ICSARIA-VISION

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Department of
Electronics
and
Instrumentation Engineering

CONTENTS

VISION AND MISSION

DEPARTMENT VISION

To impart excellent education to provide globally competent Electronics and Instrumentation Engineers.
To establish Centre of Excellence and Research in Electronics and Instrumentation Engineering and allied fields.

DEPARTMENT MISSION

To prepare competent Electronics and Instrumentation Engineers who can pursue professional career and/ or higher studies.

To promote excellence in teaching with academically good ambiance that allows the learners to be socially responsible with professional ethics.

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From the HOD's desk

Work hard at what you like to do and try to overcome all obstacles

Laugh at your mistakes and praise yourself for learning from them

I am having immense pleasure to note that this year's edition of "**ICSARIA-VISION**" is ready to release. I would like to congratulate the team of active students and faculty leadership for their efforts to ram-up various department activities under the aegis of department association.

The department conducts many programs aimed to nurture a professional interest towards the domain of study among all members of the department and "**ICSARIA-VISION**" is one of the means to publish various creative articles and news which reflects state-of-the art.

Technology related developments are there in the field of robotics, Iot, machine learning, automotive electronics, healthcare and so on which are closely linked with the common man's life.

Plenty of opportunities as well as challenges are awaiting. Hope that "**ICSARIA-VISION**" could be a platform for both students and faculty members to conduct fruitful discussion on all these breakthrough developments. Let us strive together for a greener, technically enriched better India!

As an Instrumentation and Control Engineers, it is the need of the time to follow these changes and understand the state-of-the art technology in order to be updated in the domain.

I wish that, this endeavor is a humble beginning in this direction and wish all the success.

CLASS TIME

NAME : P AVINASH
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CLASS : IV- EIE

Class time is an essential component of any educational system, whether it is in a traditional classroom or online. It provides students with a structured environment in which to learn new information, engage in meaningful discussions, and collaborate with their peers. However, class time is only effective if it is used efficiently and effectively. One of the primary benefits of class time is that it provides students with direct access to their teachers.

This allows for real-time feedback and support, which can be invaluable in the learning process. During class time, teachers can answer questions, clarify concepts, and provide additional examples to help students better understand the material. This is particularly important for students who may struggle with certain topics or need additional assistance. Class time also provides students with the opportunity to engage in discussions with their peers. This can be particularly useful in helping students develop critical thinking and problem-solving skills. When students are able to exchange ideas and perspectives, they are more likely to develop a deeper understanding of the material and to be able to apply it in real-world situations. Additionally, class time allows for the development of interpersonal skills such as communication, collaboration, and leadership. Another important benefit of class time is that it provides structure and accountability. When students attend class, they are more likely to stay on track with their coursework and to complete assignments on time. This is particularly important for students who may struggle with time management or who may have other responsibilities outside of school. By attending class regularly, students are able to stay on top of their coursework and to develop good study habits. However, in order for class time to be effective, it must be used efficiently. This means that teachers must be prepared and organized, and that they must use class time to focus on the most important concepts and skills. Additionally, students must come to class ready to engage with the material and to participate in discussions and activities. When class time is used effectively, it can be a powerful tool for student learning and success. In conclusion, class time is an essential component of any educational system. It provides students with access to their teachers, opportunities for collaboration and discussion, and structure and accountability. However, in order for class time to be effective, it must be used efficiently and effectively. Teachers and students must work together to ensure that class time is a valuable and meaningful part of the learning experience. Class time plays an important role in the overall learning experience of students. It provides a structured environment that allows for the presentation and exploration of new concepts and ideas. One of the main benefits of class time is that it allows for the development of social skills. In a classroom setting, students have the opportunity to interact with their peers, work in groups, and engage in collaborative learning activities. This helps students develop social skills that are essential for success in both academic and non-academic settings. Another important benefit of class time is that it allows for the development of critical thinking skills. During class discussions, students are encouraged to think deeply about the material being presented and to analyze it from different perspectives. This helps students develop the ability to think critically and to approach problems in a logical and systematic way. class time also provides an opportunity for teachers to assess student learning and provide feedback. By observing students in the classroom and engaging

with them during class discussions, teachers areable to gauge the level of understanding and identify areas where students may be struggling. This allows teachers to provide targeted support and feedback that can help students improve their performance. Moreover, class time helps students to stay motivated and focused on their academic goals. When students attend class regularly, they are more likely to feel connected to their coursework and to be invested in their academic success. This helps them to stay motivated and engaged in their learning, which can lead to better academic outcomes. In summary, class time is an essential component of the learning process. It provides a structured environment for the exploration of new concepts and ideas, the development of social and critical thinking skills, the assessment of student learning, and the maintenance of student motivation and focus. When used effectively, class time can be a powerful tool for student success.

Mass Migration and its future impact

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Mass migration has become an increasingly prevalent phenomenon in recent years, as people around the world seek better economic, social, and political opportunities. While migration has been a part of human history for thousands of years, the scale and scope of contemporary migration has raised questions about its long-term impact on both the countries of origin and destination. O e of t e most significant impacts of mass migration is its effect on the economies of both the sending and receiving countries. In many cases, migrants are drawn to countries with stronger economies and higher wages, where they can earn more money and support their families. However, this can create labor shortages in the countries of origin, as skilled workers and professionals leave for other opportunities. In the receiving countries, mass migration can create competition for jobs and resources, as well as new opportunities for economic growth and diversity. Another impact of mass migration is its effect on social and cultural dynamics. When people from different cultures and backgrounds come together in a new place, they often bring with them their own traditions, customs, and beliefs. This can lead to the creation of vibrant multicultural communities, but it can also lead to tensions and conflicts between different groups. It is important for both the migrants and the receiving communities to engage in cultural exchange and understanding to promote social cohesion. Mass migration can also have political implications, particularly in the countries of origin. When large numbers of people leave a country, it can lead to a brain drain, where the most skilled and educated individuals leave, which can hamper economic growth and development. Additionally, mass migration can put pressure on the political systems of both the sending and receiving countries, leading to debates about immigration policy and national identity. Looking towards the future, it is likely that mass migration will continue to be a major global issue, particularly as climate change and political instability drive people to seek new opportunities and safety. It is important for policymakers to take a long-term, holistic approach to managing mass migration, taking into account the economic, social, and political impacts on both the sending and receiving countries. This requires cooperation and coordination between nations, as well as a commitment to promoting human rights and dignity for all individuals, regardless of their country of origin or destination. In conclusion, mass migration is a complex issue that has significant economic, social, and political impacts on both the sending and receiving countries. While migration can bring opportunities and benefits to individuals and communities, it can also create challenges and tensions. It is important for policymakers to recognize the long-term implications of mass migration and to work towards solutions that promote the well-being and dignity of all individuals involved. Another potential impact of mass migration is its effect on the environment. As more people move into urban areas, it can lead to increased demand for resources and infrastructure, including housing, energy, and transportation. This can put pressure on natural resources and contribute to pollution and environmental degradation. It is important for policymakers to consider the environmental implications of mass

migration and to work towards sustainable development strategies that balance economic growth with environmental conservation. Mass migration can also have an impact on health, particularly in the context of infectious diseases. When large numbers of people move into a new area, it can increase the risk of disease transmission and outbreaks. This can pose challenges for healthcare systems and require coordinated efforts to promote public health and prevent the spread of infectious diseases. Finally, mass migration can have an impact on the human rights of migrants and their families. Many migrants face challenges such as discrimination, exploitation, and violence, as well as difficulties accessing healthcare, education, and other basic services. It is important for policymakers to prioritize the protection of human rights for all individuals, regardless of their migration status, and to work towards policies and programs that support the integration and well-being of migrants and their families.

AUGMENTED REALITY

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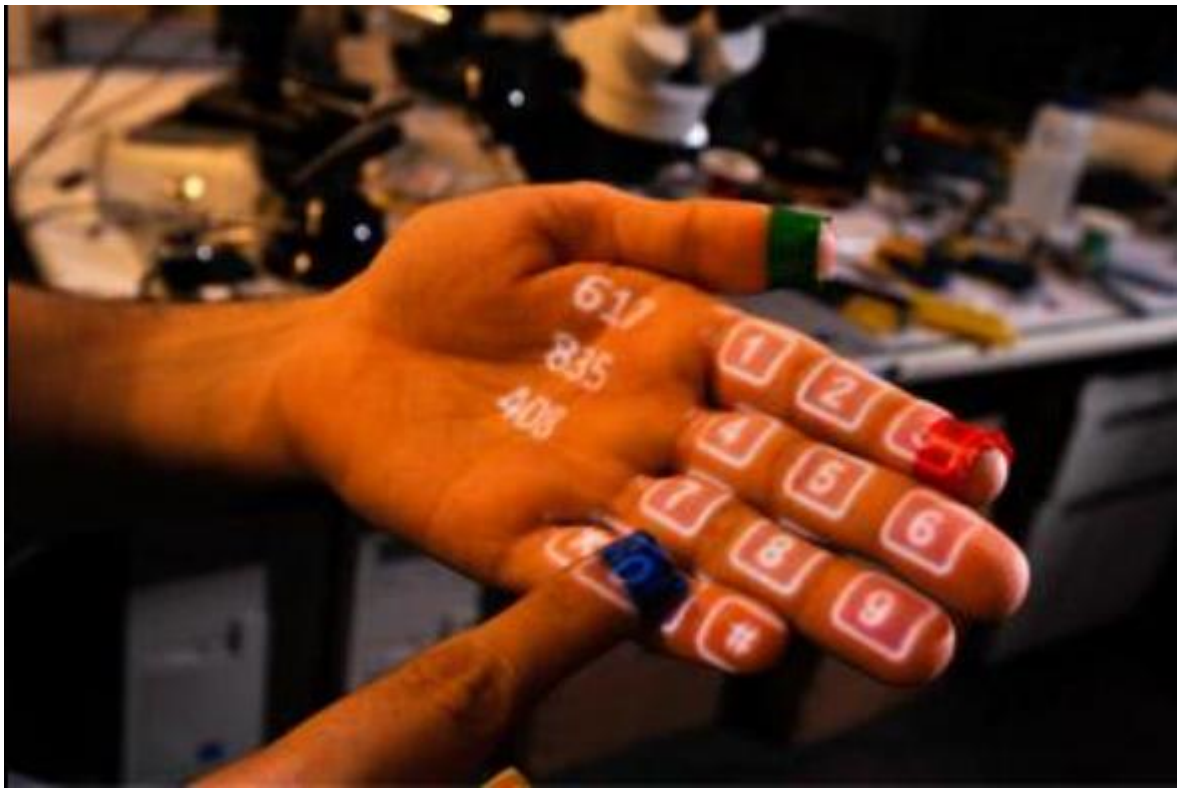
Researchers and engineers are pulling graphics out of your television screen or computer display and integrating them into real-world environments. This new technology, called augmented reality, blurs the line between what's real and what's computer-generated by enhancing what we see, hear, feel and smell.

On the spectrum between virtual reality, which creates immersive, computergenerated environments, and the real world, augmented reality is closer to the real world. Augmented reality adds graphics, sounds, haptic feedback and smell to the natural world as it exists. Both video games and cell phones are driving the development of augmented reality. Everyone from tourists, to soldiers, to someone looking for the closest subway stop can now benefit from the ability to place computer-generated graphics in their field of vision.



Augmented reality is changing the way we view the world -- or at least the way its users see the world. Picture yourself walking or driving down the street. With augmented-reality displays, which will eventually look much like a normal pair of glasses, informative graphics will appear in your field of view, and audio will coincide with whatever you see. These enhancements will be refreshed continually to reflect the movements of your head.

The Sixth Sense augmented reality system lets you project a phone pad onto your hand and phone a friend -- without removing the phone from your pocket.

Augmented Reality Applications

Primitive versions of augmented reality are already here on some cell phones, particularly in applications for the iPhone and phones with the Android operating system. In the Netherlands, cell phone owners can download an application called Layar that uses the phone's camera and GPS capabilities to gather information about the surrounding area. Layar then shows information about restaurants or other sites in the area, overlaying this information on the phone's screen. You can even point the phone at a building, and Layar will tell you if any companies in that building are hiring, or it might be able to find photos of the building on Flickr or to locate its history on Wikipedia. Layar isn't the only application of its type. In August 2009, some iPhone users were surprised to find an augmented-reality "easter egg" hidden within the Yelp application. Yelp is known for its user reviews of restaurants and other businesses, but its hidden augmented-reality component, called Monocle, takes things one step further. Just start up the Yelp app, shake your iPhone 3GS three times and Monocle activates. Using your phone's GPS and compass, Monocle will display information about local restaurants, including ratings and reviews, on your cell phone screen. You can touch one of the listings to find out more about a particular restaurant.

There are other augmented reality apps out there for the iPhone and other similar phones -- and many more in development. Urbanspoon has much of the same functionality as Yelp's Monocle. Then there's Wikitude, which finds information from Wikipedia about sites in the area. Underlying most of these applications are a phone's GPS and compass; by knowing where you are, these applications can make sure to offer information relevant to you.

WATER SAVING MANAGEMENT IN AGRICULTURE USING SMART IOT

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Despite the perception people may have regarding the agricultural process, the reality is that today's agriculture industry is data centered, precise, and smarter than ever. The rapid emergence of the Internet-ofThings (IoT) based technologies redesigned almost every industry including "smart agriculture" which moved the industry from statistical to quantitative approaches. Such revolutionary changes are shaking the existing agriculture methods and creating new opportunities along a range of challenges. This article highlights the potential of wireless sensors and IoT in agriculture, as well as the challenges expected to be faced when integrating this technology with the traditional farming practices. IoT devices and communication techniques associated with wireless sensors encountered in agriculture applications are analyzed in detail. What sensors are available for specific agriculture application, like soil preparation, crop status, irrigation, insect and pest detection are listed. How this technology helping the growers throughout the crop stages, from sowing until harvesting, packing and transportation is explained. Furthermore, the use of unmanned aerial vehicles for crop surveillance and other favorable applications such as optimizing crop yield is considered in this article. State of the art IoT based architectures and platforms used in agriculture are also highlighted wherever suitable. Finally, based on this thorough review, we identify current and future trends of IoT in agriculture and highlight potential research challenges. Agriculture is the main source of food production in our country. In India, agriculture contributes 18% of the country's Gross Domestic Product (GDP) which employs more than half of the total population. The Indian government has stressed and highlighted the need of innovations to be in above mentioned criteria's in agriculture, thus seeks an indication of technology exposure and innovative implementation practices to enhance the productivity. The productivity in agricultural, food security, erratic conditions in climates, soil conditions requires new ideas and innovations. While this is largely depends on irrigation system, and current techniques in irrigation which helps to achieve more productivity per drop of water. Automation in irrigation system helps to farmers to manage their work much easier and helps to take decisions even in the absence of farmers. IoT, sensors, smart phone tools are the technologies which helps farmers to know the status of their land, amount of water needed, temperature of soil, humidity, weather conditions, pH level. IoT is the term was first coined by the Massachusetts Institute of Technology in the year 1999. Definitions focus on technical aspects of IoT when the other based on the applications and functionalities. A few definition defined IoT as "an extension of the current Internet to all objects that can communicate directly or indirectly with electronic equipment and connected to the Internet". Other defined as "a novel paradigm that is rapidly gaining ground in the scenario of modern wireless telecommunications. IoT is automating all the aspects of farming and agricultural methods to make the process more efficient and effective. The aim of this study is to analyze recently developed IoT technologies in the agriculture and farming industries to present summary of sensors, technologies, and sub-verticals such as water management and crop management.

SpaceX Starship

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Starship is a fully reusable two-stage launch vehicle under development by American company SpaceX, comprising of a first stage booster named Super Heavy and a second stage spacecraft named Starship. The launch vehicle is expected to be the tallest, heaviest, and most powerful rocket in the world, capable of producing 72 meganewtons or 17,000,000 pound-force of thrust at lift-off—more than twice that of a Saturn V rocket. Starship can launch 100 t (220,000 lb) to low Earth orbit and with the same capacity to higher Earth orbits, the Moon, or Mars via transferring propellant in orbit. To accommodate Starship's features, a non-traditional launch complex would be used, including a launch tower that can lift and recover both stages. Both stages will be powered by Raptor engines and constructed out of stainless steel.

A Starship-like vehicle was first envisioned by SpaceX in 2005. After many changes to the vehicle design, SpaceX started developing the launch vehicle at its South Texas launch site, also known as the Boca Chica launch site. The first full-sized prototype Starship Mk1 was unveiled on 29 September 2019. The first successful hop was performed by Starhopper—a simplified prototype— on 25 July 2019, Upcoming space missions, including the dear Moon project, NASA's Artemis program, and the SpaceX Mars program, are projected to use Starship.

ABOUT THE VEHICLE: The Starship spacecraft is 50 m (160 ft) tall, 9 m (30 ft) diameter and has a total propellant capacity of 1,200 t (2,600,000 lb). The bottom-most section, informally called the "skirt," houses the Raptor engines, as well as composite overwrapped pressure vessels that store helium gas used to spin up the Raptor turbopumps. Positioned above, sits the liquid oxygen and liquid methane propellant tanks, separated by

a "common dome" containing a small, spherical methane "header tank" that contains propellant for landing. Six Raptor engines power the spacecraft, three optimized for atmospheric pressure, and three for the vacuum of space. The payload section—positioned above the propellant tanks—houses cargo, crew, or both, and a liquid oxygen header tank. A large clamshell fairing door replaces conventional rocket payload fairings or spacecraft specialized to transport, capture and return satellites and space debris to Earth. The door would be closed during launch, opened to release payloads once in orbit, and closed again during the re-entry to Earth. In the crewed variant, the payload bay would house cabins. To control the spacecraft attitude during re-entry and descent, Starship actuates two pairs of flaps installed perpendicularly to the body of the spacecraft—one pair of larger "aft flaps" sit at the bottom of Starship; a smaller pair of "forward flaps" is placed on the nose cone. The windward side of the spacecraft is covered by hexagonal ceramic tiles that make up Starship's heat shield. The heat shield protects the spacecraft from the extreme heat of atmospheric entry. Simulations from SpaceX have shown that 99.9% of the vehicle's kinetic energy would dissipate upon re-entry to Earth, however, Mars's much thinner atmosphere only dissipates 99% of Starship's kinetic energy.

Now days in Industries a lot of multivariable control techniques are used. Multivariable processes are the processes consisting of multiple input variables and multiple output variables & these variables are interacting with each other that means if any of the input is changed at least one output will change. E.g.- Distillation column, Reactors etc. In a multivariable process both the location and direction of zeros are important for controller design. They have a direct physical impact on the process. However there does not exist any laboratory process that can demonstrate multivariable zero location and direction in an illustrative way. Hence our project focuses on such a multivariable system that illustrates this phenomenon.

SELF-DRIVING CAR

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CLASS : IV- EIE

Introduction:

A self-driving car (sometimes called an autonomous car or driverless car) is a vehicle that uses a combination of sensors, cameras, radar and artificial intelligence (AI) to travel between destinations without a human operator. To qualify as fully autonomous, a vehicle must be able to navigate without human intervention to a predetermined destination over roads that have not been adapted for its use.

How self-driving cars work

AI technologies power self-driving car systems. Developers of self-driving cars use vast amounts of data from image recognition systems, along with machine learning and neural networks, to build systems that can drive autonomously. The neural networks identify patterns in the data, which is fed to the machine learning algorithms. That data includes images from cameras on selfdriving cars from which the neural network learns to identify traffic lights, trees, curbs, pedestrians, street signs and other parts of any given driving environment. For example, Google's self-driving car project, called Waymo, uses a mix of sensors, Lidar (light detection and ranging -- a technology similar to RADAR) and cameras and combines all of the data those systems generate to identify everything around the vehicle and predict what those objects might do next. This happens in fractions of a second. Maturity is important for these systems. The more the system drives, the more data it can incorporate into its deep learning algorithms, enabling it to make more nuanced driving choices. Companies developing and/or testing autonomous cars include Audi, BMW, Ford, Google, General Motors, Tesla, Volkswagen and Volvo. Google's test involved a fleet of self-driving cars -- including Toyota Prii and an Audi TT -- navigating over 140,000 miles of California streets and highways.

Cars with self-driving features

Google's Waymo project is an example of a self-driving car that is almost entirely autonomous. It still requires a human driver to be present but only to override the system when necessary. It is not self-driving in the purest sense, but it can drive itself in ideal conditions. It has a high level of autonomy. Many of the cars available to consumers today have a lower level of autonomy but still have some self-driving features. The self-driving features that are available in many production cars as of 2019 include the following:

Hands-free steering centers where the car without the driver's hands on the wheel. The driver is still required to pay attention.

• Adaptive cruise control (ACC) down to a stop automatically maintains a selectable distance between the driver's car and the car in front.

• Lane-centering steering intervenes when the driver crosses lane markings by automatically nudging the vehicle toward the opposite lane marking

BLOCKCHAIN

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CLASS : IV- EIE

Introduction:

A blockchain is a growing list of records, called blocks, that are linked together using cryptography. It's also described as a "trustless and fully decentralized peer-to-peer immutable data storage" that is spread over a network of participants often referred to as nodes. Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data (generally represented as a Merkle tree). The timestamp proves that the transaction data existed when the block was published in order to get into its hash. As blocks each contain information about the block previous to it, they form a chain, with each additional block reinforcing the ones before it. Therefore, blockchains are resistant to modification of their data because once recorded, the data in any given block cannot be altered retroactively without altering all subsequent blocks.

Blockchains are typically managed by a peer-to-peer network for use as a publicly distributed ledger, where nodes collectively adhere to a protocol to communicate and validate new blocks. Although blockchain records are not unalterable as forks are possible, blockchains may be considered secure by design and exemplify a distributed computing system with high Byzantine fault tolerance.

Structure: A blockchain is a decentralized, distributed, and oftentimes public, digital ledger consisting of records called blocks that is used to record transactions across many computers so that any involved block cannot be altered retroactively, without the alteration of all subsequent blocks. This allows the participants to verify and audit transactions independently and relatively inexpensively. A blockchain database is managed autonomously using a peer-to-peer network and a distributed timestamping server. They are authenticated by mass collaboration powered by collective self-interests. Such a design

facilitates robust workflow where participants' uncertainty regarding data security is marginal. The use of a blockchain removes the characteristic of infinite reproducibility from a digital asset. It confirms that each unit of value was transferred only once, solving the long-standing problem of double spending. A blockchain has been described as a value-exchange protocol. A blockchain can maintain title rights because, when properly set up to detail the exchange agreement, it provides a record that compels offer and acceptance.

Logically, a blockchain can be seen as consisting of several layers:

• infrastructure (hardware)

• networking (node discovery, information propagation and verification)

• consensus (proof of work, proof of stake)

• data (blocks, transactions)

• application (smart contracts/decentralized applications, if applicable)

Uses of the Blockchain: Blockchain technology can be used to create a permanent, public, transparent ledger system for compiling data on sales, tracking digital use and payments to content creators, such as wireless users or musicians. The Gartner 2019 CIO Survey reported 2% of higher education respondents had launched blockchain projects and another 18% were planning academic projects in the next 24 months. In 2017, IBM partnered with ASCAP and PRS for Music to adopt blockchain technology in music distribution. Imogen Heap's Mycelia service has also been proposed as blockchain-based alternative "that gives artists more control over how their songs and associated data circulate among fans and other musicians."

New distribution methods are available for the insurance industry such as peer-to-peer insurance, parametric insurance and microinsurance following the adoption of blockchain. The sharing economy and IoT are also set to benefit from blockchains because they involve many collaborating peers. The use of blockchain in libraries is being studied with a grant from the U.S. Institute of Museum and Library Services.

Other designs include:

• Hyperledger is a cross-industry collaborative effort from the Linux Foundation to support blockchain-based distributed ledgers, with projects under this initiative including Hyperledger Burrow (by Monax) and Hyperledger Fabric (spearheaded by IBM).

BIOGRAPHY OF RATAN TATA

NAME : JALLA NVL PRIYANKA
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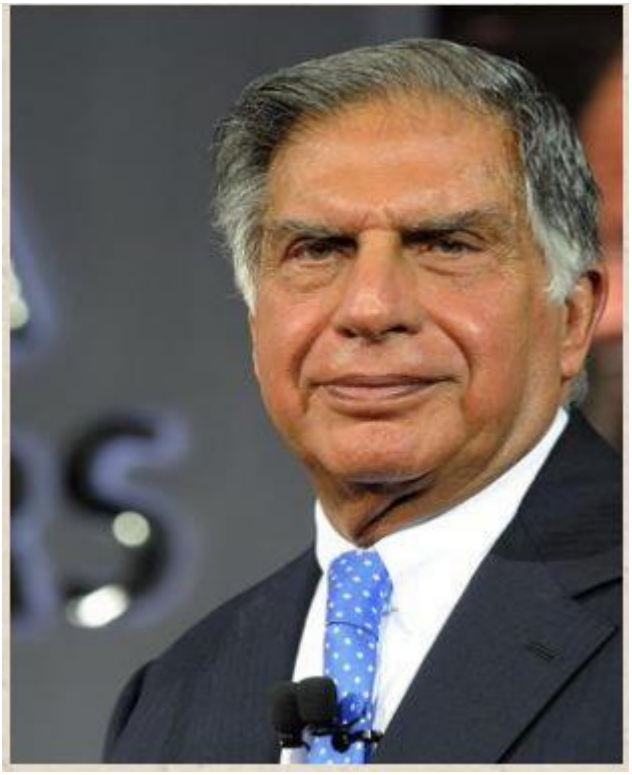
CLASS : IV- EIE

Abstract:

One of the most well-known and respected industrialists in India, Ratan Naval Tata is the Chairman of Tata Sons and Tata Group. At the age of 73, Tata heads one of the country's largest conglomerates which comprise nearly 100 firms with revenues totaling about USD 67 billion. He is also the chairman of major Tata companies such as Tata Steel, Tata Motors, Tata Teleservices. Power, Tata Consultancy Services, Tata Tea, Tata Chemicals, and The Indian Hotels Company.



Tata was born on December 28, 1937 in Mumbai, in one of the richest families. His great grandfather was Jamsedji Tata, founder of the Tata group. As a young boy, Tata had a disturbed childhood after his parents split. He was raised by his grandmother, Lady Navajbai in the lap of luxury at Tata Palace. America held a special fascination for the Tata scion and he went to Cornell University to study architecture and structural engineering. Later he pursued a management course from Harvard University.

In 1962, he joined the Tata Group and his first job involved working with the Tata Steel division in Jamshedpur, where he worked with the blue-collar employees shoveling stone and working with the furnaces. He was appointed the Director-inCharge of the National Radio & Electronics Company Limited (Nelco) in 1971 and was successful in turning

Nelco around.

Tata later paved his way to become the Chairman of Tata Industries and was instrumental in ushering in a wide array of reforms. It was under his stewardship that Tata Consultancy Services went public and Tata Motors was listed in the New York Stock Exchange giving it more international power and recognition. He is credited with leading the Tatas' successful bid for Corus- an Anglo-Dutch steel and aluminum producer as well as Jaguar and Land Rover brands from the Ford Company.

During his tenure the company witnessed the launch of india's first truly Indian car, 'Indica'. The car was the brainchild of Tata. In 2000 Tata's food division acquired tea firm Tetley for GBP 70 million. In the year 2009-10 the group's revenues have grown nearly 12-fold, totalling USD 67.4 billion. Tata also serves on the boards of Fiat SpA and Alcoa and is also on the international advisory boards of Mitsubishi Corporation, the American International Group, JP Morgan Chase, Rolls Royce, Temasek Holdings and the Monetary Authority of Singapore.

In year 2000, he was honored with Padma Bhushan by the government of India. He was also conferred an honorary doctorate in business administration by Ohio State University, an honorary doctorate in technology by the Asian Institute of Technology, Bangkok, and an honorary doctorate in science by the University of Warwick. Tata has a personal fortune of GBP 300 million and owns less than 1% of the colossal group. Over two thirds of Tata Group is owned by charitable trusts that finance good causes. Tata set a perfect example of generosity and leadership during the 26/11 attacks. Unarmed he stood all alone outside the Taj hotel and supervised the activities to help the victims. He showcased his humane gesture by personally visiting the families of all the 80 employees who were killed or injured. He left no stone unturned to provide relief to the victims and even asked the families and dependents as to what they wanted him to do.

His retirement may still be a year away, but Tata has started chalking out plans on his post-retirement. He plans to set up a design centre of international standards and scale. He has led development of many innovative designs and products, the most celebrated being Nano. The idea of Nano was born with his concern for the safety of nuclear families commuting on two-wheelers. He was the one who suggested that the miniature car should be fitted with just one windscreen wiper. This reduced its price and maintenance cost.

His also steered plan to provide cheap and clean drinking water and helped a few Pune-based designers develop a sub-Rs 1,000 water purifier, Swach. Design Directions Private Limited took more than three years to make this 560-mm unit for purifying water. A bachelor in real life, Tata loves privacy and shuns media spotlight. He has only CDs, books and dogs for company. The business baron drives himself to work in an unremarkable Tata sedan.

Standing tall with his contemporaries with a staggering fortune and world recognition, Ratan Tata has amazingly never featured in the 'Forbes billionaires lists.

Automated Gate is an automated movable barrier installed in entrance of any infrastructure for restricted access. At present, main gate of MVP's KBT College of Engineering is being operated manually thus it is hectic for the guards to open and close for every entry and exit of a vehicle, also it is time consuming. So, it needs to be automated to reduce human efforts, to save time and avoid traffic. The project consists of a Rack and Pinion and a Boom Barrier assembly, whole system is controlled using PLC controller. Both the assemblies i.e., rack and pinion and boom barrier are operated using AC motors with gear box. Also, the lamps at the entrance of the college are controlled using same PLC.

THE AMBULANCE DRONE

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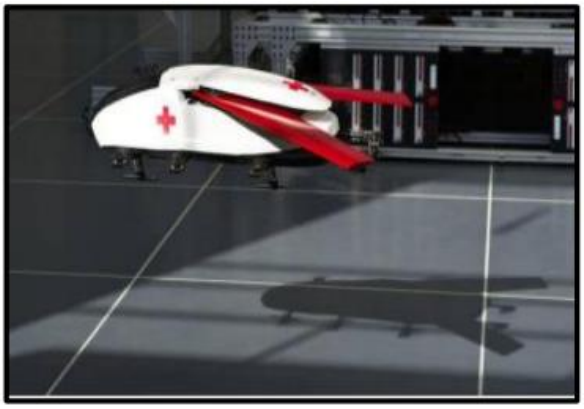
ROLL NO : 208W1A1007
CLASS : IV- EIE

Putting a positive spin on drones, Netherlands' Delft University of Technology graduate Alec Momont designed an actual ambulance drone that helps people in distress. He states that it will decrease emergency response time from 10 minutes all the way down to 1 minute – and we definitely need the speed improvement. So the actual SUPER HERO Alec Moment even received a Frame Public Award last year for this fabulous invention. This life saving device travels up to 100km an hour. It arrives at each and every destination according to coordinates and even comes equipped with supplies. Despite a chronic shortage 6.5 lakh units of blood and its components are wasted because of not being transfused timely. Drones can overcome all these challenges and save countless lives by supplying blood and other essential supplies within minutes when and where the need arises. This reimagined ambulance concept comes down to a one-person drone modeled after a standard quadcopter, driven by a GPS, pilot, or combination of both, that could be dispatched to an emergency scene with a single EMT. Smaller than the conventional ambulance and helicopter (it is roughly the size of a small car), their drone is designed to be able to land almost anywhere. Once it reaches the scene of an accident, the EMT would deploy, stabilizes the patient, load them up, and send them back to the hospital for further treatment.



An ambulance drone is a type of unmanned aerial vehicle (UAV) that medical teams use to deliver essential supplies and care in emergency situations, such as cardiac arrest, severe bleeding, or allergic reactions. These drones can fly faster and more directly than traditional ambulances, avoiding traffic jams and other obstacles. They can also reach remote or difficult places that are hard to access by road. Ambulance drones can carry lifesaving equipment, such as automated external defibrillators (AEDs), CPR kits, medication, or tourniquets. They can also communicate with the emergency callers or bystanders via a live-stream webcam, providing instructions on how to use the devices and perform first aid until the medical personnel arrive. Ambulance drones are still in the prototype stage, but they have the potential to revolutionize the medical industry and save more lives.

What Is an Ambulance Drone?

When you think of drones, medical deployments probably aren't top of mind. But the list of use cases for drones is growing by the day, and healthcare is one of the most exciting emerging markets.

Today, more and more healthcare providers are turning to ambulance drones to streamline emergency response. And this trend is having a profound impact on the medical industry. By using drones, healthcare providers are extending their reach into local communities and saving more lives.

This post examines everything you need to know about what ambulance drones do and how medical teams are using them to reach patients faster.

What Is an Ambulance Drone?

An ambulance drone is a type of unmanned aerial vehicle (UAV) that medical teams use to deliver essential supplies and care in emergency situations.

For example, medical emergencies like cardiac arrest and severe abrasions require immediate support. Despite this, it can take several minutes for nearby medical teams to reach those in need. Oftentimes, emergency medical teams arrive too late for reasons beyond their control. And when this happens, it can mean permanent damage or loss of life.

Since the first few minutes are so important during an emergency, medical teams are constantly looking for ways to reach people faster. And this is where ambulance drones come into play. These small devices can transport lifesaving technologies—like medication, CPR kits, and even automated external defibrillators (AEDs)—making it easier to provide rapid-response care.

What Are the Benefits of an Ambulance Drone?

Drones come with a variety of benefits, making them a transformative technology for any medical response team.

With that in mind, let's take a look at some of the top benefits that come with using drones during medical emergencies.

Accelerate Response Times

Ambulance drones can avoid traditional transportation barriers like traffic jams and blocked roads. Due to their nature, they can fly directly to patients instead of navigating congested paths.

By using drones to respond to medical incidents, teams can transport items before personnel arrives on the scene. This, in turn, allows patients, family members, and friends to receive immediate treatment instead of having to wait—perhaps too long—for help to arrive.

Reach Difficult Places

Oftentimes, emergencies happen in remote areas, in places that are difficult to reach. To illustrate, a hiker with a severe bee allergy may get stung in the woods, several miles away from the nearest parking lot, and even farther from the nearest hospital. Similarly, someone could have a heart attack on the 20th floor of a building.

Both cases present significant logistical hurdles for emergency responders. But drones can arrive on the scene much faster by taking a direct route to the person through the air while transporting critical supplies. This can buy time before responders can arrive, greatly improving the chances of survival.

Expand Operations

Ambulances are expensive. In addition to their price tag, they also require human operators, technicians, and medical staff. This makes it very difficult for hospitals to add new units and expand their footprints with any sense of urgency.

On the other hand, ambulance drones are much more affordable and require fewer people to operate. Hospitals can use drones to expand their operations and cover more ground. As a result, hospitals are able to serve nearby communities more effectively.

Scale Efficiently

Medical responders need to keep a close watch on shifting populations, especially in areas with seasonal changes and heavy tourism.

For example, consider a coastal town that draws tons of tourists in the summer but clears out in the winter. In this type of scenario, a medical response team could strategically place more drones in the area for faster triage. They could then scale down when populations decrease during the off-season.

Drones can also help during large events like fairs and festivals, where issues like heat stroke and substance abuse may occur. In these types of settings, medical teams can add nearby drones during events and then scale down when they conclude.

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Support Digital Transformation

Emergency medical teams have a responsibility to remain on the cutting edge of technology and innovation. This is necessary in order to provide the best possible treatment.

Drones are a simple, effective, and affordable technology, making them a viable option for medical providers of all sizes. Adding drones is a great way to modernize your emergency response fleet and make your organization more resilient, efficient, and flexible.

Improve Disaster Response

The world is constantly changing, which is challenging emergency response teams to remain agile and up to date with the latest threats. The most recent example is COVID-19, which is forcing providers to find new ways of responding and treating large numbers of patients safely and securely.

Drones can help provide surveillance and treatment following events, helping locate victims and provide on-site medical response. By using drones, medical providers can have an easier time collecting data and understanding where to send support teams. This can expedite emergency response and help conserve resources.

Enhance Battlefield Safety

Providing emergency medical response can be immensely challenging for military personnel, especially during live combat scenarios involving multiple team members. Medical teams often put their own lives on the line transporting supplies and providing emergency care for wounded soldiers.

Thanks to drones, military medical teams can rush supplies to other team members without directly crossing combat zones. By taking this approach, it is possible to transmit critical items like bandages and medicine to other team members while reducing the potential for further injury or harm.

Are Ambulance Drones in the Field Today?

While ambulance drones may seem like futuristic technology, the fact is they are already here.

Believe it or not, many healthcare providers are now using ambulance drones to collect data and save lives. They are becoming increasingly popular as the cost of drones drops and the technology improves.

Medical providers often want to know whether ambulance drones can transport people to emergency response centers. Up until recently, this was not possible. First-generation ambulance drones primarily transport medical supplies and are too small to transport humans. At this point, we are still a few years away from the point where passenger drones become commercially available. Nevertheless, drones are evolving and some companies are now experimenting with different ways of using drones to transport people. One of the most noteworthy examples is EHang, which is now dispatching passenger drones for COVID-19 response in China. Believe it or not, many healthcare providers are now using ambulance drones to collect data and save lives Unquestionably, passenger ambulance drones will

become increasingly viable thanks to beyond visual line of sight (BVLOS) technology, which allows drones to safely fly and transport objects over large distances. In a BVLOS deployment, drone operators don't have to maintain direct visibility with the vehicle. As a result, BVLOS drones can travel farther distances and go beyond obstructions like buildings and mountains.

How Iris Automation Can Help Your Company Maximize Its Drone Investments

Suffice it to say that drones can be a bit overwhelming at first if you're not experienced using them. But with the help of a trusted enabler like Iris Automation, your company can integrate drones easily and affordably—putting your organization in a much stronger position because of it.

Iris Automation specializes in helping companies adopt cutting-edge BVLOS drones, allowing them to deploy drones faster, more safely, and across greater distances. Iris Automation works with many industries, including utilities, transportation, agriculture, search and rescue, and package delivery. And new use cases are constantly emerging in response to changing market needs.

For a complete breakdown of how Iris Automation can help your organization accomplish more with drones, **check out our use cases**.

IOT BASED HOME AUTOMATION SYSTEM

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Abstract:

The concept of Home Automation aims to bring the control of operating your everyday home electrical appliances to the tip of your finger, thus giving user affordable lighting solutions, better energy conservation with optimum use of energy. Apart from just lighting solutions, the concept also further extends to have a overall control over your home security as well as build a centralized home entertainment system and much more. The Internet of Things (or commonly referred to as IOT) based Home Automation system, as the name suggests aims to control all the devices of your smart home through internet protocols or cloud-based computing. IOT or internet of things is an upcoming technology that allows us to control hardware devices through the internet. Here we propose to use IOT in order to control home appliances, thus automating modern homes through the internet. This system uses three loads to demonstrate as house lighting and a fan. Our user friendly interface allows a user to easily control these home appliances through the internet. For this system we use an AVR family microcontroller. This microcontroller is interfaced with a wi-fi modem to get user commands over the internet. Also we have an LCD display to display system status. Relays are used to switch loads. The entire system is powered by a 12 V transformer. After receiving user commands over the internet, microcontroller processes these instructions to operate these loads accordingly and display the system status on an LCD display.

what really would compel someone to actually develop a complete iot-based home automation system? could it be the need to improve the safety of your home, or could it be the desire to live a jetson-like life that millennials always dreamt of? it is difficult to say. often, it is even more difficult to visualize the technology that is required to build a home automation platform. due to the complexity introduced by software, hardware, and networking ecosystems, it becomes extremely important to learn, understand, and utilize the right home automation technology for your smart home product.

we hope to address some of the concerns with this article.

what will you learn here?

- home automation: how to get started from zero
- home automation sensors and protocols
- home automation architectures, gateways, and platforms

iot home automation:

home automation has three major parts:

- hardware
- software/apps
- communication protocols

each of these parts is equally important in building a truly smart home experience for your customers. having the right hardware enables the ability to develop your iot prototype iteratively and respond to technology pivots with ease.

a protocol selected with the right testing and careful consideration helps you avoid performance bottlenecks that otherwise would restrict the technology and device integration capabilities with sensors and iot gateways.

another important consideration is the firmware that resides in your hardware managing your data, managing data transfer, firmware ota updates, and performing other critical operations to make things talk.

applications of home automation

rebuilding consumer expectations, home automation has been projected to target wide array applications for the new digital consumer. some of the areas where consumers can expect to see home automation led iot-enabled connectivity are:

- lighting control
- hvac
- lawn/gardening management
- smart home appliances
- improved home safety and security
- home air quality and water quality monitoring
- natural language-based voice assistants
- better infotainment delivery

- ai-driven digital experiences
- smart switches
- smart locks
- smart energy meters

the list is still not exhaustive and will evolve over the time to accommodate new iot use cases. now that you are familiar with home automation applications, let's have a detailed look at what components are involved in building a typical home automation prototype.

home automation components

we have talked about them before, but let's clearly separate our components that will finally help you build a realistic model of what major components are involved in building a smart home. the major components can be broken into:

- iot sensors
- iot gateways
- iot protocols
- iot firmware
- iot cloud and databases
- iot middleware (if required)

iot sensors involved in home automation are in thousands, and there are hundreds of home automation gateways as well. most of the firmware is either written in c, python, node.js, or any other programming language. the biggest players in iot cloud can be divided into a platform-as-a-service (paas) and infrastructure-as-a-service (iaas).

major iot paas providers

- aws iot
- azure iot
- thingworx
- ubidots
- thingspeak
- carriots
- konekt
- tempoiq
- xively
- ibm bluemix

characteristics of iot platforms

again, these platforms are extremely divided over the iot application and security-related features that they provide. a few of these platforms are open source.

let's have a look at what you should expect from a typical iot platform:

- device security and authentication
- message brokers and message queuing
- device administration

- support towards protocols like coap, mqtt, and http
- data collection, visualization, and simple analysis capabilities
- integrability with other web services
- horizontal and vertical scalability
- websocket apis for real-time for real-time information flow

apart from what we mentioned above, more and more platform builders are open sourcing their libraries to developers. take for example the dallas temperature library for ds18b20 for arduino was quickly ported because of open source development to a new version that helped developers to integrate ds18b20 with linkit one . understanding these things become crucial as iot tends to evolve continuously and having an equally responsive platform makes it business safe to proceed.

let's now deeply evaluate each of these components, starting with iot sensors.

home automation sensors

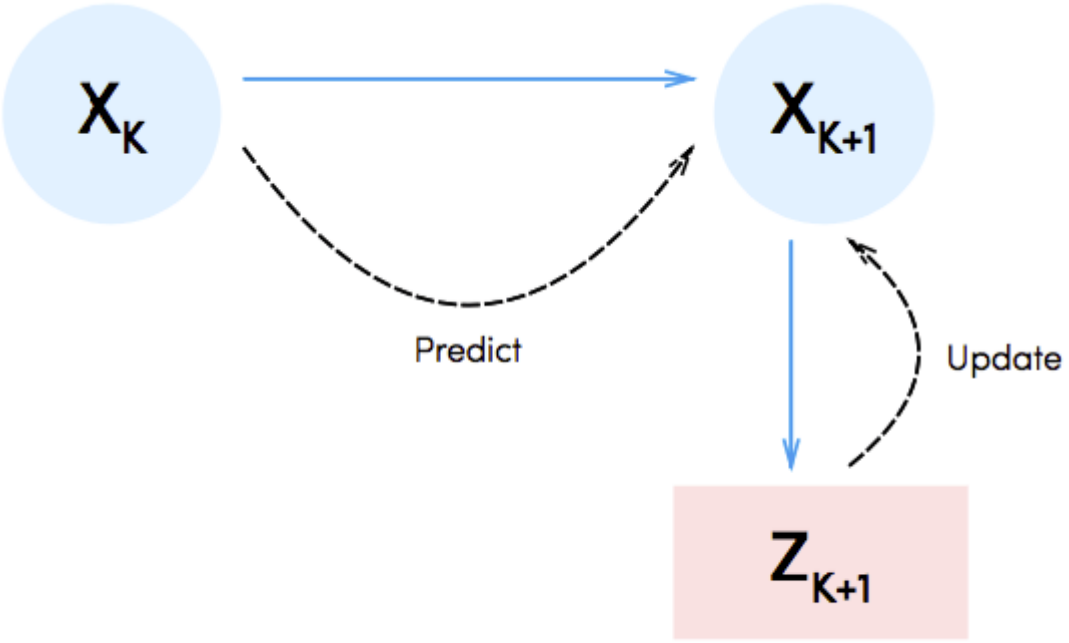
there are probably thousands of such sensors out there that can be a part of this list, but since this is an introduction towards smart home technology, we will keep it brief. we will break down iot sensors for home automation by their sensing capabilities:

- temperature sensors
- lux sensors
- water level sensors
- air composition sensors
- video cameras for surveillance
- voice/sound sensors
- pressure sensors
- humidity sensors
- accelerometers
- infrared sensors
- vibrations sensors
- ultrasonic sensors

depending upon what you need, you may use one or many of these to build a truly smart home iot product. let's have a look at some of the most commonly used home automation sensors.

temperature sensors

the market is full of them, but the famous temperature sensors are dht11/22, ds18b20, lm35, and msp430 series from ti. the msp430 series is more accurate than the rest, but at the same time, it is one of the most expensive for prototyping or initial product testing purposes. msp430 tops all temperature sensors, as the precision and battery consumption is minimal with them. the dht11 has a very restricted temperature range and suffers from accuracy issues. dht22, on the other hand, is a little bit more accurate but still, doesn't make it as the preference. the ds18b20, on the other hand, is more accurate, as opposed to digital temperature sensors like the dht22 and 11. dallas temperature sensors are analog and can be extremely accurate down to 0.5 degrees.



take note that often, the temperatures that you directly sense from these sensors may not be very accurate, and you would occasionally see 1000 f or greater values no matter what you are doing. there's an entire logic that goes around building temperature sensors that we will address in another blog post.

lux sensors

lux sensors measure the luminosity and can be used to trigger various functions range from cross-validating movements to turn the lights on if it becomes too dark. some of the most popular light sensors are tsl2591 and bh1750. recent tests to include tsl2591 and bh1750 into low-powered iot devices have found them to be working fairly well for most use cases. here's a study done by robert and tomas that shows how these two compare against a spectrometer and a photodiode. to get a good idea of whether these two sensors would meet your needs, we would suggest illuminance tests followed by normalizations of the data to observe deviations under various situations.

water level sensors

while building your prototype, you may consider a solid state etape liquid level sensor or, like others, just use an hc-sr04 ultrasonic sensor to measure the water level. on the other hand, in other cases where those two don't suffice, one has to utilize something that can deliver a much higher performance. float level sensors and other ics like lm1830 offer a more precise measurement capability to iot developers — although, they are substantially much more expensive than others.

air composition sensors

there are a couple of specific sensors that are used by developers to measure specific components in the air:

- co monitoring by mics-5525
- mq-8 to measure hydrogen gas levels
- mics-2714 to measure nitrogen oxide
- mq135 to sense hazardous gas levels (nh3, nox, alcohol, benzene, smoke, co2

most of these are sensors have a heating time, which also means that they require a certain time before they actually start delivering accurate values. these sensors mainly rely on their surface to detect gas components. when they initially start sensing, there's always something that's there on their surface, some sort of deposition that requires some heating to go away. hence, after the surface gets heated enough, true values start to show up.

video cameras for surveillance and analytics

a range of webcams and cameras specific to hardware development kits are usually used in such scenarios. hardware with usb ports offer to integrate camera modules to build functionality. but utilizing usb ports is not very efficient, especially in the case of real-time video transfer or any kind of video processing. take the raspberry pi for example. it comes with a camera module (pi cam) that connects using a flex connector directly to the board without using the usb port. this makes the pi cam extremely efficient.

sound detection

sound detection plays a vital role in everything from monitoring babies to automatically turning lights on and off to automatically detecting your dog's sound at the door and opening it up for your pet. some commonly used sensors for sound detection include the sen-12462 and easyvr shield for rapid prototyping. these sensors aren't as good as industrial-grade sensors like those from 3dsignals , which can detect even ultra-low levels of noise and fine tune between various noise levels to build even machine break-up patterns.

humidity sensors

these sensors bring the capability of sensing humidity/rh levels in the air to smart homes. the accuracy and sensing precision depends a lot on multiple factors, including the overall sensor design and placement. but certain sensors like the dht22 and 11, built for rapid prototyping, will always perform poorly when compared to high-quality sensors like hih6100 and dig rh. while building a product to sense humidity levels, ensure that there's no localized layer of humidity that is obscuring the actual results. also, keep in mind that in certain small spaces, the humidity might be too high at one end as compared to the others. when you look at free and open spaces where the air components can move much freely, the distribution around the sensor can be expected to be uniform and, subsequently, will require fewer corrective actions for the right calibration.

home automation protocols

one of the most important parts of building a home automation product is to think about protocols — protocols that your device will use to communicate to gateways, servers, and sensors. a few years ago, the only way to do so was by either using bluetooth, wi-fi, or gsm. but due to added expenses on cellular sim cards and low performance of wi-fi, most such solutions didn't work.

bluetooth survived and later evolved as bluetooth smart or bluetooth low energy. this helped bring a lot of connectivity in the "mobile server powered economy." essentially, your phone

would act as a middleware to fetch data from ble-powered sensors and send it over to the internet.

when looking at the major home automation protocols, the following top the list:

- bluetooth low energy or bluetooth smart: wireless protocol with mesh capabilities, security, data encryption algorithms, and much more. ideal for iot-based products for smart homes.
- zigbee: low cost, mesh networked, and low power radio frequency-based protocol for iot. different zigbee versions don't talk to each other.
- x10: a legacy protocol that utilizes powerline wiring for signaling and control.
- insteon: communicates with devices both wirelessly and with wires.
- z-wave: specializes in home automation with an emphasis on security.
- wi-fi: needs no explanation.
- upb: uses existing power lines installed in a home. reduces costs.
- thread: a royalty-free protocol for smart home automation, uses a 6lowpan.
- ant: an ultra low-power protocol helping developers build low-powered sensors with a mesh distribution capabilities.
- 6lowpan

home automation: which protocol is the best?

while there are some protocols that clearly offer much more, it is always important to start from your smart home development needs and then move towards narrowing down the solutions. the commonly preferred protocols are bluetooth low energy, z-wave, zigbee, and thread. the protocol selection can now be narrowed down by the following factors:

- ability to perform identity verification
- quality of sensor networks
- data transfer rate
- security level
- network topology required
- density of objects around
- effective distance to be covered

home automation architecture

this architecture supports the following considerations for home automation solutions:

- end to end security mechanisms involving multilevel authentication
- end to end data encryption, including the link layer
- flexible and configurable access and authorization control
- powerful cloud infrastructure
- network agnostic with built-in feedback loops
- configurable cloud-based rules engine
- api endpoints
- data scalability
- nosql databases

home automation gateways

for developing a home automation product, often a standalone product sending data to a server is not enough. due to battery and protocol limitations, the data from a sensor or sensors present in a home has been routed through an iot gateway.

to select the perfect gateway for your iot home automation, consider some of these factors:

- communication protocols supported
- real-time capabilities
- mqtt, coap, and https support
- security and configuration
- modularity

when it comes to building iot gateways, modularity and hybrid iot protocol support top the list when a product is in the early stages of market introduction. to incorporate a gateway in your home automation stack, you can consider the following options:

- either create a gateway from the ground up using existing hardware stacks for prototyping (using raspberry pi, intel edison, etc). then, when a poc is validated, you can create your own custom hardware.

- or, you can use existing gateway modules like ingincs ble gateway . these gateways are extremely easy to customize and connect with your cloud services and devices. however, they may or may not offer the same level of support that you need to build certain features.

for example, a gateway with a bad networking queue may result in traffic congestion, or it may not support the required protocols that you wish to use. further, pivoting with these gateways to some other technology stack may become very difficult. it should be emphasized that they are extremely good for robust prototyping needs.

home automation programming languages

the following programming languages dominate the home automation space: python, embedded c, c, shell, go, and javascript (node.js). this has mainly happened due to the sheer optimization of the languages for similar use cases.

home automation frameworks

if you think you can build everything for home automation (protocols, hardware, software, etc.) on your own, that is a bit unrealistic. everyone, from high-growth startups to billion-dollar consumer-focused enterprises, is now using the help of home automation frameworks to build connected products to delight consumers. there are more than 15 different smart home frameworks available for iot developers to use and build their next generation of connected home products. some of these frameworks are open source and some are closed-source. let’s have a look at some of them in the sections that follow.

open source iot platforms and frameworks

looking forward to doing a quick and dirty prototype? there’s no need to write down everything from scratch. thanks to a bunch of awesome contributions, we have open source platforms that can get your home automation products up and running in no time.

our favorites are:

- home assistant
- calaos
- domoticz
- openhab: supports raspberry pi, written in java and has design tools to build your own mobile apps by tweaking ui.
- openmotics[asked their developer, waiting for them to respond(dev confirmed)]
- linuxmce
- pidome
- misterhouse
- smarthomatic