UDGAM

2020-21

AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
ADDING VALUE TO ENGINEERING

Department of Instrumentation Engineering

Vision

To be well known department that will serve as a source of knowledge and expertise in the field of Instrumentation for the society by rendering value added education society by rendering value added education.

Mission

To impart dynamic education and develop engineers, technocrats, and researchers to provide services and leadership for development of the nation.

Program Education Objectives(PEOs)

PEO1: To train graduates with the basic techniques and modern tools of instrumentation engineering to solve real life problems of the society.

PEO2: To enrich graduates by imparting dynamic and value-added education to acquire good position in industry.

PEO3: To motivate graduates to contribute as a socially responsible citizen, ethical leader for the development of the nation.

PEO4: To encourage graduates for higher education, research, competitive examinations, and to become an entrepreneur.

Program Specific Outcomes (PSOs)

PSO1: Students will be able to utilize their knowledge of measurement and control to solve the environmental, health, agricultural and safety related problems.

PSO2: Students will be able to demonstrate their acquired skills related to modern engineering tools such as Distributed control system, programmable logic controller (PLC), supervisory control and data acquisition systems, lab view and embedded systems etc.

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Program Outcomes (POs)

Graduates will be able to

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. **[Engineering knowledge]**
2. Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. **[Problem analysis]**
3. 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. **[Design/development of solutions]**
4. 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. **[Conduct investigations of complex problems]**
5. 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. **[Modern tool usage]**
6. 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. **[The engineer and society]**
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. **[Environment and sustainability]**
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. **[Ethics]**
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **[Individual and team work]**
10. 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. **[Communication]**
11. 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. **[Project management and finance]**
12. 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. **[Life-long learning]**

Dear Readers,

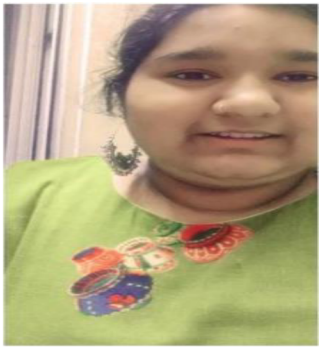
Mind is like wind which is not constant every times. It flows continuously with different ideas and thoughts. This wind helps to grow young innovators and writers. We can't hold or stop the wind but we can use this wind. UDGAM is the platform for this wind where writer write the thoughts, ideas and ne inventions so people can use this wind for their purpose like energy creation.

I am thankful to all writers who's the shining stars of AISSMS College and gives response to my call and penned their ideas for "UDGAM". I also acknowledge constant hard work of student editor Ms. Neha Dhor who proved to be catalysts in mobilizing the students to write their ideas, views and thoughts. I would also like to extend my sincere thanks to our Head of Department Dr. A. A. Shinde for her constant support and guidance through the entire Process of planning and publication of this Magazine.

Finally from our Entire Team of " UDGAM " I wish you to all readers a Happy Reading!!!!

Ms. D. L. Rathod

Assistant Professor



To meet the increasing demands and making life easier for wellbeing of the society we live in and to think about implementing the latest technology. In order to be aware about latest technology this year, a generic topic "UDGAM" has been selected for technical section.
I thanks to all the writers for contributing to the technical section of "UDGAM". I would also like to thank Ms. D. L. Rathod Madam for giving this opportunity & for supporting. Indeed it was wonderful experience and great learning.

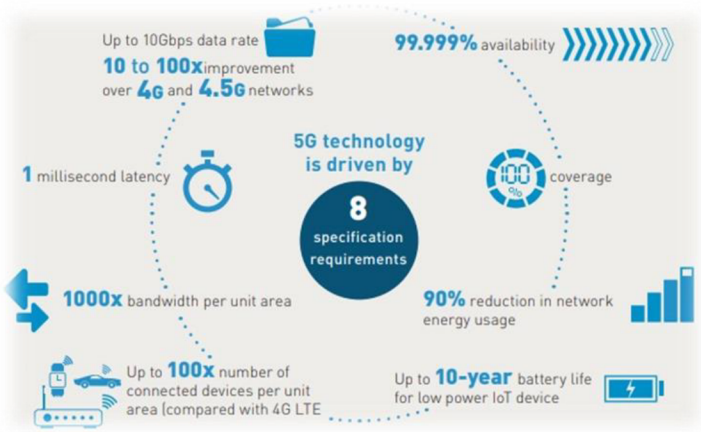
Neha Dhor
Student Editor
(Technical Section)

5G – An Enhanced Connectivity

Faster and more reliable internet doesn't just mean we can load webpages more quickly and spend less time waiting for videos to launch on Youtube. Each successive advance in mobile connectivity from 3G onwards has unlocked new use cases for the internet. 3G made web browsing and data-driven services useful on mobile devices, 4G led to the growth of streaming video and music platforms as bandwidths increased, and 5G, likewise, will open more doors in terms of what is possible.

5G means that services relying on advanced technologies such as augmented reality and virtual reality as well as cloud-based gaming platforms like Google's Stadia or NVidia's GeForce Now become a viable proposition, anywhere at any time. They also threaten to make cable and fiber-based networks redundant, with their need for us to be tethered to a particular location.

The fifth generation of the mobile internet is going to bring the kind of speed most people associate with Wi-Fi to uploading and downloading data from remote locations. This will lead to sharp improvements in the way applications can be written, deployed and interacted with by mobile users. This also includes the development of data-intensive applications and the Internet of Things is meant to deliver higher multi-Gbps peak data speeds, ultra low latency, more reliability, massive network capacity, increased availability, and a more uniform user experience to more users. Higher performance and improved efficiency empower new user experiences and industries.



5G is based on OFDM (Orthogonal frequency-division multiplexing), a method of modulating a digital signal across several different channels to reduce interference. 5G uses 5G NR air interface alongside OFDM principles. 5G also uses wider bandwidth technologies such as sub-6 GHz and mmWave.

Like 4G LTE, 5G OFDM operates based on the same mobile networking principles. However, the new 5G NR air interface can further enhance OFDM to deliver a much higher degree of flexibility and scalability. This could provide more 5G access to more people and things for a variety of different use cases. Mi

5G will bring wider bandwidths by expanding the usage of spectrum resources, from sub-3 GHz used in 4G to 100 GHz and beyond. 5G can operate in both lower bands as well as mmWave which will bring extreme capacity, multi-Gbps throughput, and low latency.5G is designed to not only deliver faster, better mobile broadband services compared to 4G LTE, but can also expand into new service areas such as mission-critical communications and connecting the massive IoT.

In short, 5G and other advanced, high-speed networks make all of the other trends we discuss here available anywhere, any time. A great example is Norwegian fishery operator Salmar that uses a 5G network to automate the care and feeding of its fish. Image recognition algorithms are used to detect which fish are over or under-feeding, and automatically dispense food and medicine needed to keep them healthy. Initiatives like this will become increasingly important during 2021, where businesses look to increase automation across their workforces.

- Sumeet saibi
SE Instrumentation.

UCL-Ventura

Low-cost breathing aids developed by Mercedes High Performance Powertrains, University College London and University College London Hospital have been shipped to hospitals around the world in a life-saving partnership.

CPAP (Continuous Positive Airway Pressure) devices were used in the first COVID-19 outbreaks to keep patients off invasive ventilators in China and Italy, but they were in short supply in the UK – and difficult to mass manufacture cheaply and quickly.

It took just 100 hours from the first meeting, between Mercedes HPP engineers, and clinicians from UCL and UCLH, to produce the first UCL-Ventura CPAP device with Mercedes' Brixworth factory repurposed to manufacture them.

Teams reverse-engineered an off-patent mechanical device, previously used in the NHS, to create a less oxygen-hungry version. This involved redesigning the entrainment port and improving flow and pressure. Mercedes set up a rig to do flow tests on filters, while simulation engineers, more used to designing inlet ports and compressors for F1 engines, improved fluid flow through the jet pump.

Applying motorsport characteristics of competitive ingenuity and adaptability helped to drive the success of this healthcare innovation; from idea to hospital testing took just 100 hours, with Medicines and Healthcare products Regulatory Agency approval gained in ten days.

The UCL-Ventura device blueprints and manufacturing information is freely available online, with over 1900 teams in 105 countries having downloaded the device. They have now been shipped to around 130 hospitals in the UK, Palestine, and Uganda, and locally manufactured in countries such as India, Pakistan, South Africa and Mexico.

- Aditya Rege
SE Instrumentation

Artificial Intelligence

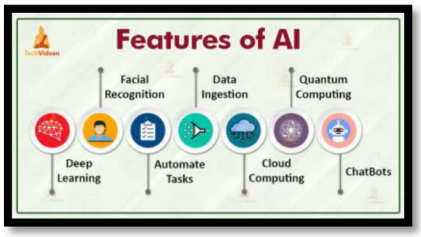
Artificial intelligence

Artificial intelligence is a boon to the human society. Basically artificial intelligence means that the machines which actually mimic all the human actions and the response to stimuli. It is done by using computer system and the machines are been programmed according to the need. There are some of the sub-types of artificial intelligence- reasoning, knowledge representation, planning, learning, natural language processing, perception and the ability to move and manipulate objects.

History of artificial Intelligence

Looking into the history of artificial intelligence, it was founded as an academic discipline in 1956. The major applications of AI are as follows: expert systems, natural language processing, speech recognition and machine vision, etc. AI research has used the hit and trial method in many different approaches during its lifetime, including simulating and training of the brain, modelling human problem solving tendency, formal logics, large databases of knowledge and emulating animal behaviour. In its first decades starting at the 21st century, highly mathematical statistical machine learning has dominated the field, and this technique has proved highly successful, helping to solve many challenging problems throughout industry and academia.

Applications



Artificial intelligence helps in curing cancers, for automating the automobiles and also to increase human intelligence. Today, we already have adopted artificial intelligence in our day-to-day life. We use it in Google maps, Alexa, Face Detection and Recognition, Text Editors or Autocorrect, Chatbots, Social Media, E-payment and many more applications as such. Artificial intelligence makes our living easier and better. It reduces human efforts and saves time. Artificial Intelligence applications which are widely used all over the world include up to the minute search engines, smart advisable systems which are very often in use by various companies like YouTube, Amazon and Netflix, helps in recognising the natural human language such as Siri or Alexa, automatic cars e.g. Tesla, and are capable of throw one's hat in the ring at the pro level in strategic game systems such as chess and Go.

Ms. Jijnyasa Sandeep Joshi
(SE INSTRUMENTATION ENGINEERING)

Machine Learning in Daily Life

ML is one of the most exciting technologies that one would have ever come across. As it is evident from the name, it gives the computer that makes it more similar to humans: ***The ability to learn***. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.

The need for *Machine Learning Engineers* are high in demand and this surge is due to evolving technology and generation of huge amounts of data aka *Big Data*. On an Average, an ML Engineer can expect a salary of **₹719,646** (IND) or **$111,490** (US). Herein, we share few examples of machine learning that we use every day and perhaps have no idea that they are driven by ML.

1. Virtual Personal Assistants

Siri, Alexa, Google Now are some of the popular examples of virtual personal assistants. As the name suggests, they assist in finding information, when asked over voice. Machine learning is an important part of these personal assistants as they collect and refine the information on the basis of your previous involvement with them.

2. Traffic Alerts (Maps)

Now, **Google Maps** is probably **THE** app we use whenever we go out and require assistance in directions and traffic. Everyone using maps is providing their location, average speed, the route in which they are traveling which in turn helps Google collect massive Data about the traffic, which makes them predict the upcoming traffic and adjust your route according to it.

3. Social Media Services

From personalizing your news feed to better ads targeting, social media platforms are utilizing machine learning for their own and user benefits. Here are a few examples that you must be noticing, using, and loving in your social media accounts, without realizing that these wonderful features are nothing but the applications of ML. *People You May Know, Recommendation, Face Recognition.*

4. Self Driving Car

Well, here is one of the coolest application of Machine Learning. It's here and people are already using it. Machine Learning plays a very important role in Self Driving Cars and I'm sure you guys might have heard about **Tesla**. The leader in this business and their current ***Artificial Intelligence*** is driven by hardware manufacturer **NVIDIA**, which is based on Unsupervised Learning Algorithm.

5. Online Video Streaming (Netflix)

With over 100 million subscribers, there is no doubt that Netflix is the daddy of the online streaming world. Netflix's speedy rise has all movie industrialists taken aback – forcing them to ask, "**How on earth could one single website take on Hollywood?"**. The answer is Machine Learning. The Netflix algorithm constantly gathers massive amounts of data about users' activities like: *When you pause rewind or fast forward, The Date and Time you watch, Browsing and Scrolling behaviour* and a lot more. They collect this data for each subscriber they have and use their Recommender System and a lot of Machine Learning Applications. That's why they have such a huge customer retention rate.

It remains not worth amazing how machine learning and artificial intelligence have changed our life by making it easier, also with some of AI and ML trends we are expecting more growth in technologies. We have screened various applications here, the machine learning is used back in the arena to impact our daily lives, it also allows us *to take business decisions, optimize operations and augment productivity for industries to stand out in the market.*

Unmesh Sonawane

S.E. Instrumentation

Crypto Currency

"Innovation is the outcome of a habit, not a random act."

So let us talk about the emerging monster innovation know by name "**CRYPTO**"

Cryptocurrency is a type of CURRENCY without physical appearance. It is a digital asset designed to work as a medium of exchange wherein individual coin ownership records are stored in a ledger existing in a form of a computerized database.

It uses strong cryptography to secure transaction records, to control the creation of additional coins, and to verify the transfer of coin ownership.

Here, are some important conditions of Cryptocurrency,

- The system does not require a central authority; its state is maintained through distributed consensus.
- The system keeps an overview of cryptocurrency units and their ownership.
- The system defines whether new cryptocurrency units can be created. If new cryptocurrency units can be created, the system defines the circumstances of their origin and how to determine the ownership of these new units.
- Ownership *of cryptocurrency units can be proved exclusively cryptographically*.
- The system allows transactions to be performed in which ownership of the cryptographic units is changed. A transaction statement can only be issued by an entity proving the current ownership of these units.
- If two different instructions for changing the ownership of the same cryptographic units are simultaneously entered, the system performs at most one of them.

BITCOIN, was the first to be released as open-source software in 2009, is the first decentralized cryptocurrency. Since the release of bitcoin, many other cryptocurrencies have been created.

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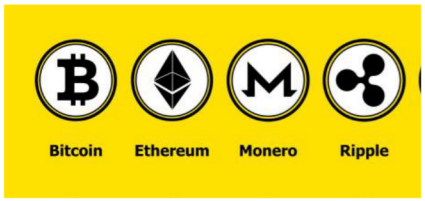
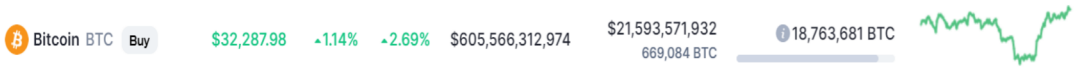


The most important types of cryptocurrency are ***Bitcoins and other are as follow:-***

Todays's *current rate of cryptocurrency is:-*



Here are some advantages of cryptocurrency:-

Transaction Speed

Anonymity

No restriction on payments

Secure Payment information

No Inflation

Ms. Vaishnavi Suhas Phadtare

(SE INSTRUMENTATION ENGINEERING)

Smart Factories: The next Step in Industrial Evolution

Smart Factory is a concept for expressing the end goal of digitization in manufacturing. It is a highly digitized system that continuously collects and shares data through connected machines, devices, and production systems. The data can then be used by self-optimizing devices or across the organization to proactively address issues, improve manufacturing processes and respond to new demands. Smart factories are an amalgamation of Artificial Intelligence, Cloud Computing and Industrial IoT.

The manufacturing practice adopted by smart factories is the most optimized application of technologies arising from the fourth industrial revolution known as Industry 4.0. The key components differentiating a smart factory from a regular industry are:

- **Industrial IoT(IIoT):** Industrial machines and devices are linked to each other by data communication systems facilitating information exchange between machines and people.
- **Sensors:** Distinct data is needed to be collected at various points within the process to regulate said process. Sensors are attached to machines at measuring points to achieve the same.
- **Cloud Computing:** Collected data needs to be stored for comparison and analysis. Traditional methods of recording are being replaced by cloud storage. Cloud computing allows storage, processing, and sharing data with greater flexibility at a lower cost.
- **Big Data Analytics:** The accumulation of data over time can provide insights into how efficient the production process is. Spotting error patterns, running predictive quality assurance with high accuracy, delivering the right information at the right time enables shop floors to improve optimally and quickly.

Benefits of a Smart Factory

Smart factories optimize efficiency and productivity by widening scope of the capabilities of both manufacturing devices and people. By focusing on creating a continuous, efficient production process through data collection, smart factories can aid decision-making processes with stronger evidence.
By continuously improving the productivity of manufacturing processes, smart factories can lower costs, reduce downtime and minimize waste. Identifying and reducing misplaced or underused production capacities mean opportunities for growth without investing in additional monetary and/or physical resources.

Notable Smart Factories

The Tesla Gigafactory, Berlin(Germany)

The Berlin Gigafactory, which will be launched in 2021, will be the first of its kind, with Tesla promoting it as the most advanced high-volume electric vehicle production plant in the world. It will be used for building batteries, powertrains, and vehicles.

Schneider Electric, le Vadreuil(France)

Recognised as one of the most advanced manufacturing sites in the world, applying Fourth Industrial Revolution technologies at scale, the factory has implemented EcoStruxureTM Augmented Operator Advisor giving +2% to +7% production increase and 30% energy savings.

-Kaushal Agashe(SE Instrumentation)