may have available more than a hundred kHz. Within this limited bandwidth, the signal is subject to multipath propagation through a channel whose characteristics vary with time and are highly dependent on the location of the transmitter and receiver.

UWA COMMUNICATION CHANNELLS: In a digital communication system, multipath propagation causes inter symbol interference (ISI), and an important figure of merit is multipath spread in terms of symbol intervals. While typical multipath spreads in the commonly used radio channels are on the order of several symbol intervals, in the horizontal UWA channels they increase to several tens, or a hundred of symbol intervals for moderate to high data rates. For example, a commonly encountered multipath spread of 10ms in a medium-range shallow water channel, causes the IS1 to extend over 100 symbols if the system is operating at a rate of 10 kilo symbols per second (ks/s). A time-varying multipath communication channel is commonly modeled as a tapped delay line, with tap spacing equal to the reciprocal of twice the channel bandwidth, and the tap gains modeled as stochastic processes with certain distributions and power spectral densities. While it is known that mobile radio channels fit well within the model of Rayleigh fading.
UWA MODULATION TECHNICS: With the goal of increasing the bandwidth efficiency of an UWA communication system, research focus on phase-coherent modulation techniques, such as phase shift keying (PSK) and quadrature amplitude modulation

(QAM). Depending on the method for carrier synchronization, phase-coherent systems fall in to two categories: differentially coherent and purely phase -coherent.

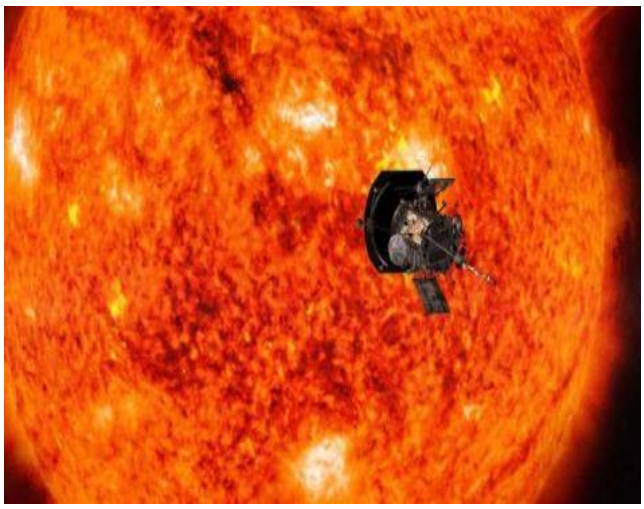
Developed by	Application	Channel	Modulation	ISI Compensation	Band	Data Rate
Oki Elec, Ind.Comp	Robot Comm./ Contr.	Very short(60mt), shallow	16-QAM	LE(LMS)	1MHz	500Kbps
JAMSTEC	Image tx.	Vertical(6500 mts)	4-DPSK	LE(LMS)	20KHz	16Kbps
IFREMER/ORCA	Image and data tx.	Vertical(2000 mts)	2-DPSK	none	53KHz	19.2Kbps
ENST-Br./IFREMER	Digital speech tx.	Test pool	4-DPSK	DFE(LMS)	Not-rep.	6Kbps
Micrilor	Telemetry	Medium (1Km) ,Shallow	2-DPSK	DS-SS	30KHz/100 KHz	600bps
WHOI/Datasonics	Telemetry	Vertical & Horizontal	16x4-FSK	none	15KHz	1200 bps
WHOI	Telemetry	Under-ice, shallow	QPSK	DFE(RLS)	15KHz	5Kbps

Table. Current Technical Specifications

~Mrs.K.Rani Rudrama (Associate Professor)

8. Mission to touch sun

Distance between earth and our nearest star is 149.6 million Kms, National Aeronautics and Space Administration (NASA) had sent PARKER SOLAR PROBE. It is the first satellite to be named after Living scientist (Dr. Eugene Parker), it is the first Satellite that will go to the nearest distance i.e., 3.9 million miles/6.1 million km from sun. It will travel at a speed of 16,000 kmph, which is the fastest moving satellite until now, it can bear temperature up to 2,500 degree (Fahrenheit), The main objective of this mission is to trace the flow of energy and understand the heating of the solar corona and to explore what accelerates solar wind. Solar wind is a stream of energized, charged particles, primarily electrons and protons. These will be flowing outward from the sun, through the solar system at speed as high as 900 km/s and at a temperature of 1 million degrees (Celsius) and it is made of plasma.



Solar wind concept revolutionized the study of Solar physics and this concept was proposed by parker, Cost for this most unbelievable project is 1.5 billion dollars, reason for attempting this expensive project is to take preventive measures for protecting the modern communication system. In 1859 earth was attacked by solar flare, normally solar flares were diverted by the earth's magnetic field, but this 1859 solar flare is huge so that earth's magnetic field cannot divert it and there is destruction in telegraph communication system and every communication is damaged severely in those days where electronic communication is in its initial stages, Now a days there is vast development in communication and if similar kind solar flare occurs now, we will have severe damage in money and property and in order to take preventive measures like switching off the advanced power grid and activating sleep mode in satellite, can reduce damage in

communication system and in general modern satellite will give information about those solar flares before 30-45 min of it's occurrence and parker solar probe will give information in advance , and also it is used to study the sun's corona where the heat will be around 3million degree(Celsius).satellite is protected by using solar shield which is made of carbon reinforced surfaces and it is of thickness 11.4cm and of diameter 2.3m, and it has artificial intelligence and can take it's own commands and it will reach the nearest distance by the year 2024, as it was launched on 12th August,2018 and it is the first mission to the nearest star.

~Praveen Kumar.T(16761A0448)

9.Sensors in Embedded Applications

Sensors are used for detection of changes in the physical and/or logical relationship of one object to another and/or the environment. Sensors are sophisticated devices that converts the physical parameter (for example: temperature, blood pressure, humidity, speed, etc.) into a signal which can be measured electrically. Sensors are classified as Active and Passive sensors. Active Sensors are those which require an external excitation signal or a power signal. Passive Sensors, on the other hand, do not require any external power signal and directly generates output response. The different types of sensors that are commonly used in various Embedded applications are Temperature Sensor, Ultrasonic sensor, water sensor, IR(infrared sensor),Pressure sensor and proximity sensors.

A Temperature Sensor, as the name suggests, senses the temperature .It measures the changes in the temperature correspond to change in its physical property like resistance or voltage. There are different types of Temperature Sensors like Temperature Sensor ICs (like LM35), Thermistors, Thermocouples, RTD (Resistive Temperature Devices).Temperature Sensors are used everywhere like computers, mobile phones, automobiles, air conditioning systems, industries etc.

An Ultrasonic Sensor is a non-contact type device that can be used to measure distance as well as velocity of an object. An Ultrasonic Sensor works based on the properties of the sound waves with frequency greater than that of the human audible range. Using the time of flight of the sound wave, an Ultrasonic Sensor can measure the distance of the object (similar to SONAR).

A water sensor is an electronic device that is designed to sound an alarm when its sensor comes in contact with water. It can be installed near heaters, washing machines, bathtubs, dishwashers, and other equipment. There are two types of water sensors - passive and active. To determine which one will be more suitable to your needs, you are advised to consult a professional. With passive water sensors, the device is placed on the floor and activates when it becomes wet. It is a battery operated device. As for active water sensors, they are capable of operating on individual appliances or on the entire house.

This system is also designed to sound an alarm, and it automatically shuts off the water supply when the alarm is activated. Special shut off valves and electrical wiring is required for this type of water sensor.

An infrared sensor is an electronic instrument that is used to sense certain characteristics of its surroundings. It does this by either emitting or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion. There are two types of IF sensors .Thermal infrared sensors which use infrared energy as heat. Their photo sensitivity is independent of the wavelength being detected. Thermal detectors do not require cooling but do have slow response times and low detection capabilities. Quantum infrared sensors provide higher detection performance and faster response speed. Their photo sensitivity is dependent on wavelength. Quantum detectors have to be cooled in order to obtain accurate measurements.

A pressure sensor is a device equipped with a pressure-sensitive element that measures the pressure of a gas or a liquid against a diaphragm made of stainless steel, silicon, etc., and converts the measured value into an electrical signal as an output.

A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Proximity sensors can have a high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between the sensor and the sensed object. Proximity sensors are also used in machine vibration monitoring to measure the variation in distance between a shaft and its support bearing. This is common in large steam turbines, compressors, and motors that use sleeve-type bearings.

~M.DurgaBhavani (15761A0425)

9.Telemedicine

Even today, there may be a chances of losing the lives if we don't reach the hospital in time and the people who are living in the remote areas are not getting the complete clinical facilities as the hospitals are not well-equipped to meet the requirements of medical services, and there is a chance of spreading the infections from one person to another, if we didn't get the proper treatment there is a possibility of losing the lives.

Telemedicine is the use of electronic information to communicate technologies to provide and support healthcare when distance separates the participants.(1)"*Tele*" is a Greek word meaning "distance "and "*mederi*" is a Latin word meaning "to heal". Time magazine called telemedicine "healing by wire". Although initially considered "futuristic" and "experimental," telemedicine is today a reality and has come to stay. Telemedicine has a variety of applications in patient care, education, research, administration and public health.(2) Worldwide, people living in rural and remote areas struggle to access timely, good-quality specialty medical care. Residents of these areas often have substandard access to specialty healthcare, primarily because specialist physicians are more likely to be located in areas of concentrated urban population. Telemedicine has the potential to bridge this distance and facilitate healthcare in these remote areas

In 1990's, Department of telecommunications and information technology launched a project titled as "TELEMEDICINE" with the objective of providing the health services through the phone or internet. In developing countries, the health care facilities are limited due to the lack of infrastructure, low ratio of physicians to population and conflicting policies, so it is necessary to develop this technology in developing countries. Almost 70% of the India's population lives in remote areas and 80% of the hospitals are located in cities and towns. With the help of Telemedicine technology, the patient can easily contact the doctor without visiting the hospital and it also reduces the visiting cost. This technology is more convenient to the patients and there is a chance of early diagnosis of the patient condition in emergency situations. It is a valuable tool that patients can send their medical information and Scanning reports by taking the images, by using this the patient condition is evaluated and treated by the physicians from wherever they are.

This technology was developed almost 25 years ago, but till now it was developed in many countries, So, the government and the youngsters should take an initiative to develop this project in remote areas and educate the people in rural areas how the technology is used, advantages of using it, then only it will be helpful to the people in rural

areas. This technology is very helpful for the poor, as they are not able to go the hospitals every time because of their economic conditions, so this will be helpful to the poor people.

Challenges:

Perspective of medical practitioners: Doctors are not fully convinced and familiar with e-medicine.

- **Patients' fear and unfamiliarity:** There is a lack of confidence in patients about the outcome of e-Medicine.
- **Financial unavailability:** The technology and communication costs being too high, sometimes make Telemedicine financially unfeasible.
- **Lack of basic amenities:** In India, nearly 40% of population lives below the poverty level. Basic amenities like transportation, electricity, telecommunication, safe drinking water, primary health services, etc. are missing. No technological advancement can change anything when a person has nothing to change.
- **Literacy rate and diversity in languages:** Only 65.38% of India's population is literate with only 2% being well-versed in English.
- **Technical constraints:** e-medicine supported by various types of software and hardware still needs to mature. For correct diagnosis and pacing of data, we require advanced biological sensors and more bandwidth support.
- **Quality aspect:** "Quality is the essence" and every one wants it but this can sometimes create problems. In case of healthcare, there is no proper governing body to form guidelines in this respect and motivate the organizations to follow-it is solely left to organizations on how they take it.
- **Government Support:** The government has limitations and so do private enterprises. Any technology in its primary stage needs care and support. Only the government has the resources and the power to help it survive and grow. There is no such initiative taken by the government to develop it.

References :

1. Brown N. A brief history of telemedicine. Telemedicine Information Exchange. 1995;105:833–5.
2. Ganapathy K. Neurosurgeon, Apollo Hospitals, Chennai, Telemedicine in India-the Apollo experience, Neurosurgery on the Web. 2001
3. Aparajita Dasgupta and Soumya Deb,"Telemedicine: A New Horizon in Public Health in India", Indian J Community Med. 2008 Jan; 33(1): 3–8.

~M. Sravani(15761A0427)