PANIMALAR ENGINEERING COLLEGE

AN AUTONOMOUS INSTITUTION

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POONAMALLEE,CHENNAI-600 123

DEPARTMENT OF ECE PROUDLY PRESENTS

FUERZA '22

TECHNICAL MAGAZINE 2022

FUERZA ‘22

TECHNICAL MAGAZINE 2022

ABOUT PANIMALAR ENGINEERING COLLEGE

Our esteemed Panimalar Engineering College is a renowned Christian Minority Institution of Technical Education functioning under Jaisakthi Educational Trust. Our institution mainly focuses on disseminating knowledge coupled with discipline and ethics. Our college has gained an immense name for itself among the numerous college for its standardized teaching, plush infrastructure, expert professional body, scrumpalicious regimen and also in emphasizing discipline. Our Institution also takes care to impart updated and high quality Technical Education throughout the year making them competent to face the challenges of leading corporate firms amidst harsh competition and in total, excelling in their chosen career fields. Students are transformed into vibrant personalities with robust confidence and sound character striving for perfection, morality, perseverance and commitment. Our college merges simulating environment with skilled professionals to mould the young minds into the accomplished future generation of tomorrow.

About the Department

Panimalar Engineering College affiliated to Anna University, Chennai, is established in the year of 2000. The college is recognized with the department named Electronics and Communication Engineering (ECE) which offers both Under Graduate and Post Graduate courses. The main focus of the ECE department is to impart the world class standard of technical education in the field of Electronics and Telecommunication for the benefit of the society.

The students of both UG and PG are well qualified to meet the demands of the Industry and Research Organization. Our department is equipped with eminent faculty members who are expertise in various technical domains. The total strength of regular teaching faculty members in the department is 72, of which 32 of them are doctorates and all the remaining staff members are qualified with Masters Degree. The research activities are carried out by a group of expert research members. The overall focus of the department is to

- Emphasis elemental knowledge of the subjects.
- Provide exposure to the emerging technology.
- Inculcate a strong research and development activities.

VISION

To provide world class quality education and excelling research activities in Electronics and Communication Engineering with strong ethical values and social challenges.

MISSION

M1: To impart high quality technical education by investing in faculty development and resources.

M2: To adapt best teaching and learning process with strong state of art facilities for academic and research activities.

M3: To enhance national and international collaborative activities for evolving indigenous technological solutions to meet social needs, nurture leadership and entrepreneurship qualities with ethical means.

M4: To facilitate partnership with leading core industries and R&Ds for global outreach.

PEOs of the ECE Program

PEO1: Core Competencies

To prepare the graduates in fostering Electronics and Communication Engineering principles to provide socially relevant and sustainable engineering solution.

PEO2: Professional Integrity

To gain adequate knowledge to become good professional in Electronics and Communication Engineering associated industries, higher education and research.

PEO3: Research & Global Responsibilities

To prepare graduates in an area of specialization, ethically develop innovative and research oriented methodologies to enhance the adaptability of technological and social challenges.

Program Outcomes (POs)

PO1: Engineering Knowledge:

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

PO2: Problem Analysis:

Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: 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.

PO4: 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.

PO5: 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.

PO6: 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.

PO7: 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.

PO8: Ethics

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

PO9: Individual and Team work:

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: 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.

PO11: 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.

PO12: 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.

Program Specific Outcomes (PSOs)

PSO1: Graduates should demonstrate an understanding of the basic concepts in the primary area of Electronics and Communication Engineering, including: analysis of circuits containing both active and passive components, electronic systems, control systems, electromagnetic systems, digital systems, computer applications, and communications.

PSO2: Graduates should demonstrate the ability to utilize the mathematics and the fundamental knowledge of Electronics and Communication Engineering to design complex systems which may contain both software and hardware components to meet the desired needs.

PSO3: The graduates are capable of excelling in Electronics and Communication Engineering industry/Academic/Software companies through professional careers.

MESSAGE FROM SECRETARY

Dr. P. Chinnadurai, M.A., Ph.D.

Secretary & Correspondent, Panimalar Group of Institutions

Success is all about respecting the past and creating the future. I wish the Panimalar group of institutions the very best in delivering quality education to all walks of the society.

MESSAGE FROM DIRECTOR

Dr. C. Sakthi Kumar M.E., Ph.D.

Director, Panimalar Group of Institutions

As we speak, technology around us changes. Innovation has become the buzzword. We at Panimalar group of institutions, create and carve out a niche for the students, and we make them believe that "education for life" rather than "education for living"

MESSAGE FROM PRINCIPAL

Dr. K. Mani, M.E, Ph.D.
Principal

I congratulate the department of ECE, Panimalar Engineering College for bringing out their department's Technical magazine. I'm sure that this magazine will definitely provide a platform to the students and faculty members to expand their technical knowledge, sharpen their hidden talent and strengthen their thoughts to work hard to pursue their commitments. I wish this to be a historical document of all your team work.

MESSAGE FROM HOD

Dr.P. KANNAN M.E, Ph.D.
Professor and Head of the Department
Electronics and Communication Engineering

It is great enthusiasm that I bring to your attention the extraordinary accomplishments and pioneering initiatives undertaken by our accomplished students, dedicated editorial team, and esteemed faculty members in the FUERZA Magazine. Within these pages, you will witness the incredible impact of our ECE department, from Avant-garde research to the latest technological advancements. Prepare to be inspired, astounded, and motivated to explore new frontiers of possibility in this historic edition. Embark on this captivating journey, and let your enthusiasm for the field of electronics reach new heights.

PREFACE

We the students of Panimalar Engineering College are at immense pleasure in publishing Tech Magazine -2022 on behalf of Electronics and Communication Engineering department.
We believe that this magazine would create a platform to enhance the students and also forms a bridge between their subjects and current standards of the industries and industrial applications.
We trust that this will prove a very successful endeavour, in future every student will contribute in a magazine like this for the growth of this institution and our Nation as a whole'.
With this Technical Magazine being released on the special occasion of our National Level Technical Symposium **"FUERZA'22***".*
We in this Magazine attempted to achieve

- *An Effective interface between industry, business and community.*
- *Inculcation of scientific eagerness, analytical thinking and to train students in modern day trends in electronics and communication.*
- *Provide versatile knowledge in field of electronics and communication.*
- *Develop the department in a full fledged centre of learning in various fields and increase student enthusiasm in our field.*

CREDITS

PUBLISHING COORDINATORS

THOMAS G GEORGE
III-ECE

VETRIVEL P
III ECE

CHRISTINA MANGALA RANI K
III-ECE

N.VELVIZHI
III-ECE

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III-ECE

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III-ECE

LAVANYA J
III ECE

FACULTY INCHARGES

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Mr.N.CHIDAMBARAM
Mr.ASHOK.R

COVER DESIGN

VIGNESH B
III- ECE

CONTENTS

ROBOTICS AND AI

Robotics is a separate entity in Artificial Intelligence that helps study the creation of intelligent robots or machines. Robotics combines electrical engineering, mechanical engineering and computer science & engineering as they have mechanical construction, electrical component and programmed with programming language. Although, Robotics and Artificial Intelligence both have different objectives and applications, but most people treat robotics as a subset of Artificial Intelligence (AI). Robot machines look very similar to humans, and also, they can perform like humans, if enabled with AI.

Artificial Intelligence is defined as the branch of Computer Science & Engineering, which deals with creating intelligent machines that perform like humans. Artificial Intelligence helps to enable machines to sense, comprehend, act and learn human like activities. There are mainly 4 types of Artificial Intelligence: reactive machines, limited memory, theory of mind, and self- awareness.

A robot is a machine that looks like a human, and is capable of performing out of box actions and replicating certain human movements automatically by means of commands given to it using programming.

Actuators: Actuators are the devices that are responsible for moving and controlling a system or machine. It helps to achieve physical movements by converting energy like electrical, hydraulic and air, etc. Actuators can create linear as well as rotary motion.

Power Supply: It is an electrical device that supplies electrical power to an electrical load. The primary function of the power supply is to convert electrical current to power the load.

Electric Motors: These are the devices that convert electrical energy into mechanical energy and are required for the rotational motion of the machines.

Pneumatic Air Muscles: Air Muscles are soft pneumatic devices

that are ideally best fitted for robotics. They can contract and extend and operate by pressurized air filling a pneumatic bladder. Whenever air is introduced, it can contract up to 40%.

Muscles wire: These are made up of nickel-titanium alloy called Nitinol and are very thin in shape. It can also extend and contract when a specific amount of heat and electric current is supplied into it. Also, it can be formed and bent into different shapes when it is in its martensitic form. They can contract by 5% when electrical current passes through them.

Piezo Motors and Ultrasonic Motors: Piezoelectric motors or Piezo motors are the electrical devices that receive an electric signal and apply a directional force to an opposing ceramic plate. It helps a robot to move in the desired direction. These are the best suited electrical motors for industrial robots.

Sensor: They provide the ability like see, hear, touch and movement like humans. Sensors are the devices or machines which help to detect the events or changes in the environment and send data to the computer processor. These devices are usually equipped with other electronic devices. Similar to human organs, the electrical sensor also plays a crucial role in Artificial Intelligence & robotics. AI algorithms control robots by sensing the environment, and it provides real-time information to computer processors.

NAGA NANDHINI.R
III-ECE

HUMAN AUGMENTATION

Human Augmentation is the ability to perform actions, whether physical or mental, with the help of tools that practically (not every increment of this type is directly grafted onto the body) integrates into our bodies. This Human augmentation is also referred to as "Human 2.0" which basically focuses on creating cognitive and physical improvements as an integral part of the human body.
JULIAN HUXLEY is a biologist and considered as an author for Human Augmentation.

There are 3 subtypes in human augmentation technology. The first type is the Replication of Human ability, this technology restores or replicates human abilities. For example, hearing aids for the deaf or prosthetic limbs for the disabled, etc.. Also, it helps those who were born with inadequacies and face daily challenges

The second type is the Supplementing Human Ability .This category includes human augmentation technology that improves one's ability to do things. For example, these could be devices that boost one's strength, improve one's vision. This also pushes them beyond their natural limits or devices that boost their intelligence. The third type is Exceeding Human Ability is the most fascinating one because this refers to the technology that allows us to perform tasks beyond our physical capability. This also includes typical superhero abilities such as the ability to fly.

The major players in the Human Augmentation market are Samsung electronics co.ltd(South Korea),Google LLC(US), Ekso Bio-Nics (US),Vuzix corporation(US), Garmin ltd.(US).

Human Augmentation mostly used in:

1. Bio-medical Solutions

(i)Bio-printing
(ii)Ageing Tech
(iii) prosthetics & Bionics

2. Wearable Devices

(i)Exoskeleton
(ii)Gadgets etc..

IMPACT OF HUMAN AUGMENTATION:

(i) Human enhancement does not only effect ontogenetic identity, It also affects bodily identity & social identity.
(ii) Contemporary Western societies are nearly all characterized by a market economy, a consumer culture, and a liberal system of government.
(iii) These features of societies strongly determine the way in which enhancements are made available and the way in which they will be used.
(iv) This, in turn will influence the impact they have on identity.
(v) A liberal attitude towards enhancements would require that they are safe for the user(so that produces do not cause harm to users)and that they are not likely to do harm to others when used properly.
(vi) Enhancements will be good that can be bought and sold. In other words, they will be commodities consumers can buy height, intelligence, beauty, and a pleasant personality, and companies sell products.

CONCLUSION:

- Human Enhancement Techniques are likely to engender an introduction of new inequalities into society and to enable the development of HETs that end up harming rather than improving the quality of life.
- However whether to have a reason to promote a particular enhancement will enquire wisdom, dialogue, good scientific research, good public policy and academic debate.

M.NARMADA
N.VELVIZHI
III EC

GI-FI TECHNOLOGY

For many years cables ruled the world, optical fibres played a dominant role for its faster transmission but installation of cable caused a greater difficulty and lead to wireless access. Foremost of this is Bluetooth then Wi-fi followed it. But the mans continuous quest for even better technology led to the introduction of new, more up-to-date standard for data exchange rate. As there is no recent developments which transfer data at faster rate, as video information transfer taking a lot of time .This leads to introduction of Gi-fi technology.

The Gi-fi chip is developed by the Australian researcher's measures 5mm square and is manufactured using existing complementary metal-oxide-semiconductor (CMOS) technology, the same system that is currently used to print silicon chips.

Gi Gi-Fi is emerging wireless technology which is ten times faster than other technologies and it delivers short range multi gigabits data transfer in a local environment. The features of this technology can be helpful for use in development of next generation of devices.

Gi-Fi is supported across various devices like mobiles ,laptops, PDA's fax ,printers, internal radio modules and other supported devices.

WORKING OF GI-FI TECHNOLOGY

- Use of Time Division Duplex for Use both transmission and receiving .
- Conversion of data from IF range to RF60Ghz range .
- The incoming RF signal is first down converted to an IF signal centered at 5Ghz and then to normal data ranges.
- Then use heterodyne principle for this process to avoid leakages.
- And then data is transferred.

FEATURES OF GI-FI

- High speed of data transfer.
- Low power consumption.
- High security.
- Cost effective.
-

ADVANTAGES OF GI-FI

- ❖ Profitable chip.
- ❖ Small in size.

APPLICATIONS

- It makes the wireless home and office of the future.
- As it transfers data at high speeds that made work very easy.
- Video information at a speed of gbps.

CONCLUSION

Within five years, we expect Gi-fi to be the dominant technology for wireless networking, which will develop wireless home and office of future. If the success of wi-fi and the imminent wide usage of WiMAX is any indication, Gi-Fi potentially can bring wireless broadband to the enterprise in an entirely new way.

VASUNDARA A
III ECE

Virtual Reality

Virtual reality is a technology that attempts to regenerate computer images and videos to produce real-life visual experiences that are beyond those achieved on the ordinary computer monitor and phone. VR systems do so by using computer vision and advanced graphics to generate 3D images and video by adding depth, and by reconstructing the scale and distances between static 2D images

Computer graphics and human perception

1. It is possible to avoid side effects on human perception while deriving maximum benefits from VR perception. This is possible with an in-depth and complete understanding of human body physiology and optical illusions.

2. Our human body perceives the world through body senses that respond differently to different stimuli. Mimicking human perception in virtual reality requires knowledge of how to fool the senses to know what are the most important stimuli and what is acceptable quality for subjective viewing

The Technology Behind It

For instance, edge detection generates an image by detecting points where brightness will drastically drop or stop altogether. **Other methods use other techniques to identify an image.**

1. Virtual reality headsets attempt to help a user enjoy an immersive 3D environment by putting a screen in front of the user's eyes to eliminate their connection with the real world.

2. An autofocus lens is placed between each eye and the screen. The lenses are adjusted based on the movement and positioning of the eyes. This allows tracking of the user movement vis-a-vis the display.

3. On the other end is a device such as a computer or mobile device that generates and renders the visuals to the eye through the lenses on the headset.

1	**Gaming**	It was and still is the most traditional application of VR. Used to play immersion games.
2	**Workplace collaboration**	Employees can collaborate on assignments remotely with the feeling of presence. Beneficial for demo tasks where visuals are critical to understanding and completion of tasks.
3	**Pain management**	VR visuals help distract patient's brains to confuse pain pathways and from suffering. For soothing patients.
4	**Training and learning**	VR is good for demo and demonstration for instance demo of surgical procedures. Training without exposing the lives of patients or trainees to danger.
5	**Treatment of PTSD**	Post-experience trauma is a common disorder among combat soldiers and also other people who undergo petrifying experiences. Using VR to re-liven experiences can help medical experts understand patients' conditions and device ways of solving the problems.

Application Of Virtual Reality

Virtual Reality Hardware And Software

VR hardware is used to produce stimuli to manipulate the VR user's sensors. These can be worn on the body or used separately away from the user.VR hardware uses sensors to track motions, **for example,** the user's button presses, and controller movements such as hands, head, and eyes. The sensor contains receptors to collect mechanical energy from the user's body.The sensors in the hardware convert energy it receives from a hand movement or button press to an electrical signal. The signal is fed into a computer or device for action.

Manages the VR input/output devices, analyzes the incoming data, generate proper feedback. The inputs to the VR software must be on time and the output response from it should be prompt.A VR developer can build his/her own Virtual World Generator (VWG)using a software development kit from a VR headset vendor. An SDK provides basic drivers as an interface to access tracking data and call graphic rendering libraries. VWG can be ready-made for particular VR experiences.

VR software relays the VR content from the cloud and other places via the Internet and helps to manage the content.

A.NITHYASRI
III-ECE

AUGMENTED REALITY

Augmented reality (**AR**) is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory.[1][2] AR can be defined as a system that incorporates three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects.[3]The overlaid sensory information can be constructive (i.e. additive to the natural environment), or destructive (i.e. masking of the natural environment).[4]

This experience is seamlessly interwoven with the physical world such that it is perceived as an immersive aspect of the real environment.[4] In this way, augmented reality alters one's ongoing perception of a real-world environment, whereas virtual reality completely replaces the user's real-world environment with a simulated one.[5][6] Augmented reality is related to two largely synonymous terms: mixed reality and computer-mediated reality.

The primary value of augmented reality is the manner in which components of the digital world blend into a person's perception of the real world, not as a simple display of data, but through the integration of immersive sensations, which are perceived as natural parts of an environment.

The earliest functional AR systems that provided immersive mixed reality experiences for users were invented in the early 1990s, starting with the Virtual Fixtures system developed at the U.S. Air Force's Armstrong Laboratory in 1992.[4][7][8] Commercial augmented reality experiences were first introduced in entertainment and gaming businesses.[9]

Subsequently, augmented reality applications have spanned commercial industries such as education, communications, medicine, and entertainment. In education, content may be accessed by scanning or viewing an image with a mobile device or by using markerless AR techniques.[10][11][12]

Augmented reality is used to enhance natural environments or situations and offer perceptually enriched experiences.

With the help of advanced AR technologies (e.g. adding computer vision, incorporating AR cameras into smartphone applications and object recognition) the information about the surrounding real world of the user becomes interactive and digitally manipulated.

Information about the environment and its objects is overlaid on the real world. This information can be virtual.

Augmented Reality is any experience which is artificial and which adds to the already existing reality.[13][14][15][16][17] or real, e.g. seeing other real sensed or measured information such as electromagnetic radio waves overlaid in exact alignment with where they actually are in space.[18][19][20] Augmented reality also has a lot of potential in the gathering and sharing of tacit knowledge.

Augmentation techniques are typically performed in real time and in semantic contexts with environmental elements. Immersive perceptual information is sometimes combined with supplemental information like scores over a live video feed of a sporting event. This combines the benefits of both augmented reality technology and heads up display technology (HUD).

R.PRANATI III – ECE

CYBER SECURITY

Cyber security is the application of technologies, processes and controls to protect systems, networks, programs, devices and data from cyber attacks.

It aims to reduce the risk of cyber attacks and protect against the unauthorised exploitation of systems, networks and technologies.

Types of cyber threats

Common cyber threats include:

Malware, such as ransomware, botnet software, RATs (remote access Trojans), rootkits and bootkits, spyware, Trojans, viruses and worms.
Backdoors, which allow remote access.
Formjacking, which inserts malicious code into online forms.
Cryptojacking, which installs illicit cryptocurrency mining software.
DDoS (distributed denial-of-service) attacks, which flood servers, systems and networks with traffic to knock them offline.
DNS (domain name system) poisoning attacks, which compromise the DNS to redirect traffic to malicious sites.

5 types of cyber security

1. Critical infrastructure cyber security

Critical infrastructure organisations are often more vulnerable to attack than others because SCADA (supervisory control and data acquisition) systems often rely on older software.

Operators of essential services in the UK's energy, transport, health, water and digital infrastructure sectors, and digital service providers are bound by the NIS Regulations (Network and Information Systems Regulations 2018).

Among other provisions, the Regulations require organisations to implement appropriate technical and organisational measures to manage their security risks.

2. Network security

Network security involves addressing vulnerabilities affecting your operating systems and network architecture, including servers and hosts, firewalls and wireless access points, and network protocols.

3. Cloud security
Cloud security is concerned with securing data, applications and infrastructure in the Cloud.

4. IoT (Internet of Things) security
IoT security involves securing smart devices and networks that are connected to the IoT. IoT devices include things that connect to the Internet without human intervention, such as smart fire alarms, lights, thermostats and other appliances.

5. Application security
Application security involves addressing vulnerabilities resulting from insecure development processes in the design, coding and publishing of software or a website.

Cyber security vs information security

Cyber security is often confused with information security.

Cyber security focuses on protecting computer systems from unauthorised access or being otherwise damaged or made inaccessible.
Information security is a broader category that protects all information assets, whether in hard copy or digital form.

The legal requirement for cyber security

The GDPR and DPA 2018 require organisations to implement appropriate security measures to protect personal data. Otherwise, you risk substantial fines.
Cyber security is a critical business issue for every organisation.

Cyber Security Checklist

1. Staff awareness training

Human error is the leading cause of data breaches. It is therefore essential that you equip staff with the knowledge to deal with the threats they face.
Staff awareness training will show employees how security threats affect them and help them apply best-practice advice to real-world situations.

2. Application security

Web application vulnerabilities are a common point of intrusion for cyber criminals.

As applications play an increasingly critical role in business, it is vital to focus on web application security.

3. Network security
Network security is the process of protecting the usability and integrity of your network and data. This is achieved by conducting a network penetration test, which assesses your network for vulnerabilities and security issues.

4. Leadership commitment
Leadership commitment is key to cyber resilience. Without it, it is tough to establish or enforce effective processes. Top management must be prepared to invest in appropriate cyber security resources, such as awareness training.

5. Password management
Almost half of the UK population uses 'password', '123456' or 'qwerty' as their password. You should implement a password management policy that provides guidance to ensure staff create strong passwords and keep them secure.

P.MONISHA
III- ECE

THE NEXT GENERATION OF EMBEDDED TECHNOLOGY AND DESIGN-IN SERVICES

If you were to consider the most remarkable technological breakthrough of the last couple of decades, what will you think of right away? Perhaps, the invention and the exponential rise in the usage of computers, the internet, and smartphones would rank as the most probable responses.

From a business perspective, the Internet of Things (IoT) and Artificial Intelligence (AI) are two game-changing technology trends that are becoming predominant. More than just buzzwords, these two technologies together – AI and IoT promise to reconceptualize the future of industrial automation.

The combination of AI and IoT – referred to as "Artificial Intelligence of Things" (AIoT), is gaining traction as businesses move towards digitalization. AIoT helps to study trends, patterns, and interrelationships between connected machines.

The AIoT symbolizes a more modern way of dispensing AI — getting it from the data center and embedding it promptly in the devices we use on a day-to-day basis.

As the efficiencies of these technologies continue to evolve, they are now being leveraged across a gamut of industry where intelligent information and problem-solving.

This mode of optimizing AI is revolutionary for industries, including healthcare, manufacturing, transportation, and several others. For example, in Smart cities, the technological opportunities of AI are endless – From monitoring traffic and security within cities to monitoring patients remotely in healthcare and accurate personalization options for Smart homes.

For manufacturers, AIoT assists in realizing more efficiencies in IoT functions, human-device communication, and strengthen data processing. When transforming IoT data into meaningful insights for better decision-making processes, AI could add tremendous value.

The union of AI and IoT is genuinely transformational and concurrently beneficial for both technologies. On the one hand, where AI thrusts value to IoT through machine learning abilities, IoT increases AI's value through connectivity, signaling, and data transfer. When implemented well, AI analytics has the potential to transmogrify IoT data into practical and helpful information.

As AIoT is very profitable and productive to industrial settings, it is significant to contemplate the progression of connected systems. The merger of IoT devices has helped companies gain greater control and clarity over crucial IT assets. For instance, furnishing the production equipment with cloud-enabled IoT sensors empowers manufacturers with the capability to maximize their workflows, reduce downtime and employ predictive maintenance approaches.

How can you take advantage of the AIoT

To begin with, you can start planning to leverage AI at the heart of your products – whether you're an organization that manufactures electronics for Smart homes or provides services in the healthcare or transportation industry.

So, what is it can you do to prepare yourself? Firstly, the starting point is the processor, and as you embed AI into your device, you will face an age-old engineering challenge of enormously increasing your device's processing power without increasing the costs. The most viable suggestion is to look for future-ready chip technology that assures superior—performance and is economical and sufficiently flexible to be applied in almost any AI application.

For example, if you're a manufacturer of vehicles, add intelligence that analyses the conditions of critical parts and automatically creates updates to replace oil, tires or reminds you of a complete overhaul.
Once manufacturers can respond to both these challenges, the AIoT will become the fundamental force that will help you refocus core business, lead innovations, and reduce time to the market. No wonder that a recent study on ResearchAndMarkets.com indicates that AI in industrial machines is expected to touch $415M worldwide by 2024 with collaborative robot growth at 42.5% CAGR.

Advantages of AIoT in

Industry 4.0

• Helps streamline business processes for enhanced operational efficiencies

• AI-based algorithms eliminate junk data and help organize unstructured data into practical and meaningful insights

• Enables understanding your consumer's behavior and the challenges they face with greater precision and help you offer more personalized experiences

• Quick access to data allows businesses to pinpoint cost savings without compromising productivity

Most importantly, AIoT can analyze telemetry data from a colossal number of connected devices in real-time. Unlike the conventional IoT systems, which are reactive and are designed to react to urgent lapses by sending out alarms to relevant stakeholders, AIoT architectures are proactive and competent to predict any equipment failures and shutting down defective machinery before an accident happens. Manufacturers will need to refurbish their networking infrastructure to take complete advantage of these intelligent connected systems.

SAS, Deloitte, and Intel, in their recent survey,queried 90% of the global business leaders revealed that significant Artificial Intelligence (AI) use was paramount to appreciate value from the Internet of Things (IoT) initiatives across their organization.

Across various industry verticals, AIoT has a range of use cases, and it is entirely reliant upon your business objectives. You can take advantage of them to amplify your overall productivity. While there will be challenges en route, but the rewards of implementing a combination of IoT and AI will indeed override them.

VAISHNAVI.P

III ECE-B

MINIATURIZED ELECTRONICS

First mobile phones were literally the size of bricks and all they could do was make phone calls. Now think about the thin, lightweight mobile device that fits easily in your pocket today. In addition to making calls, it's a camera, a calculator and a calendar. It has email and text messaging. It's a calendar, a health tracker, a flashlight and more.
Thanks to the marvels of engineering, we've been able to continually shrink the size and weight of our devices while also making them more powerful. We call this miniaturization, and we use advanced electronic assembly processes to make it happen.

What is Miniaturization?

Miniaturization in electronic devices involves fitting more transistor nodes on a smaller integrated circuit (IC). The IC is then interfaced within its intended system or device so that, once assembled, the system can carry out the desired function. The technology is made tinier yet mightier.

Furthermore, device miniaturization aligns with Gordon Moore's 1965 prediction that "Cramming more components onto integrated circuits [would] lead to such wonders as home computers, automatic controls for automobiles and personal portable communications equipment." His prediction proved true, ushering in an era of technology that would vary from portable computers, smartphones and new medical devices to the Internet of Things and 5G wireless devices, as well as AR/VR and AI, all enabled by smaller yet more powerful computing systems.

Dreaming up these miniature technologies is one thing — the manufacturing process is quite another. Electronics manufacturers constantly innovate to overcome the challenges that come with interfacing smaller and more powerful electronic components.

Miniaturization will change the world. But new advanced manufacturing processes, like advanced electronics assembly, are needed to tackle the challenges and embrace the promises of miniaturization.

Whether we are developing the next system-on-chip, or attaching it to a new device, advanced electronics assembly is the masterful combination of knowhow, precision and innovative processes that

makes the devices dreamed up by our customers in a studio go into mass production and distribution across the world.

One miniaturization technique is to develop integrated circuit packages in Ball Grid Arrays (BGAs). BGA designs enable large amounts of connections between the integrated circuit and printed circuit board - increasing the ability to route signals and therefore increasing the processing power of the system it is being assembled into.

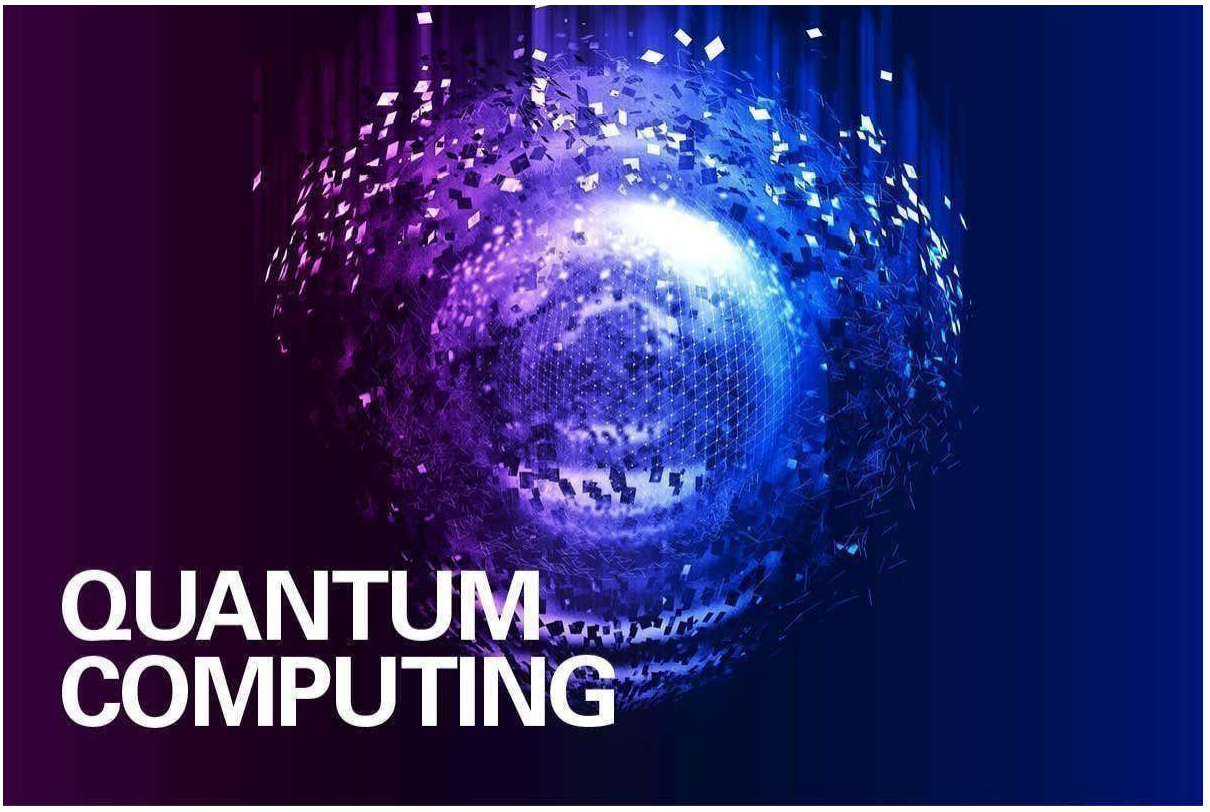
BGAs also improve chip reliability and reduce overheating, as they allow for higher numbers of thermal channels and shorter signal travel lengths. Establishing more and better electrical connections make BGAs a key enabler in technology miniaturization.

Inherently, BGAs are a great way of integrating the plethora of sensing and response systems needed for applications such as autonomous vehicles. The Advanced Driver Assistance Systems (ADAS) that are critical pieces of autonomous vehicles require carefully calibrated sensors to gather the constantly changing information around a car as it travels down the road. According to Intel, "Autonomous vehicles will need the computing power necessary to fuse ~1gb/sec of information from various sensors to [output] safe decisions."

Advanced electronics assembly brings research to life, finding ways to fabricate at scale, minimizing costs and leveraging massive engineering expertise. Whether you're a startup or a Fortune 500 technology leader, if you're creating the next disruptive electronic device, an advanced electronics assembly team can help you go seamlessly from prototype to production, no matter how tiny or complex the electronics.

K.ROSHINI
H.SARANYA
P.B.VINISHA ROSEMARY
III ECE-B

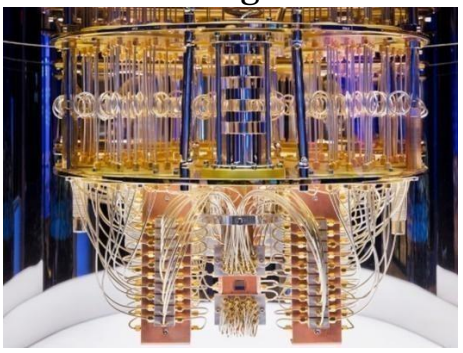
QUANTUM COMPUTING



Until now, we've relied on supercomputers to solve most problems. These are very large classical computers, often with thousands of classical CPU and GPU cores. However, supercomputers aren't very good at solving certain types of problems, which seem easy at first glance. This is why we need quantum computers.Quantum computing harnesses the phenomena of quantum mechanics to deliver a huge leap forward in computation to solve certain problems.

IBM designed quantum computers to solve complex problems that today's most powerful supercomputers cannot solve, and never will.Imagine you want to seat 10 fussy people at a dinner party, where there is only one optimal seating plan out of all the different possible combinations. How many different combinations would you have to explore to find the optimal?Can you guess how many combinations?Supercomputers don't have the working memory to hold the myriad combinations of real world problems.Quantum computers can create vast multidimensional spaces in which to represent these very large problems. Classical supercomputers cannot do this.

Algorithms that employ quantum wave interference are then used to find solutions in this space, and translate them back into forms Currently, the process of analysing weather conditions by traditional computers can sometimes take longer than the weather itself does to change. But a quantum computer's ability to crunch vast amounts of data, in a short period, could indeed lead to enhancing weather system modelling allowing scientists to predict the changing weather patterns in no time and with excellent accuracy — something which can be essential for the current time when the world is going under a climate change.



The price of quantum computers ranges from $10,000 to $10 billion due to the high range price they are not available for public use. Also, the errors in these type of computers are high because they are still in the development phase. Quantum computers work fine in 10 qubits but after increasing qubits like 70 qubits, the accuracy is not right. There are experiments already going on to make the results of these computers precise.

M.Rajeswari
III ECE

6G WIRELESS TECHNOLOGY

6G sixth generation wireless is the successor to 5G cellular technology. 6G networks will be able to use higher frequencies than 5G networks and provide substantially higher capacity and much lower latency.One of the goals of 6G internet will be to support one micro second latency communication.

Who invented 6G?

China has successfully launched"The world first 6G satellite into space to test the technology".It went into orbit along with 12 other satellite from the Taiyuansatellite launch center in shanxi province.

Where is the 6G?

On November 6,2020 china successfully launched an experimental test satellite with candidates for 6G technology into orbit along with 12 other satellite using long March6 launch vehicle rocket.In fact 6G technology hasn't even been defined yet through the researches defined 6G as the sixth Generation of wireless service that will feature "Terahertz Frequency Networks and Spatial Multiplexing".

- 6G radio frequency will work in the wavelength ranges above 95GHZ.

6G will operate on terahertz bands from 100GHZ to 10THZ delivering a peak data rate of 1000 Gigabits/second with air latency lower than 100 Microseconds.6G will be 50 times faster than 5G 100 times more reliable offer wider coverage and support ten times more devices per square kilometer.

How 6G will change the world?

Will reshape the world by enabling Intelligent Interaction between the virtual world and physical world and serving the Intelligently connected society of all things.

Is 6G available in any country?

While most countries are working on the 6G technology a commercial launch is not expected before 2030.China has already launched a 6G TEST SATELLITE Huawei Technologies .6G is expected to come into play around 2030.

R.SWETHA

III ECE

5G and enhanced connectivity

There is little doubt that 5G is a new milestone – the likes of which has rarely been seen since the advent of wireless networking. Why is 5G so different from 4G or all other standards that preceded it? A lot of people operate under the assumption that yet another iteration of the 'G' just means better speeds and lower latency. While 5G certainly mean those things, it is paradigm altering in the sense that it comes built-in with enhanced capabilities.

For instance, as the industry evolves away from centralised data centres and closer to users to offer better services, our IT Support will completely support edge computing with 5G.

5G also supports network slicing that can enable operators and industry verticals to pretty much 'own' their pizza slice of the network pie, who can now build their private cloud within their data centers for example.

5G is the largest ever improvement we have seen on the packet core side of wireless technology. 5G Core forms the backbone of the network and connects all the base stations and radio heads. The technology is based on three fundamental protocols including:

Service-based architecture (that enables it to move away from highly mobile-centric wireless networks – 4G, 3G and prior iterations – towards more standard web protocols)

Cloud-native

Enables a much higher degree of automation (that can empower the billions of mushrooming IoT devices worldwide)

Apart from these fundamental differences, 5G also comes equipped with a host of technical benchmarks including:

10 to 100x speed improvement over 4G networks

1-millisecond latency

Up to 100x number of connected devices per unit area (compared with 4G LTE)

99.999% availability

90% reduction in network energy usage

Security embedded in the network core

How will 5G impact end-users?

5G is likely to co-exist with 4G for some time as telecom operators slowly manage the shift to the much more upfront cost-intensive 5G architecture. Once activated though, 5G can literally open up entire new vistas of value-driven use cases that simply weren't possible before. For example, if a transport company wants real-time analysis and processing of data from their vehicle that's on the move – they are much more likely to pay a premium for real-time, flawless connectivity than say, a home user.

For individual users, 5G will obviously mean much better quality on video calls, zero lags or stuttering on calls and streaming and flawless connectivity during large events, such as a conference or a multiplayer gaming scenario with a multitude of devices all feeding and processing large amounts of data at speeds faster than human perception.

By
VIGNESH
II ECE

ERS ECO A BATTERY - FREE SENSOR LINE

Industry leading LoRaWAN sensor provider ELSYS is launching their first battery-free products using Epishine's indoor light energy harvesting solution. The environmentally friendly sensor line is launching two sensor types called ERS Eco and ERS Eco CO_2. They are entirely powered by Epishine's indoor solar cells and are made from biodegradable materials.

The ERS ECO series enables customers to have complete control over their air quality and indoor environment. This in itself saves money and reduces its CO_2 footprint, and its battery-free operation reduces the CO_2 footprint even further.

ELSYS' vision of making an environmentally friendly sensor, demanded battery-free operation, and a more sustainable enclosure design. The solution was a cooperation between ELSYS and Epishine which resulted in a sensor that is powered solely by indoor solar cells as well as an enclosure made from biodegradable materials.

Sensors powered with Epishine's indoor light energy harvesting modules do not only function uninterrupted when ambient light is available, but also function continuously for up to seven days in the dark. This results in a solution with very low or nomaintenance and with no need to ever change batteries again.

"This combination of energy harvesting from indoor light, battery-free operation, and a biodegradable enclosure is an IoT industry first. I believe that we at ELSYS, with ongoing support from Epishine, have developed a truly unique and ground-breaking product." **says David Skånehult, Hardware Engineer at ELSYS.**

SWARNALATHA S
III- ECE

BARCODING TECHNOLOGY

What is barcode?

A barcode or bar code is a method of representing data in a visual,machine-readable form. Initially, barcodes represented data by varying the widths and spacings of parallel lines.

A barcode or bar code is a method of representing data in a visual, machine-readable form. Initially, barcodes represented data by varying the widths and spacings of parallel lines.

What is barcode technology?

• Barcode, a printed series of parallel bars or lines of varying width that is used for entering data into a computer system. The bars are typically black on a white background,and their width and quantity vary according to application.

What are barcodes used for?

❑ Barcodes can be used for all kinds of inventory/stocktaking work, but they are probably most familiar to us as identification codes printed on grocery store products.

• Using barcode technology in stores can help to solve all these problems.

★ shoplifting? If you see a lot of whisky bottles missing from the shelves, can
you really be certain you've sold them all? How do you know if some have
been stolen?

How barcodes represent numbers?

➢ Each digit in a barcode is represented by seven equal-sized vertical blocks. These are colored in either black or white to represent the decimal numbers 0–9.

❑ Every number ultimately consists of four fat or thin black and white stripes and its pattern is designed so that, even if you turn it upside down, it can't be confused with any other number.

★ You've probably noticed that barcodes can be quite long and that is because they have to represent three different types of information. The first part of a barcode tells you the country where it was issued. The next part reveals the manufacturer of the product. The final part of the barcode identifies the product itself. Different types of the same basic product (for example, four-packs

of Coca-Cola bottles and six-packs of Coca-Cola cans) have totally different barcode numbers.

How does a barcode scanner works?

1. Scanning head shines LED or laser light onto barcode.
2. Light reflects back off barcode into a light-detecting electronic component called a photoelectric cell.

White areas of the barcode reflect most light; black areas reflect least.

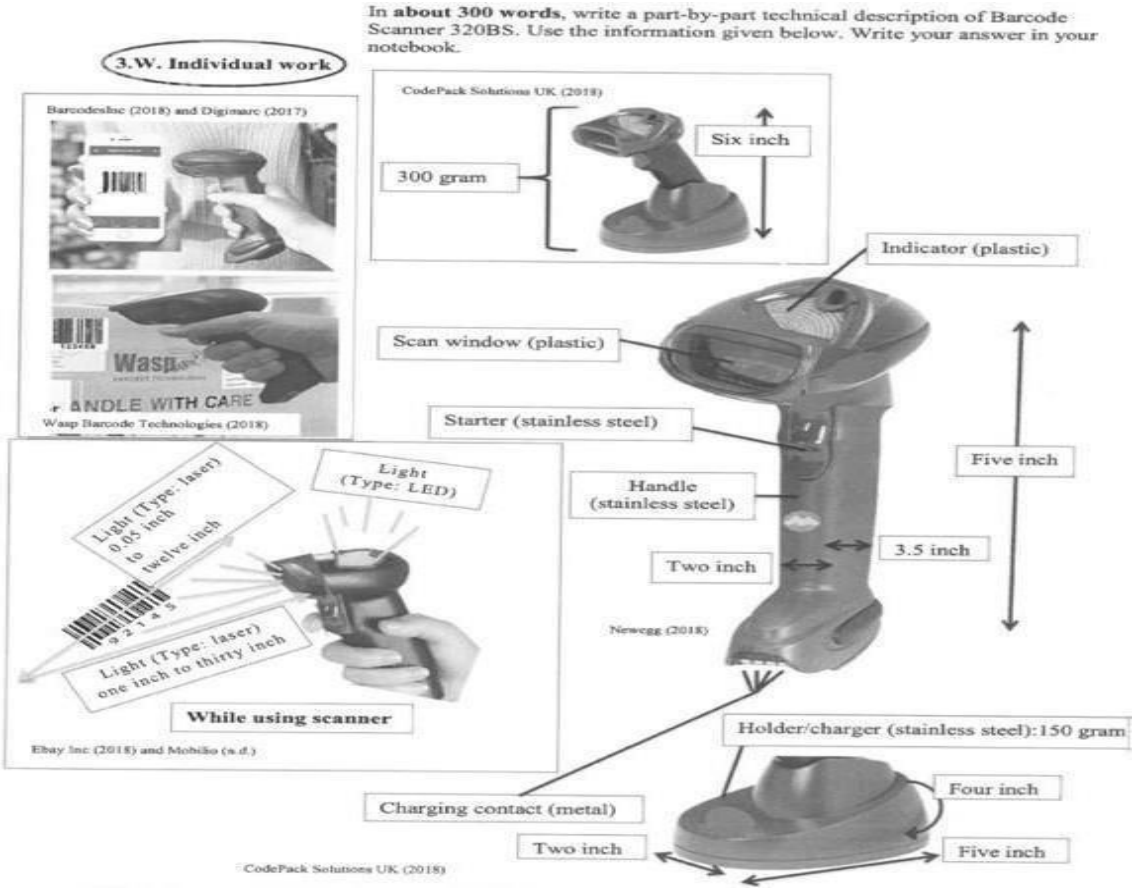
3. As the scanner moves past the barcode, the cell generates a pattern of on-off pulses that correspond to the black and white stripes. So for the code shown here ("black black black white black white black black"), the cell would be "off off off on off on off off."
4. An electronic circuit attached to the scanner converts these on-off pulses into binary digits (zeros and ones).
5. The binary digits are sent to a computer attached to the scanner, which detects the code as 11101011

- In some scanners, there’s a single photoelectric cell and, as youmove the scanner head past the product (or the product past the scanner head), the cell detects each part of the black-white barcode in turn. In more sophisticated scanners, there's a whole line of photoelectric cells and the entire code is detected in one go.

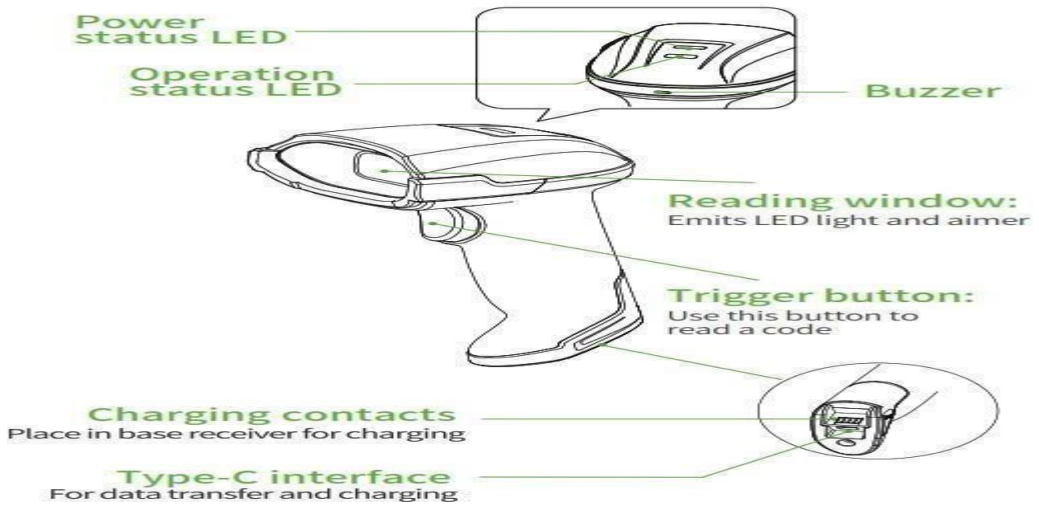
- ➢ In reality, scanners don't detect zeros and ones and produce binary numbers as their output: they detect sequences of black and white stripes, as we've shown here, but convert them directly into decimal numbers, giving a decimal number as their output.

Types of barcode scanners:

Technical description of barcode scanners:

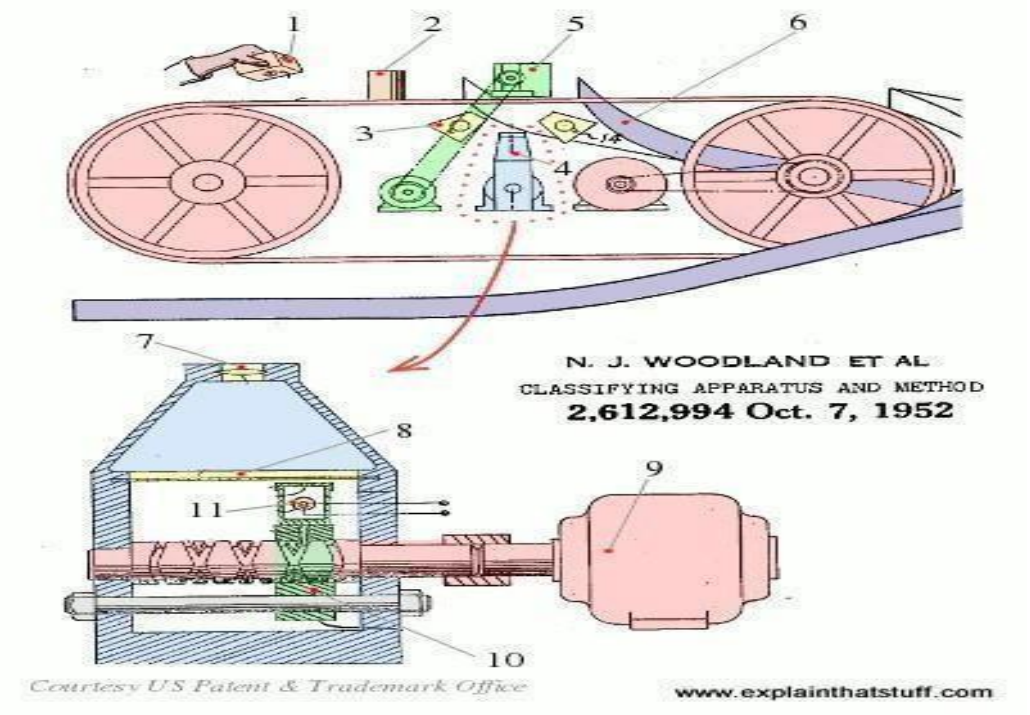


Product description:



Who invented barcodes?

Norman Joseph Woodland



• 1948: Bernard Silver (1924–1963) and N. Joseph Woodland (1921–) get the idea for developing grocery checkouts that can automatically scan products. In October 1949, the two inventors refine their system to use bullseye patterns and apply for a patent (US Patent #2,612,944), which is granted on October 7, 1952.In 1951, Joe Woodland joins IBM to work on barcode technology, though the company declines to purchase his patent, which is acquired by Philco (and later RCA).
• 1960s: RCA develops a number of commercial applications until the patent expires in 1969.
• 1970: By now, grocery stores are beginning to explore the idea of using their own product coding and marking systems, but different stores are considering different systems.

- Under the guidance of Alan Haberman (1929–2011), executive vice president of

- First National Stores in Boston, the stores come together to form the Uniform Code Council (UCC), later known as GS1 US, the organization that now manages
barcode standards worldwide.

● 1971: Meanwhile, at IBM, engineer George J. Laurer (1925–) builds onWoodland's ideas to develop the Universal Product Code (UPC)—themodern black-and-white striped barcode. ● 1973: After examining a variety of different marking systems, Haberman'sgrocery stores committee settles on IBM's rectangular UPC as the standard grocery barcode. Although he didn't invent the barcode,Haberman is widely credited with its universal adoption.
● 1974: On June 26, the world's first grocery-store barcode scanner goes into use at Marsh's Supermarket, Troy, Ohio in the United States. The first scanned purchase, made by Clyde Dawson, is for a 10-pack of Wrigley's chewing gum.
● 1979: In the UK, a barcode scanner is used for the first time at Key Markets in Spalding, Lincolnshire.
● 2011: Joe Woodland and the late Bernard Silver are inducted into the National Inventors Hall of Fame in recognition of their brilliant invention.

What is the use of barcode?

- Barcodes are applied to products as a means of quick identification.

● They are used in retail stores as part of the purchase process, in warehouses to track inventory, and on invoices to assist in accounting, among many other uses.

APPLICATIONs:

● Mobile Loyalty. ...
● Mobile Payment. ...
● Multiple Barcode Capture
● (Multi-Code) ...
● Images and Signatures. ...
● Optical Character
● Recognition (OCR) ..
Driver's License Parsing.
● Positive Patient ID

- SPECIMEN COLLECTION
- MEDICATION
- ADMINISTRATION
- DIETARY
- PRESCRIPTION IMAGING
- TRACK AND TRACE
- WORK IN PROCESS (WIP)

BY
TEJA YANDAPALLI
III - ECE

Radio-Frequency Identification

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID system consists of a tiny radio transponder, a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to track inventory goods.

A radio-frequency identification system uses **tags**, or **labels** attached to the objects to be identified. Two-way radio transmitter-receivers called **interrogators** or **readers** send signal to the tag and read its response

HISTORY:

Russian physicist Leon Theremin is commonly attributed as having created the first RFID device in 1946 (Scanlon, 2003). While Theremin may be recognized for the first successful application of the technology, RFID has earlier roots. In 1983, the first patent to be associated with the abbreviation RFID was granted to Charles Walton.

USES:

Animal identification

RFID tags for animals represent one of the oldest uses of RFID. Originally meant for large ranches and rough terrain, since the outbreak of mad-cow disease, RFID has become crucial in animal identification management. An implantable RFID tag or transponder can also be used for animal identification. The

transponders are better known as PIT (Passive Integrated Transponder) tags, passive RFID, or "chips" on animals.[66] The Canadian Cattle Identification Agency began using RFID tags as a replacement for barcode tags. Currently CCIA tags are used in Wisconsin and by United States farmers on a voluntary basis. The USDA is currently developing its own program.
RFID tags are required for all cattle sold in Australia and in some states, sheep and goats as well.

HUMAN IMPLEMENTATION:
Biocompatible microchip implants that use RFID technology are being routinely implanted in humans. The first-ever human to receive an RFID microchip implant was American artist Eduardo Kac in 1997. There is controversy regarding human applications of implantable RFID technology including concerns that individuals could potentially betracked by carrying an identifier unique to them. Privacy advocateshave protested against implantable RFID chips, warning of potential abuse.

SPORTS :
RFID can provide race start and end timings for individuals in large races where it is impossible to get accurate stopwatch readings for every entrant.[citation needed].
Transportation payments:
The **Zipcar car**-sharing service uses RFID cards for locking and unlocking cars and for member identification.
In Singapore, RFID replaces **paper Season Parking Ticket (SPT).**

Problems and concerns
Global standardization:
The frequencies used for UHF RFID in the USA are as of 2007 incompatible with those of Europe or Japan. Furthermore, no emerging standard has yet become as universal as the barcode.To address international trade concerns, it is necessary to use a tag that is operational within all of the international frequency domains.

Health: Microchip–induced tumours have been noted during animal trials.

CONCLUSION:

We should integrate RFID with hospital information systems (HIS) and electronic health records (EHRs) and support it by clinical decision support systems (CDSS), it facilitates processes and reduce medical, medication and diagnosis errors.

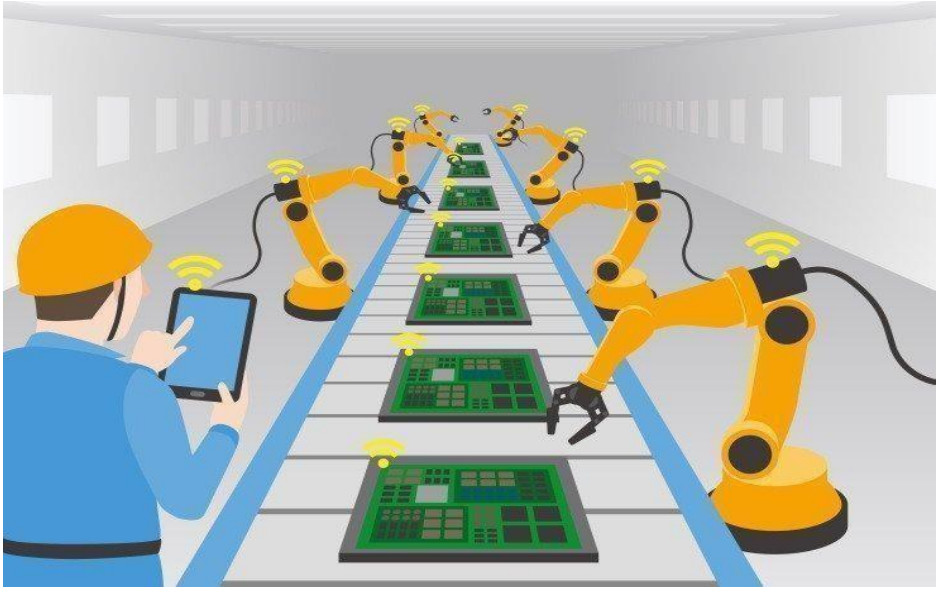
P.THIRUPUGAZHI
R.SANDHIYA
III ECE

Robots and Automation in Electronics Manufacturing

FANUC, a leading robot manufacturer in Japan, has a 22-factory complex where they use the *'lights*- manuctufring concept to build their products - with very little or no human intervention. Using this approach, FANUC utilizes its automated industrial robots to create over 22,000 new robots per month for customers such as Apple, Tesla, and other companies.

Other manufactures are adopting this 'lights out' manufacturing concept — referred to as such because robots can work without lights, HVAC, coffee breaks, days off and other conditions that human workers require.

Today, automated robots have great potential in electronics manufacturing, and are applicable to almost any stage of the entire production cycle. Typical application areas include component fabrication, pick and place, assembling miniature components on PCBs, applying adhesives, inspections, testing, packing and more.



Why automate electronics manufacturing

Electronics manufacturing is increasingly becoming complex as the size of components and circuits continue to shrink. High component density, small pitches, multiple layers, and small and delicate parts that require precise placement are just a few of the issues manufacturers encounter when building products.

Such issues are likely to introduce challenges that can slow down the assembly and testing of products. Also, the delicate nature of the circuits requires extra care, but even with this, there is a likelihood of errors, wastage, and inefficiencies. As competition increases and demand for new features and products grow, manufacturers need to look for innovative and efficient ways.

Generally, automation improves the processes and quality of products while lowering operational and production costs. When implemented well, this translates to lower production costs and manufacturers can pass this benefit to their customers.

Robotic automation applies to almost all the stages in the electronics production cycle. Among the major areas are the material and component handling, assembly lines, etching, inspections, testing, and more. Since most of these are repetitive tests, the robots can reduce the labor costs significantly by cutting on the number of employees while increasing the production times andreducing errorsand wastage.

Handling delicate components

Using sensors and other technologies, the robots can pick and precise place components, build subassemblies, connectors, display screens, and other delicate parts. Other automated tasks include handling and accurately populating and coating the PCBs, applying sealants, adhesives in addition to inspecting and testing the boards and complete systems

Assembling electronics boards

During the pick and place activities, the robots rely on high-resolution cameras for vision with the ability to see and confirm the physical features of the components. They then use force sensors on the robotic arms to ensure that they only apply the necessary pressure when handling and fitting the parts on
the PCB. With vision and flexible arms, the robots can do most of the physical work, just like human beings, more efficiently, and faster.

Automated packing

The automated packaging improves consistency, speed, efficiency and space utilization. Also, it reduces potential damages such as breakages likely to occur due to mishandling or human error. It also reduces the risks of damage to the sensitive components and assemblies by stray electrostatic fields.

Benefits of automated robots in the electronics industry

Automated manufacturing delivers a wide range of cost, quality, flexibility and safety benefits. Unlike human beings, the can repeat the same task consistently without getting tired, requiring breaks or making errors. Also, automation helps to extend the operating time, hence increase productivity.

Robots are always consistent in the way they perform their tasks and this gives them the ability to produce electronic assemblies that are identical and high quality. Further, automation increases production while reducing manufacturing defects, material wastage and returns.

Trends in automation and robots

Demand for automation and robots in electronics manufacturing have been on the increase. Currently, it accounts for about 22% of the total robot shipments — only second to the automobile industry (at 33%) which has been the major consumers for a long time. With this trend, the electronics industry is likely to replace the automobile and become the largest market for industrial and collaborative robots.

As prices continue to drop, small and medium companies are increasingly automating their processes. The availability of the right and inexpensive technical skills to implement, integrate, operate and maintain automation and robotic systems is also encouraging.

Other things supporting the adoption of the technologies include;

Potentialjob losses

As the robots increasingly perform most of the tasks previously done manually, the workforce of the future will have smaller human workers than the way it is today. For example, Philips electric razor manufacturing plant in the Netherlands has robots that outnumber human workers by 14 to 1.

Since automation and robots can perform a wide range of repetitive tasks better and faster, their adoption means several job

losses. Even in countries like China, which is a manufacturing hub due to cheap labor, most factories have replaced half of their workforce with robots. This trend is likely to continue as more manufacturers automate their operations.

Automation and robots in the electronic manufacturing industry can replace human workers and perform a wide range of tasks — quickly and more efficiently. Today, the robots are performing activities such as semiconductor manufacturing, packaging, pick and place, soldering, and visual and physical testing, packaging and more.

The automated robotic systems are also ideal in the manufacture of today's sophisticated electronic devices and products. Features such as force sensing, vision, and proximity sensors as well as automation software give the robots the ability to perform repetitive, delicate and sensitive tasks that require handling of normal and fragile devices with precision.

BY
CHARULATHA S
ECE

CONTACTLESS SMART DUSTBIN

This smart bin can help maintain clean and hygienic environment as garbage can be thrown into it without touching it. The bin has a motor attached to its lid and uses an HC-SR04 sensor to detect hands approaching it. The bin could be useful in crowded places like malls, offices, schools, colleges, and hospitals.

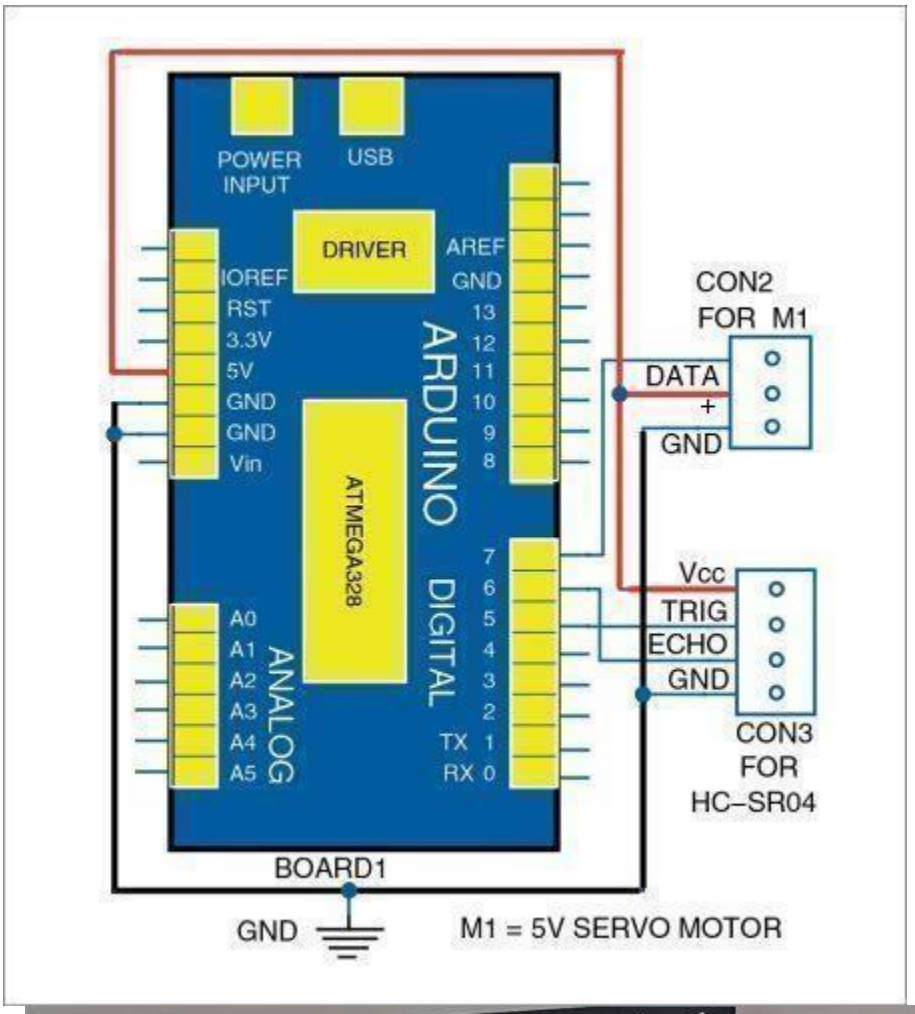
Most Indian cities, towns, and villages are not well equipped for garbage collection. Even when the dust-bins start overflowing, no one clears them. This smart bin could be a good solution in such situations as it will send an alert when the bin becomes full.

The bin device has the following features:

1. The bin opens automatically when someone approaches it, thus keeping the process of disposal non-contact and hygienic.
2. The bin can alert the garbage collectors when it needs to be emptied. Thus, municipal corporations can have the garbage collected well in time, before it starts overflowing, and thus prevent their ugly spillage.
3. Hospitals can use the smart bins to keep the cities free of bio-waste that could potentially be hazardous and spread infections.

Circuit and working

It is built around Arduino Uno Board1, HC-SR04 ultrasonic sensor US1, and servo motor M1.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IOREF
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4
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2
TX 1
RX 0
ARDUINO
ATMEGA328
DIGITAL
ANALOG
A0
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A2
A3
A4
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CON2
FOR M1
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+
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HC–SR04
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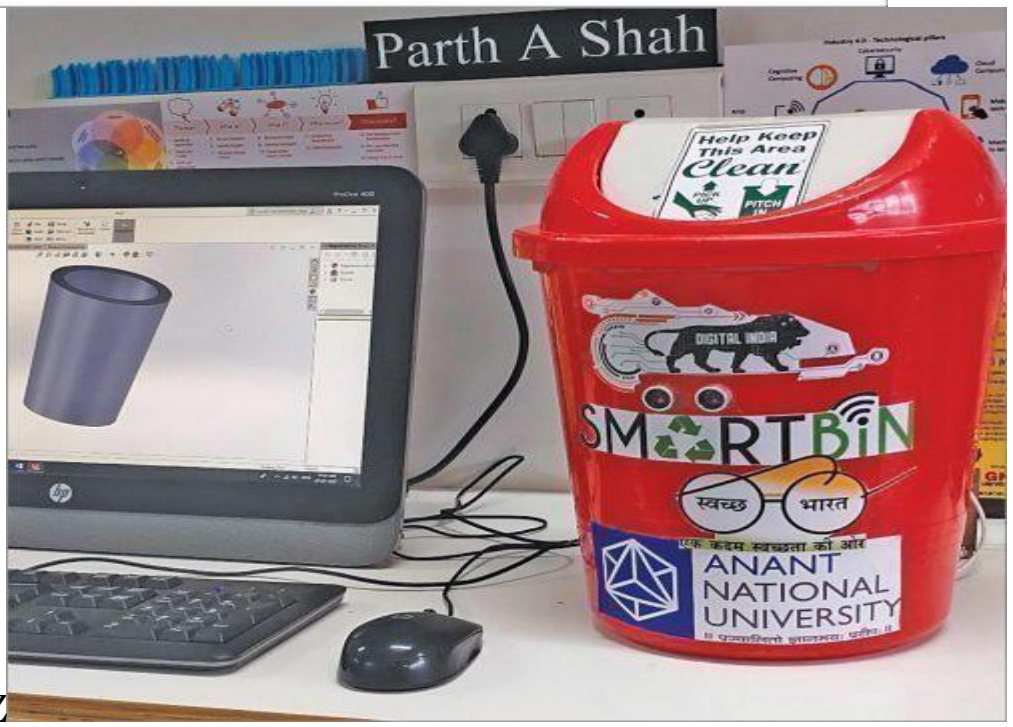
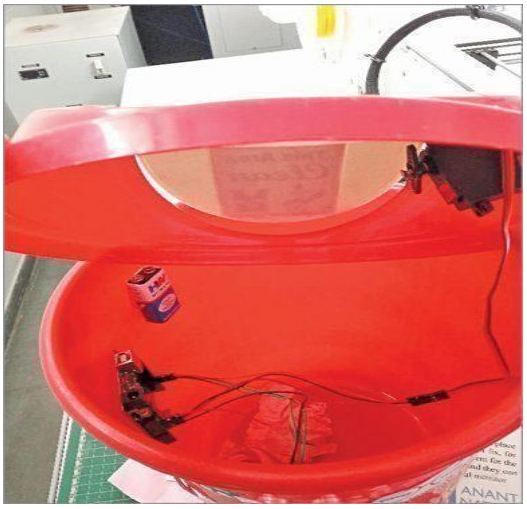

Parth A Shah
Help Keep This Area Clean
DIGITAL INDIA
SMARTBIN
स्वच्छ
भारत
ANANT NATIONAL UNIVERSITY

Z

When the ultrasonic sensor registers hand movement in front of the bin, it generates a signal at its Echo and Trigger pins. This signal is received and processed by the controller (Arduino) and sent to its digital output pins. The signal goes to servo motor MG90S to rotate the bin's lid attached to it by required degrees. The degree of rotation, decided by size of the dust bin's lid, needs to be set through trial and error.



The project can be extended by using load cell and GPS sensor. A load cell can sense the weight of the bin. When the bin gets full and its weight exceeds certain limit, it will send alert signal to the nearest municipality and concerned garbage collector through the GPS. The exact location of the dust-bin can be tracked through the GPS latitude and longitude coordinates on Google Maps.

The circuit uses the software program loaded into the internal memory of Arduino Uno. The program dustbin_EFY.ino is simple and easy to understand. Comments are given at the end of each command line. The code starts by defining the pin numbers of ultrasonic sensor.

BY

SARAN S

III - ECE

µLC TEST SYSTEM

The compact hardware-in-the-loop test system for simulation and quality assurance . The new and modern hardware-in-the-loop test system µLC Test System is suitable for mobile application, measuring a compact 17 cm x 11 cm x 6 cm. Initial test setup typically takes under ten minutes, since the system allows for a simple test setup.

It is a compact open-loop test system for quality assurance of control unit development and combines the simulation of all typical automotive sensors and communication protocols in one unit. Its interface is user-friendly and enables an easy operation and evaluation.
The µLC Test System is especially used for automotive control units with typical interfaces for sensors and bus systems such as analogue/digital inputs and outputs, PWM signals, SENT, LIN, CAN and speed sensors.

Technical data

- Operating voltage = 12 V DC
- Current consumption typ. < 1 A
- ECU voltage = 12 V / 24 V DC
- ECU current = 10 A
- Permissible operation temperature = 0°C to 40°C
- Housing material = Aluminium
- Dimensions = 175 mm x 107 mm x 61 mm
- Weight = 690 g
- Engine Speed Simulation = up to 20,000 rpm, Sensor types: Hall, inductive, DG23i, TL4953

- Vehicle Busses = 2 x CAN , LIN Master/Slave , 4 x SENT
- Additional Features
    - Cylinder Pressure Simulation
    - Expansion boards for additional HW features
    - Multi device support
    - Throttle Simulation

Flexible possibilities for test automation

Since the µLC Test System is flexible and efficient with minimal cost, each individual control unit project can have its own test station to provide the best possible support to automated testing. The µLC Test System provides the possibility of a complete automation through Lua scripts and an application programming interface (API).
This API fits the existing control software and offers both a graphic interface and the opportunity to operate the µLC Test System. Thanks to its open software interfaces, the test system can also be integrated into pre-existing test infrastructure such as Trace Tronic GmbH's ECU Test. As a result, this sort of test system allows for continuous integration in software development, so as to keep on collating the modifications of different developers.

The symbiosis of hardware and software – µLC Test System and MicroLC Software

Bosch Motorsport provides the µLC Test System, including the hardware and control software (MicroLC Software), and its maintenance by regular software updates and e-mail support.

The MicroLC Software is finely adapted to the µLC Test System and guarantees a fast test arrangement and results, since it is ready to use at any time. If required we offer additional services for an expansion of the hardware (e.g. additional interfaces) and of the control software by implementing new functions. Further a connection to existing customer solutions, an implementation of automations and the development of test cases is served.

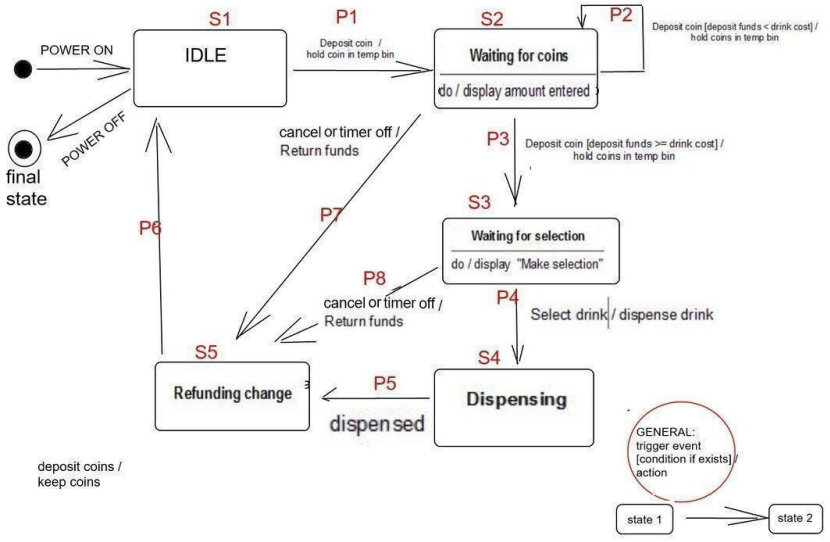
NIVEDHITHA . P
MONICA . S
SINDU MITHRA M.K.
III – EC

VENDING MACHINE

INTRODUCTION

A vending machine is a machine which dispenses items such as snacks, beverages, alcohol, cigarettes, lottery tickets, cologne, consumer products and even gold and gems to customers automatically, after the customer inserts currency or credit into the machine. Previous CMOS and SED based machines are more time consuming than the FPGA based machines. The FPGA based machine is also more flexible, programmable and can be re-programmed. The machine also supports a cancel feature means that the person can withdraw the request and the money will be returned back to the user. This is due to the modern lifestyles which require fast food processing with high quality.

STATE DIAGRAM



MODERN VENDING MACHINES

This machine was invented by Percival Everitt in 1883 for dispensing post cards. In U.S. it was built in 1888 by the Thomas Adams Gum Company for selling gum.In December 1970, Texas displayed its "talking" vending machine, the Venda Talker.
In 1994, vending machines began to compete with the Fast- Moving Consumer Goods industry. Chargebox which is used for charging small mobile devices such as mobile phones and iPods. Machines of this new category are generally called Automated Retail kiosks.

Liskom (Russia) and Xerox (Global) both have coin-operated or pay-per-copy vending machines. A full-line vending company may set up several types of vending machines that sell a wide range of products. Products may include candy, cookies, chips, fresh fruit, milk, cold food, coffee and other hot drinks, bottles, cans of soda, and even frozen products like ice cream. These products can be sold from machines that include coffee, snack, cold food, 20-oz. bottle machines, and glass-front bottle machines.

CONCLUSION

• We found out that a simple everyday machine takes a lot of engineering to design and build and how they are used in everyday machines that we take for granted.
• The main principles of a vending machine are fairly simple, however, the top of the line machines are very complex.

VASUMITHRA S
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