



**ZEAL  
INSTITUTES**

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NARHE | PUNE | INDIA

*Re-defining Excellence*



***ELECTRONICS AND TELECOMMUNICATION  
ENGINEERING***

# SPECTRUM



**2K21-22**

**"Let the currents of knowledge flow through your  
circuits of imagination."**

## FOUNDER DIRECTOR'S MESSAGE



I believe that diploma education provides hands on experience to students. Therefore as an entrepreneur, I insisted my three sons to take admission in polytechnic before going to higher education in mechanical engineering.

At zeal polytechnic, we are committed to creating an ambience for nurturing innovation, creativity and excellence in our students. We aim to prepare young engineer entrepreneurs and managers. They will have the competence and confidence to face all challenges. It is possible only when we impart high quality technical and managerial education coupled with appropriate training and wide exposure to the state of art practices.

This newsletter lays emphasis on all round personality development and also on inculcating human values and professional ethics. It helps our students become more human and socially responsible beings to lead a meaningful life. I wish a very knowledgeable, healthy and prosperous life to all.

**Hon. Shri. S. M. Katkar**  
Founder Director,  
Zeal Education Society, Pune.

## PRINCIPAL'S MESSAGE



We provide best platforms to budding engineers to acquire technical knowledge, motor skills and soft skills which are utmost demands of the industry. Uniqueness of our institute is a caring, nurturing culture that recognizes the various aspects of each student and encourages them to bloom to their fullest with confidence.

We are also committed to very good quality of teaching-learning process with having maintained high grade discipline among the staff and students and to achieve sky-scraping point superiority in academic by maintaining a conducive atmosphere for studies, state-of art laboratories communication center and digital library. MOUs have been signed with reputed organization to impart cutting edge technologies through extensive courses.

In another view, we aim at development of our student at different levels by the proper encouragement, guidance, support and generation of in-house recourses for sports, cultural, yoga, meditation etc followed by giving them a confidence to feel free at home.

These efforts have resulted in more placements and we are keen to argument it further. We are quite self-assured for the molding and nurturing of our students as a young, bright, dynamic, talented & professional technocrats and a responsible gentle citizen by raising the our actions to at high quality technical education.

**Prof. A.A.TAMBOLI**

**HEAD OF DEPARTMENT (H.O.D.)  
MESSAGE**



The Department of Electronics & Telecommunication has a strong team of faculty members who grace the department with their extensive teaching experience and industrial exposure to the department. The department offers excellent facilities in terms of modern equipment and instruments to the students.

Faculty members pay special attention to all the students for their curricular and co-curricular development. The department aims providing excellent theoretical and practical knowledge which helps the students in the academic growth.

The department organises various industrial visits offer practical exposure of the industry to the students. To add a feather to our hat, MSBTE has awarded an ‘Excellent’ grade during external monitoring.

**Prof.S.N.NAVALE**  
H.O.D

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## ELECTRIC VEHICLE



World is too big for an individual to change it on their own but each one of us can change what we can; Our environment, our space, our people then we can change the world. There are several ways to change the world one of them is by switching to Electric Vehicles (EV).

Do Electric Vehicles really help the environment? yes it does. Because regular cars run on gasoline and pumps CO2 directly into the atmosphere where as EV's run on electricity they don't burn gasoline at all. So, no gas, no CO2.

The main reason why everyone must shift towards EV's is because of the increased versatility. EV's use coal to power it. And also, it can use nuclear, or waste, or wind, or solar, or any other method of producing electricity. With gas cars, you just have gas. The switch to electric cars gives us the option to switch to better

ways of producing electricity, rather than being stuck with what we got.



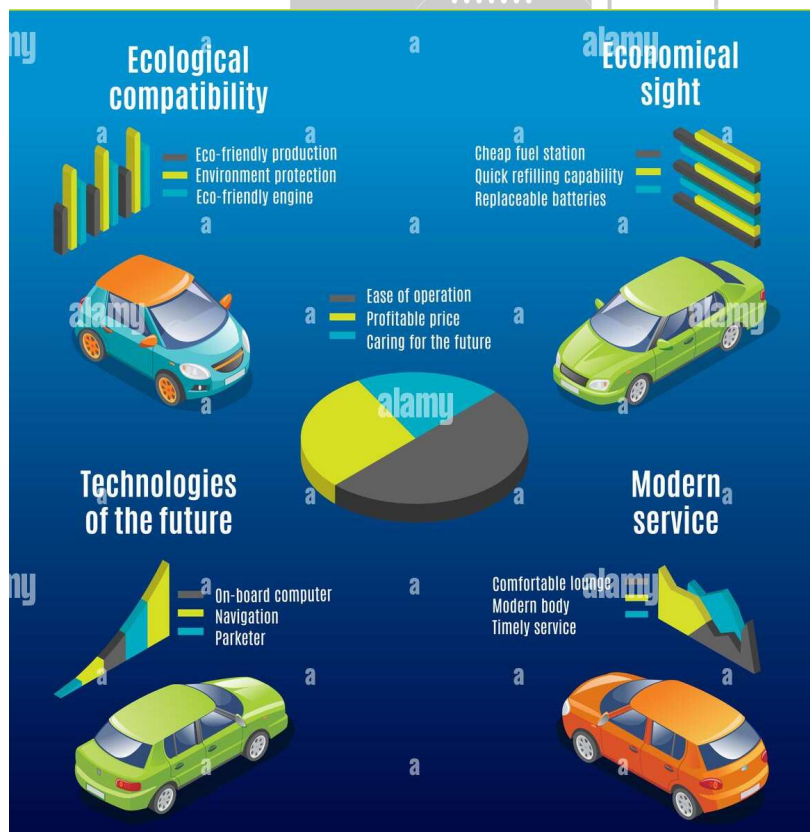
Norway is the world leader in the adoption of electric cars and other nations like France and UK announcing the plan to ban the sales of gas and diesel cars by 2040.

The EV's are actually nothing new, they started in 1832 well before the first gasoline vehicles. In fact, the first EV's were faster than 100km/hr was in 1899 called 'JAMAIS CONTENTE'. People were apparently satisfied with electric cars by 1910 they were almost twice as common on American roads as internal combustion engines. But then came Model T which at \$650, was significantly cheaper than the electric car's, and then these gas stations popped up all over the country.



## There are many types of EV'S

- i) Plug in EV's these are any vehicles that can be recharged from an external source of electricity.
- ii) Hybrid EV's these are the type of hybrid vehicles that combines conventional combustion engine system with electric propulsion system
- iii) Railborne EVs The fixed nature of a rail line makes it relatively easy to power EVs through permanent overhead lines or electrified third rails, eliminating the need for heavy onboard batteries.
- iv) Space rover vehicles :- Related to space exploration, like Manned and unmanned vehicles have been used to explore the Moon and other planets
- v) Airborne EV's:- related to aircrafts, Currently flying electric aircraft include manned and unmanned aerial vehicles.
- vi) Seaborne EV's: - Electric motors can and have also been used in sailboats instead of traditional diesel engines.
- vii)Electrically powered spacecraft:- The power sources used for spacecraft are batteries, solar panels and nuclear power.



Electric motors don't require oxygen, unlike internal combustion engines; this is useful for submarines and for space rovers.

Recently Tesla has revealed its new model named Tesla Cybertruck. This is an all-electric battery-powered light commercial vehicle, with range estimates of 250–500 miles (400–800 km) and an estimated 0–60 mph time of 2. Major auto companies have invested heavily in this technology. Tesla has plans to build 1 million EVs by 2020.

EVs will soon become a reality for many drivers, auto companies and transport sector companies, and the impact of EVs on the environment will help create a greener future.



PATIL NITESH NAMDEV  
TY E&TC



## SMART POT

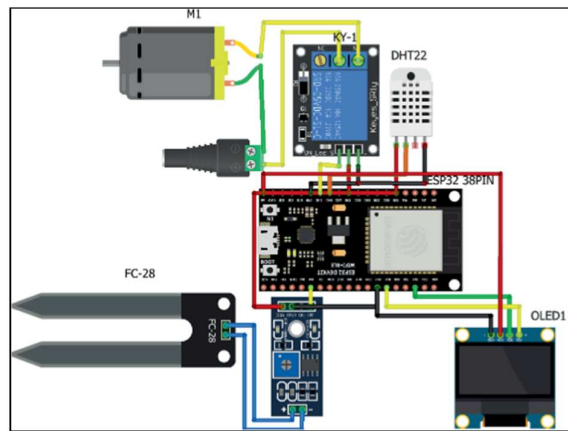


Smart Pot is the one of the methods to grow a plant effectively. Each and every thing related to grow a plant that is temperature, moisture, sunlight everything is monitored by Smart Pot. So, it will inform the owner about his/her plant. And also, Smart Pot saves water by turning off the water supply when plant is having enough amount of water.

Two main effective things in this project is, it is concerned to save water and plant, which are very precious things on the earth. This project is modern way of growing plant. Because it includes technology like IoT and electronics things to monitor plants status. So, this is best way of growing plant effectively.

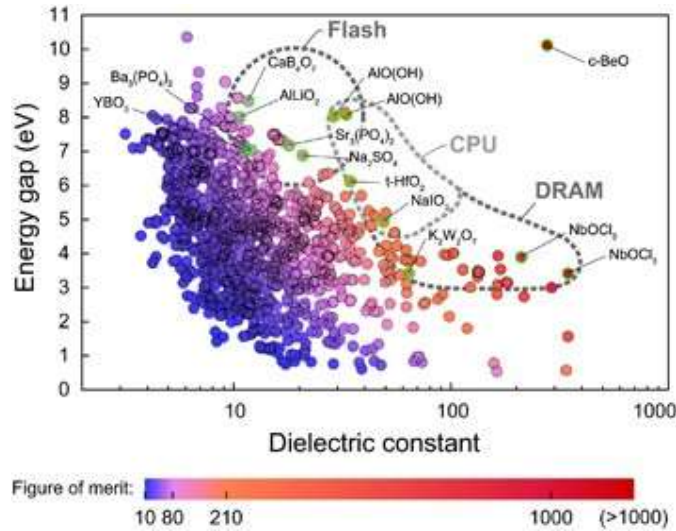
It is our duty to protect the plant. If we allow to destroy our natural resources like this then it will be dangerous for all human beings. Because without oxygen we can't even imagine our life. Trees and plants are the source of oxygen. So, we have to think about saving greenery on the earth. Our innovation should not be harmful towards natural resources.

The components which are used to make this smart pot are esp8266, Oled, DHT11 sensor, Soil moisture sensor, servo motor.

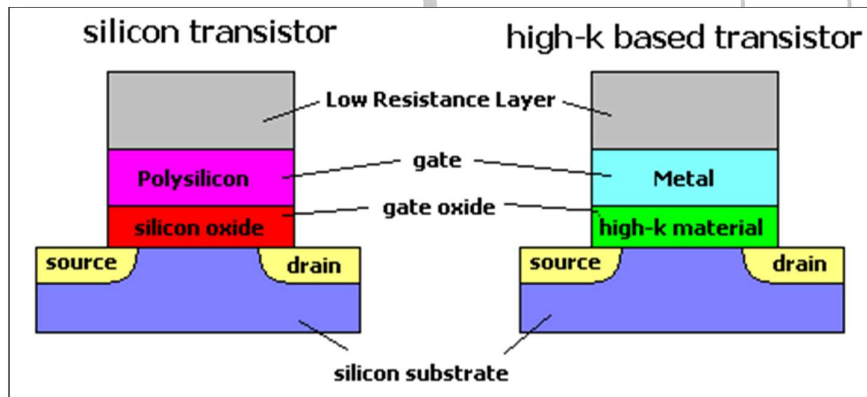


- Soil moisture sensor gives the amount of water content in the soil and displays the reading on OLED.
- If water supplied is less, then servo motor runs and supplies the water.
- DHT11 sensor senses the humidity & temperature around the plant & displays that on dashboard.
- LDR measures the amount of sunlight fallen on the plant and displays that on dashboard.

## HIGH-K DIELECTRIC MATERIALS



The microelectronics revolution of the past six decades has been intimately connected with advances in computer aided design, material science and fabrication technology. Over the years, complexity has increased from single transistor to integrated circuits, to large scale integration to very large scale integration where entire subsystems are placed on a single chip. Moore's law is the empirical observation that component density and performance of integrated circuits doubles every year, which was later revised to doubling every two years.



Guided by the scaling rules set by Dennard in 1974, smart optimization, timely introduction of new processing techniques, device structures and materials, Moore's law has continued unabated for the last 40 years and is likely to continue in the future. The present MOSFET based VLSI technology is working on the principle of small dimensions with high integration".

In recent years, the ever increasing demand for higher speed, low power dissipation and more function on a chip, has led to relentless scaling of MOSFETs from sub microns to nanometer regime. For this historical trend to continue existing materials and technologies are approaching their physical limits and several technological challenges need to be overcome. In addition to the critical dimension control, oxide thickness, shallow junction formation, isolation and interconnect technologies need immediate attention.

When the channel length is of the same order of magnitude as the depletion layer widths of the drain and the source, a MOSFET is said to be short. This reduction in channel length has resulted in different physical effects such as enhanced leakage current, drain induced barrier lowering (DIBL), short channel effects, sub threshold conduction and so on.

The thickness of silicon dioxide ( $\text{SiO}_2$ ) gate dielectric is reduced as transistors are scaled down, in order to increase the drive current, reduce threshold voltage and increase device performance. Due to thinning of the standard  $\text{SiO}_2$  gate dielectric, tunneling induced leakage current and dielectric breakdown will lead to unacceptable device performance resulting in increased power dissipation thus leading to its replacement. High-k dielectric materials could be a solution to overcome the scaling limit of  $\text{SiO}_2$ .

**PATIL AJINKYA RAJENDRA  
SY E&TC**



# WIRELESS COMMUNICATION SYSTEM



Communication is transfer of message or information from one point to another. Correspondence Systems can be Wired or Wireless and the medium utilized for this can be Guided or Unguided. In

Wired Communication, the medium is a physical path like Co-axial Cables, Twisted Pair Cables and high speed Communication Optical Fiber Links etc. On the other hand, Wireless Communication doesn't require any physical medium but propagates signal through space. Antennas will play very important role in wireless communication to transmit and receive signal over space.

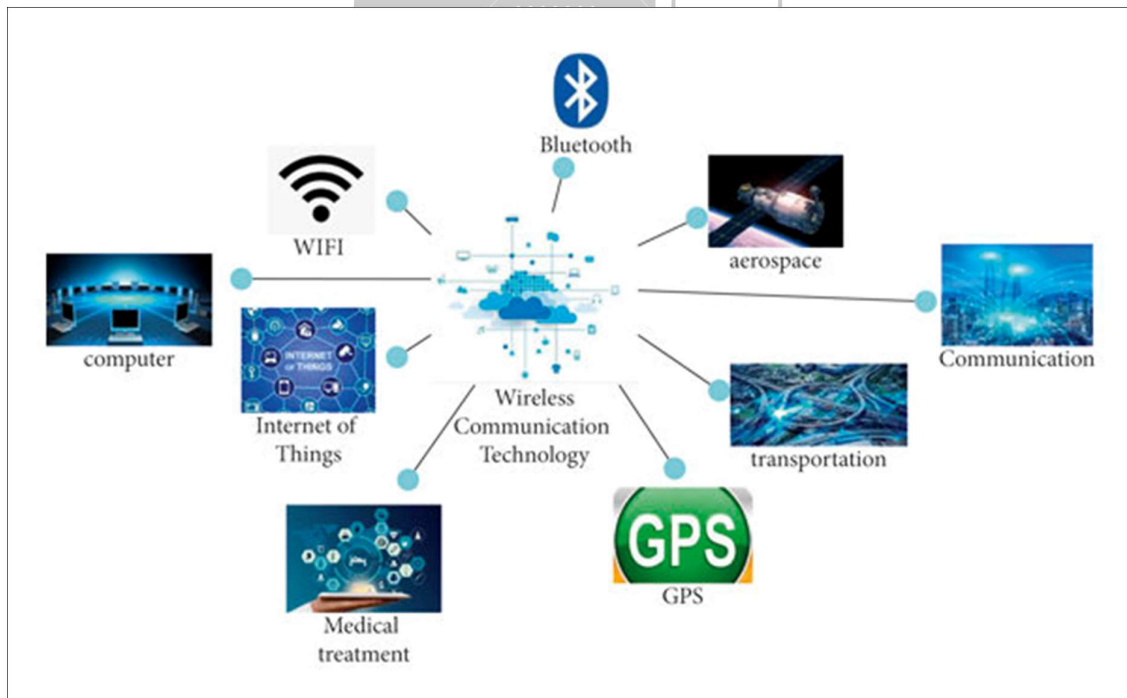
Since the utilization of smoke signals, banners and glimmering mirrors, Wireless system has been a piece of human life and is persistently developing. Utilizing electrical signals and radio waves for correspondence has been around us for more than 100 years.

Throughout the improvement of remote correspondence, there are numerous remote frameworks and strategies that thrived and many got disappeared. Throughout the development of wireless communication, there are many wireless systems and methods that flourished and many got disappeared. The best example for this is Telephone Communication and Television Transmission. Initially, all telephone related communication was carried out using wired network.

But the rapid growth of Mobile Communication started to replace the complex wired telephone system. In this scenario, the wired technology became outdated and got replaced by wireless communication.

There are numerous advantages of Wireless Communication Technology, Wireless Networking and Wireless Systems over Wired Communication like Cost, Mobility, Ease of Installation, and Reliability etc.

Today there are different types of wireless communication. One of the most important types of wireless communication is free space optics which uses light waves instead of radio waves for communication. Free Space Optics is the alternate for the high speed wired optical fiber communication Free Space Optic interchanges may give adaptable, simple to introduce, and permit free view remote correspondences links.



The rapid and huge data transfer capacity offered by light wave correspondence innovation makes Free Space Optics exceptionally appealing as a way to fulfill future need for broadband

Communication. In order to overcome the bandwidth limitation free space optics are preferred compared to RF wireless communication.

Driving factors for the growth of free space optics market also includes the reduced cost associated with its installation and incorporation of this technology in cellular networks such as 3G and 4G, whereas atmospheric turbulence or bad weather can be a restraint factor in the market. Advancement in free space optics technology and growing economies of emerging countries will bring new opportunities in the market.

**PACHARANE KSHITIJ PRAMOD**  
**FY E&TC**



**Online Poster Competition conducted on Engineer's Day 2K21:**

