E-VIDYUT

VOLUME-15

MARCH 2020

**ELECTRICAL AND ELECTRONICS ENGINEERING**

INDEX

The essence of knowledge lies in a spirit of creative thinking, expression and experimentation. And in this regard the college EEE Department magazine E- Vidyut has played a vital role as a platform for the students to think, reflect, create and innovate in a multitude of languages. The magazine is indeed a precious document that preserves the words and vision of our talented students as budding, writers and thinkers.

It is a significant milestone in their creative journeys and inspires them to aspire higher. In today's world where we are constantly surrounded by events of social unrest and multiple forms of oppression.it is of the utmost importance that students explore issues that extend beyond their curriculum and classroom. Literature is one of the most powerful media through which they can engage with the world meaningfully and creatively. It is a holistic art generated by introspection and retrospection, by self-questioning and a desire to seek answers, by imagination and a deeper understanding of realities. I congratulate the entire editorial team of the magazine and appreciate their dedication. And I sincerely wish that E- Vidyut continues to inspire the students in the years ahead.

Dr. Surya Narayan Patnaik
PRINCIPAL, GIFT, BHUBANESWAR
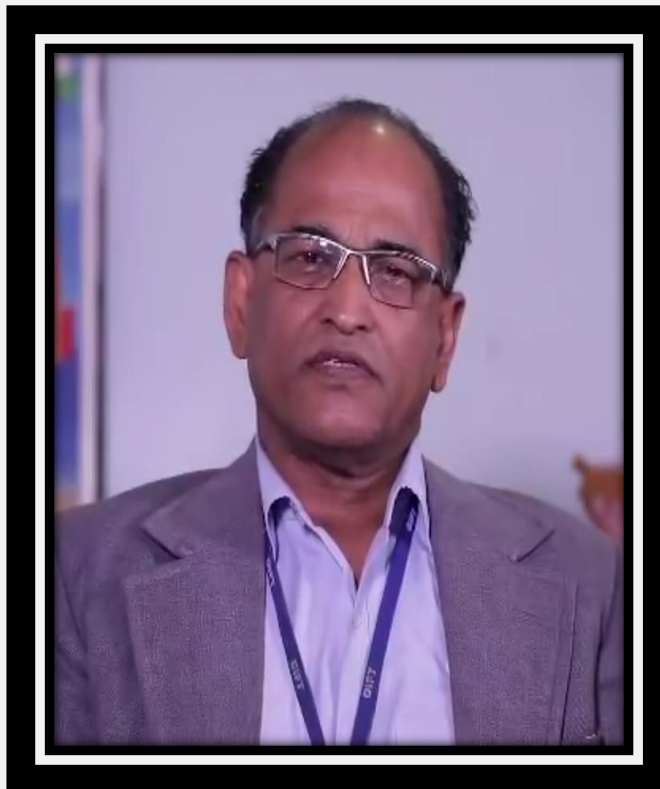
Education is a tool to enlighten students, empower individuals and thereby evolve our society in a positive, progressive direction. As socially aware and alert citizens, we all must be committed to educate in order to encourage, to inspire, guide; and above all, to teach and learn to respect humanity regardless of religion, caste, gender and class. Universities and colleges are places of understanding and analyzing the world around us. Only then can we hope to change this world.

The Department magazine is a space for students to express their ideas, opinions, imagination, concerns, questions, creativity, doubts, thoughts, feelings, views, visions, dreams and goals. Congratulations to the Principal and the Editorial team for providing this space. I extend my full support to all endeavors aimed for the advancement of the student community. All the best!

Lt. Col (Retd.) Mihir Kumar Raut
DEAN ADMISTRATION, GIFT, BHUBANESWAR
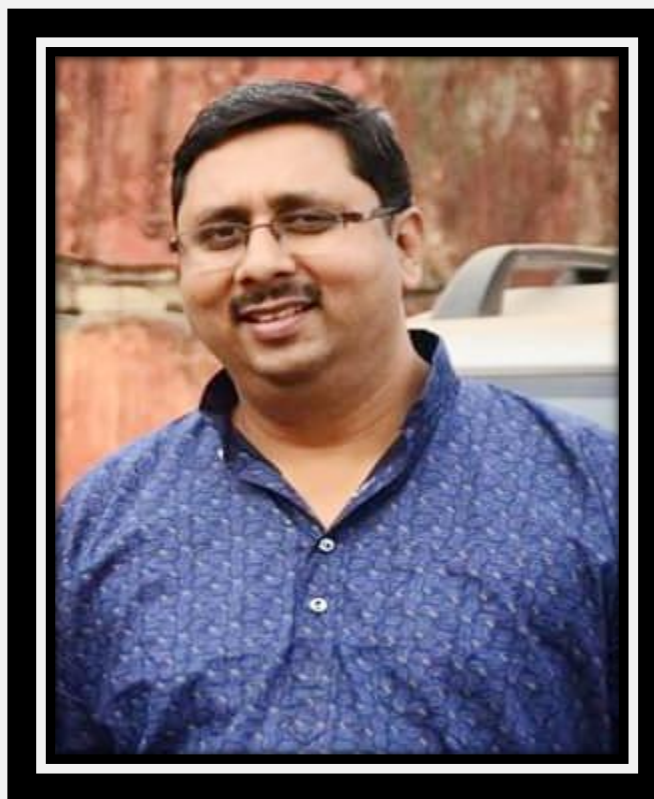
I am immensely pleased to give this message to E- Vidyut 2020 EEE student's reflection . Department magazine is the true reflection of the creative minds of the students impaired education in curricular and co curricular activities by the institution . It is also an avenue for the expression of their feelings, thinking and creativity which is also equally vital as these are the thoughts based on high literary value acting as an oasis in an otherwise day to day routine. It is also a reflection of academics and achievements of the institution in it's totally for the preceding year.

The magazine is also a place where under able guidance of their teachers an outlet is given for the expansion of their creativity and thoughts.

Prof. (Dr.) Srikant Kumar Dash
(HOD,EEE)
GIFT, BHUBANESWAR

I am extremely pleased to learn that this Edition student magazine of EEE Department is about to be unfurled . The magazine I believe is a true creation and representation of and by the students.

It is a rare opportunity to not only exhibit but also share their experience and enhance their talent amongst their contemporaries and faculty members. I am sure that the students magazine will not only boost the moral amongst. the younger generation of students towards creativity but will also reflect the high cultural and aesthetic values which are universal and genuinely radiate about. My sincere wishes and blessings to the staff and the editorial board.

Prof. Sudhansu Bhusan Pati
FACULTY, GIFT, BHUBANESWAR

Our Department is collectively embarking on a great voyage to the frontiers of Technical knowledge, I wish my students all the very best to achieve their goals . But in the midst of all this students must not forget that the character can not be developed in ease and quiet. Only through experience of trial and toil can the soul be strengthen, vision cleared, ambitions inspired and success achieved.

I am very happy to congratulate the staff and students of our college who have helped the editorial board to unleash the magazine of our Department "E- Vidyut 2020"

Dr. Satyajit Mohanty
FACULTY, GIFT, BHUBANESWAR

EDITORIAL BOARD.....

"When you write more and more personal it becomes more and more universal."

Writing is an act of reacting to the environment around you. An expression is a basic instinct of thoughtful mind and the act of writing is one of the fountain head of ideas that springs into poem or article. The writing comes to life when it meets its reader. Students are most enthusiastic budding creative expressionist who just need a platform to throw their ideas and emotions on the paper. A Department magazine is there to capitulate all those expressions for the tasteful readers. " E – VIDYUT " is one of the most eagerly awaited moment for students, staff and all those associated with Giftian family. The Department magazine which showcases the literary expressions, social awareness and recognition to all the achievers in the academic and extracurricular activities, strengthens the internal bonding amongst the Giftians as one family.

A budding tender plant flourishing into a self contending tree grounded firmly into the past and solidifying the future. The editorial board like every year went through a stupendous task of selecting and finalizing the best of the best creative material for the magazine. We are overwhelmed with the humongous response both by the students and the staff members with their drafts.

We tried our best to accommodate all the deserving articles and poems into the magazine. We hope this sixth edition of E – VIDYUT will set the bar higher with its interesting and novel material which will certainly astonish the reader. We would be delighted to receive your valuable feedback for motivation and self-retrospection.

EDITORIAL WING

Prof. Sudhansu Bhusana Pati

Dr. Srikanta Kumar Dash

Dr. Satyajit Mohanty

Prof. Sweekruti Panda

Prasad Maharana (STUDENT 3RD YR)

Kisan Mahapatro (STUDENT 3RD YR)

ABOUT DEPARTMENT

The Department of Electrical and Electronics Engineering was established in the year 2007. It aims at producing qualified engineers in the areas of electrical machine, power electronics, control system, power system, and instrumentation. The field of Electrical and electronics is advancing at a very rapid pace. Power electronics has taken the center stage in every area be it power systems, control systems, power quality, etc. The department is well equipped with a group of highly qualified and dynamic teachers. It boasts of laboratory facility to be one of the best in the state. The students are encouraged and motivated to take up challenging projects. Summer training, industrial visit and projects are carefully planned for the students to remain updated with the technology trend. Seminars and short courses are regularly organized to update the students with the latest in the education and industry trends.

VISION AND MISSION OF THE DEARTMENT

VISION

To create a distinctive culture, that could enable students and faculty members collaboratively approach to advance their knowledge about recent advancements in the core domains of electrical and electronic engineering such as power electronic, smart grids, renewable energy etc., and develop effective, implementable and environment friendly solutions towards solving the energy vs. sustainability crisis for present and future society.

MISSION

➢ To create a culture of research and Innovation through necessary collaboration with the premier institutions to purse career in research.

➢ To develop a distinctive environment where student, teacher can learn and acquire necessary knowledge and skills through effective collaborations and holistic interactions.

➢ To create a conducive ambience where students and faculty members can engage themselves for developing effective solutions for recent as well as prominent future challenges in the area of energy generation, transmission and distribution.

➢ To Generate a Pool of eco-pruners and entrepreneurs with the ability to address the industry and social problems and should be able to provide weight age towards Society and sustainable energy issues

Michael Faraday

Michael Faraday FRS (22 September 1791 – 25 August 1867) was an English scientist who contributed to the study of electromagnetism and electrochemistry. His main discoveries include the principles underlying electromagnetic induction, diamagnetism and electrolysis.

Although Faraday received little formal education, he was one of the most influential scientists in history. It was by his research on the magnetic field around a conductor carrying a direct current that Faraday established the basis for the concept of the electromagnetic field in physics. Faraday also established that magnetism could affect rays of light and that there was an underlying relationship between the two phenomena. He similarly discovered the principles of electromagnetic induction and diamagnetism, and the laws of electrolysis. His inventions of electromagnetic rotary devices formed the foundation of electric motor technology, and it was largely due to his efforts that electricity became practical for use in technology.

As a chemist, Faraday discovered benzene, investigated the clathrate hydrate of chlorine, invented an early form of the Bunsen burner and the system of oxidation numbers, and popularized terminology such as "anode", "cathode", "electrode" and "ion". Faraday ultimately became the first and foremost Fullerian Professor of Chemistry at the Royal Institution, a lifetime position.

Faraday was an excellent experimentalist who conveyed his ideas in clear and simple language; his mathematical abilities, however, did not extend as far as trigonometry and were limited to the simplest algebra. James Clerk Maxwell took the work of Faraday and others and summarized it in a set of equations which is accepted as the basis of all modern theories of electromagnetic phenomena. On Faraday's uses of lines of force, Maxwell wrote that they show Faraday "to have been in reality a mathematician of a very high order – one from whom the mathematicians of the future may derive valuable and fertile methods. "The SI unit of capacitance is named in his honour: The farad .

Albert Einstein kept a picture of Faraday on his study wall, alongside pictures of Isaac Newton and James Clerk Maxwell. Physicist Ernest Rutherford stated, "When we consider the magnitude and extent of his discoveries and their influence on the progress of science and of industry, there is no honour too great to pay to the memory of Faraday, one of the greatest scientific discoverers of all time

Internet of Things-Aided Smart Grid

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A traditional power grid consists of a large number of loosely interconnected synchronous Alternate Current (AC) grids. It performs three main functions: generation, transmission and distribution of electrical energy in which electric power flows only in one direction, i.e., from a service provider to the consumers. Firstly in power generation, a number of large power plants generate electrical energy, mostly from burning carbon and uranium based fuels. Secondly in power transmission, the electricity is transmitted from power plants to remote load centers through high voltage transmission lines. Thirdly in power distribution, the electrical distribution systems distribute electrical energy to the end consumers at reduced voltage. Each grid is centrally controlled and monitored to ensure that the power plants generate electrical energy in accordance with the needs of the consumers within the constraints of power systems. Nearly, all the generation, transmission and distribution of electrical energy is owned by the utility companies who provide electrical energy to consumers and bill them accordingly to recover their costs and earn profit. The traditional power grid worked very well from its inception in 1870 until 1970. Even though the consumers' demand for energy grew exponentially, it was still rather predictable. However, there has been a dramatic change in the nature of electrical energy consumption since 1970, as the load of electronic devices has become the fastest growing element of the total electricity demand and new sources of high electricity consumption have been developed, such as electric vehicles (EVs). The power grids endure a significant wastage of energy due to a number of factors, such as consumers' inefficient appliances and lack of smart technology, inefficient routing and dispensation of electrical energy, unreliable communication and monitoring, and most importantly, lack of a mechanism to store the generated electrical energy. Furthermore, power grids face some other challenges as well, including growing energy demand, reliability, security, emerging renewable energy sources and aging infrastructure problems to name a few. In order to solve these challenges, the Smart Grid (SG) paradigm has appeared as a promising solution with a variety of information and communication technologies. Such technologies can improve the effectiveness, efficiency, reliability, security, sustainability, stability and scalability of the traditional power grid. SG solves the problem of electrical energy wastage by generating electrical energy which closely matches the demand. SG helps to make important decisions according to the demand of energy, such as real time pricing, self healing, power consumption scheduling and optimized electrical energy usage. Such decisions can significantly improve the power quality as well as the efficiency of the grid by maintaining a balance between power generation and its usage. SG differs from traditional power grids in many aspects. For instance, SG offers a bi-directional communication flow between service providers and consumers, while a traditional power grid only offers only uni-directional communication from the service provider to the consumer. SG provides supervisory control and data acquisition (SCADA), advanced metering infrastructure (AMI), smart meters, fault tolerance, unauthorized usage detection, and load balancing , as well as self-healing, i.e., detection and recovery from faults.

SG deploys various types of devices for monitoring, analyzing and controlling the grid. Such monitoring devices are deployed at power plants, transmission lines, transmission towers and distribution centers and consumers premises. The numbers of such devices is large. One of the main concerns for SG is the connectivity, automation and tracking of such large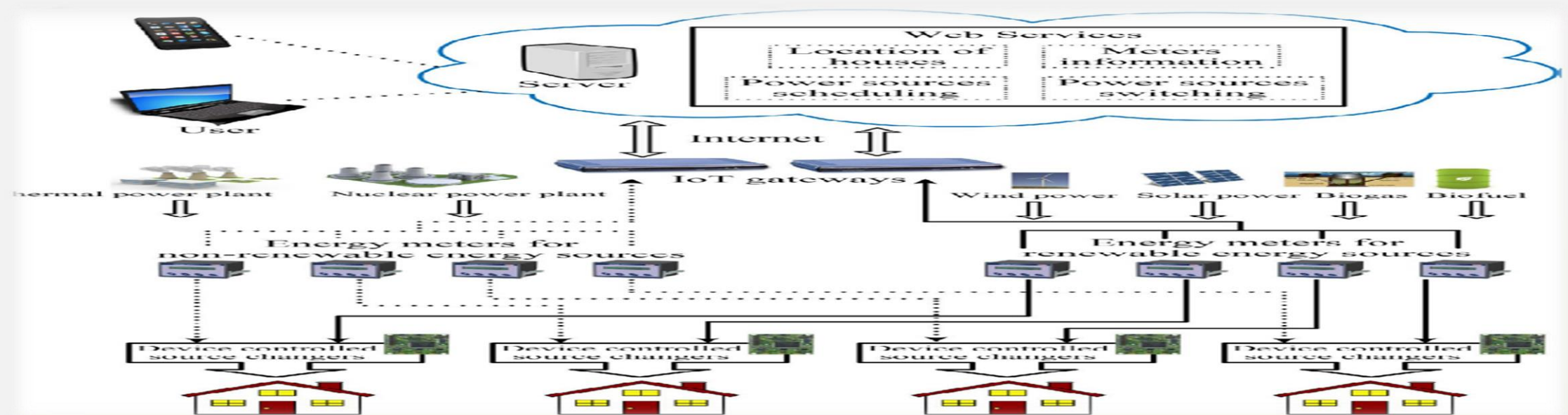 number of devices, which requires distributed monitoring, analysis and control through high speed, ubiquitous and two-way digital communications. It requires distributed automation of SG for such devices or "things". This is already being realized in the real world through the Internet of Things (IoT) technology.

IOT AS A PART OF SMART GRID:-

IOT-AIDED SMART GRID SYSTEM ARCHITECTURE:-
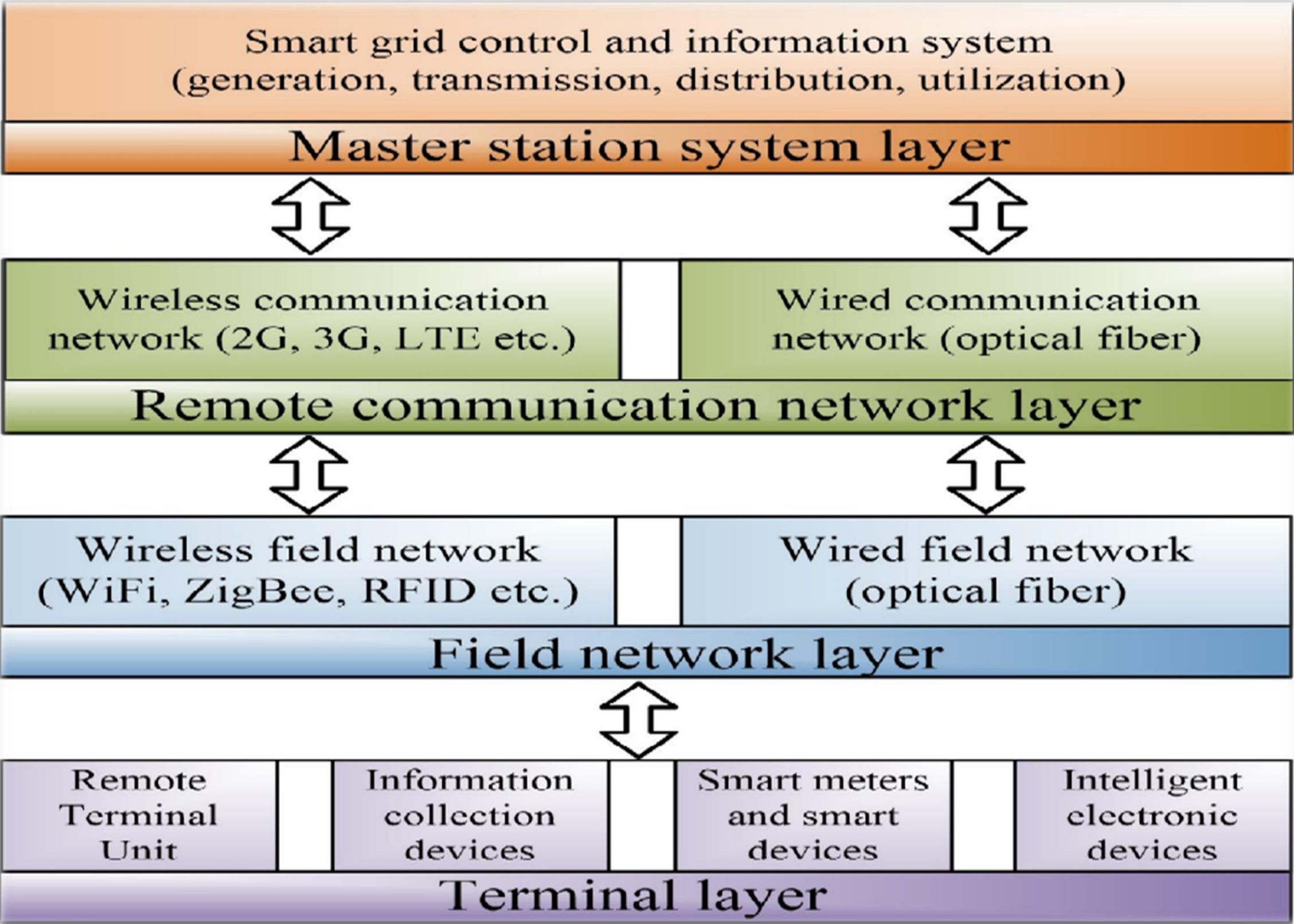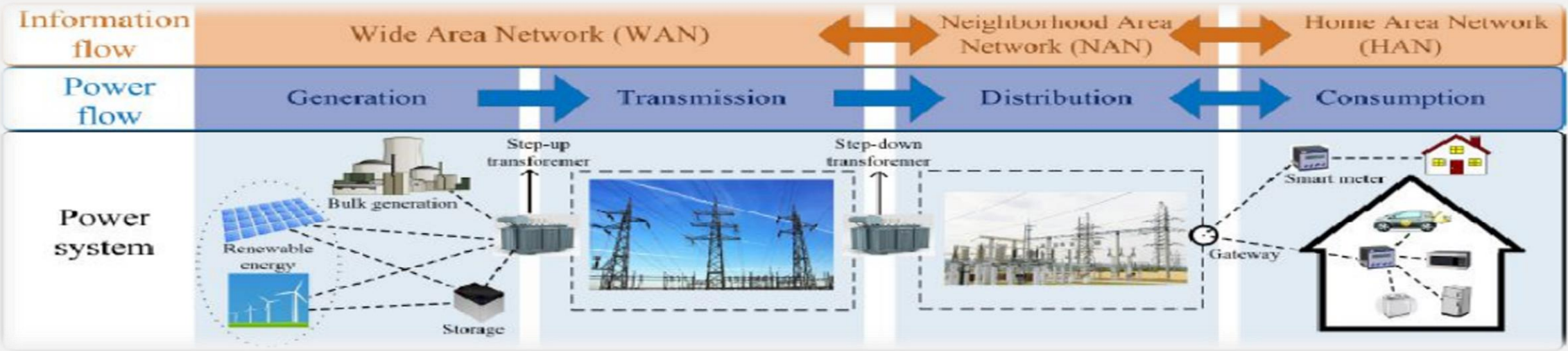
WEB ENABLED SMART GRID ARCHITECTURE:-

BIG DATA AND CLOUD FOR IOT-AIDED SG SYSTEMS

The integration of IoT technology with SG comes with a cost of managing huge volumes of data, with frequent processing and storage. Such data includes consumers load demand, energy consumption, network components status, power lines faults, advanced metering records, outage management records and forecast conditions. This means that the utility companies must have hardware and software capabilities to store, manage and process the collected data from IoT devices efficiently and effectively.

Big data is defined as data with huge volume, variety and velocity (three V's). The high frequency of data collection by IoT devices in SG makes the data size very large. The variety is represented by the different sensors that produce different data. The data velocity represents the required speed for the data collection and processing. Hence, IoT-aided SG systems can apply the techniques of big data management and processing (such as hardware, software and algorithms).

CONCLUSION

Smart Grid (SG) is the future grid which solves the problems of uni-directional information flow, energy wastage, growing energy demand, reliability and security in the traditional power grid. The Internet of Things (IoT) technology provides connectivity anywhere and anytime. It helps SG by providing smart devices or IoT devices (such as sensors, actuators, and smart meters) for the monitoring, analysis and controlling the grid, as well as connectivity, automation and tracking of such devices. This realizes the IoT-aided SG system which supports and improves various network functions at the power generation, transmission, distribution, and utilization. **BIG DATA**

AND CLOUD FOR IOT-AIDED SG SYSTEMS

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Transducer: - An Industrial Instrument

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Introduction:-

Instrumentation is the heart of industrial applications. Instrumentation is the art and science of measuring and controlling different variables such as flow, level, temperature, angle, displacement etc. A basic instrumentation system consists of various devices. One of these various devices is a transducer. A transducer plays a very important role in any instrumentation system. An electrical transducer is a device which is capable of converting the physical quantity into a proportional electrical quantity such as voltage or electric current. It converts any quantity to be measured into usable electrical signal. This physical quantity which is to be measured can be pressure, level, temperature, displacement etc. The output which is obtained from the transducer is in the electrical form and is equivalent to the measured quantity. There are of many different **types of transducer**, they can be classified based on various criteria as

❑ **Types of Transducer based on Quantity to be Measured**

o Temperature transducers (e.g. a thermocouple)
o Pressure transducers (e.g. a diaphragm)
o Displacement transducers (e.g. LVDT)
o Flow transducers
❑ Types of Transducer based on the Principle of Operation
o Photovoltaic (e.g. a solar cell)
o Piezoelectric
o Chemical
o Mutual Induction
o Electromagnetic
o Hall effect

o Photoconductors
❑ **Types of Transducer based on Whether an External Power Source is required or not**

Active Transducer
Active transducers are those which do not require any power source for their operation. They work on the energy conversion principle. They produce an electrical signal proportional to the input (physical quantity). For example, a thermocouple is an active transducer.

Passive Transducers
Transducers which require an external power source for their operation is called as a passive transducer. They produce an output signal in the form of some variation in resistance, capacitance or any other electrical parameter, which than has to be converted to an equivalent current or voltage signal.

One of the important transducers used in industrial purposes is piezoelectric transducer **Piezoelectric material** is one kind of transducers. We squeeze this material or we apply force or pressure on this material it converts it into electric voltage and this voltage is function of the force or pressure applied to it. The material which behaves in such a way is also known as **piezoelectric Sensor**. The electric voltage produced by **piezoelectric transducer** can be easily measured by voltage measuring instruments, which can be used to measure stresses or forces. The physical quantity like mechanical stress or force cannot be measured directly. Therefore, piezoelectric transducer can be used.

Piezoelectric Actuator

Piezoelectric actuator behaves in reverse manner of **piezoelectric sensor**. It is the one in which the electric effect will cause the material to deform i.e. stretch or bend. That means in piezoelectric sensor, when force is applied to stretch or bend it, an electric potential is generated and in opposite when on a **piezoelectric actuator**, an electric potential is applied it is deformed i.e. stretched or bend.

Piezoelectric transducer has high sensitivity. So, it acts as sensor and used in accelerometer due to its excellent frequency of response. The piezoelectric effect is used in many applications that involve production and detection of sound, electronic frequency generation. It acts as ignition source for cigarette lighter and used in sonar, microphone, force, pressure and displacement measurement

Application of Piezoelectric Materials

1. In microphones, the sound pressure is converted into electric signal and this signal is ultimately amplified to produce louder sound.
2.   Automobile seat belts lock in response to a rapid deceleration is also done by piezoelectric material.
3. It is also used in medical diagnostics.
4. It is used in electric lighter used in kitchens. Pressure made on piezoelectric sensor creates an electric signal which ultimately causes flash to fire up.
5. They are used for studying high speed shock waves and blast waves.
6. Used in fertility treatment.
7. Used in Inkjet printers
8. It is also used in restaurants or airports where when a person steps near the door and the door opens automatically. In this the concept used is when person is near the door a pressure is exerted persons weight on the sensors due to which the electric effect is produced and the door opens automatically.

Development of a Hybrid Power Generation System

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Introduction

As a consequence of the Fukushima reactor catastrophe in the year 2011 the German government has decided an accelerated phasing out of nuclear energy. Up to 2022 a gradual decommissioning of nuclear power plants will take place. Furthermore the goal of a reduction of greenhouse gas emissions by 40 percent by 2020 compared with the base year 1990 was announced by the Federal Minister for the Environment, Nature Conservation and Nuclear Safety, Germany. This goal can only be achieved by the penetration of renewable energy sources, e.g. wind and solar power. As part of the program "Energiewende" - transforming Germany's energy system a forward-looking approach of a decentralized power generation is currently installed in the town Kelsterbach located in the German Frankfurt/ Rhine Main metropolitan region with a total population of around 3.5 million. The proposed system consists of a combined heat and power plant (CHP) which provides a residential neighborhood with thermal and electrical power. In case of conventional CHP the consumers are supplied with heat together with a peak load boiler to cover the total thermal power demand. In addition a certain amount of electrical power is generated. During periods of heavy consumption additional electrical power is provided by the public grid. The aim of the proposed system is to establish a nearly independent power supply. Therefore a photovoltaic system (PV) is integrated. Due to the fluctuation of the solar power an electric energy storage device is required. Investigations of the electricity storage association ESA show that for photovoltaic applications in the medium power range lithium-ion batteries seems to be the most promising solution . Hence an energy storage system which consists of a lithium-ion pack is used for the proposed application. Fig. illustrates the residential neighborhood which consists of 180 lowenergy town houses in accordance with the energy saving regulations KfW efficient house 70 (EnEV 2009). The housing estate was built by Deutsche Reihenhaus AG, a German building enterprise. As indicated in Fig. 1 the power station is located on the left end of the area, it comprises the combined heat and power plant, the peak load boiler and the electric energy storage system. The photovoltaic system will be installed on an anti-noise barrier which separates the housing complex from a railroad line.

System Topology

Fig. shows the block diagram and the energy flows of the proposed hybrid decentralized power generation. In this system a CHP is used which consists of one module with a rated electrical power of $P_{el,CHP}$ = 50 kW and a rated thermal power of $P_{th,CHP}$ = 80 kW. The annual generated thermal energy is approximately 300000 kWh/a, this leads to about 6000 full load hours. Since the CHP operates always in the heat-controlled mode, these values can vary in dependence on the thermal power demand of the consumers. The thermal power of the installed peak load boiler is 895 kWh. The CHP and the peak load boiler if necessary charge the heat storage tank. The residential neighborhood is supplied with thermal power via a district heating network (dashed line). With this plant design the complete thermal power demand can be covered.

The electrical power of the CHP Pel,CHP is transmitted via a 400V/50 Hz low voltage grid (solid line). To establish a hybrid power generation a PV array as a second electrical energy source will be integrated. The installed peak power depends on the useful area of the anti-noise barrier. In this system the projected peak power is set to 70 kWP. As mentioned above a lithium-ion battery is integrated into the system to compensate the fluctuating solar power. In addition the battery supplies power during power-off durations of the CHP. The DC voltage on the PV panel output VDC, PV varies with the module temperature T and the solar irradiation S, the DC voltage on the output terminal of the battery VDC, Bat varies with the state of charge (SOC). Therefore the PV panel and the battery are linked to the low voltage grid via individual converters. Each converter consists of two power electronics components, first a DC/DC converter which is required for the DC voltage adaption, second a grid tied inverter which converts the DC power into AC power for the low voltage grid. To ensure a charge and discharge of the battery the power flow PAC, bat is bidirectional. To reduce the power flow from the public grid in order to establish a nearly independent power supply an optimized power management will be implemented so that the complete demand of the consumers Pel is covered by the electrical power of the CHP (Pel,CHP) and the PV and battery system (PAC), Pel = Pel,CHP + PAC. In this way the power from the public grid can be minimized, Pgrid → 0.

Design of the electrical energy storage system

The integral part of the decentralized power generation is the CHP. As described in section 2 the design is determined by the requirement to cover the entire thermal power demand of the residential neighborhood. Since the described project is a new housing estate no operation experiences regarding the thermal power consumption exists. In the first phase of the project 120 town houses will be supplied. Therefore load curves of a reference plant are used and scaled to 120 houses. the resulting load curves of the thermal power demand separated into a winter, summer and transition day. Based on this data a CHP with a nominal thermal power of 80 kWh in combination with a peak load boiler with a rated power of 895 kWh are projected. The selected CHP provides a nominal electrical power of 50 kWel. This is not sufficient to supply electrical power to the town houses. For this reason a hybrid system is supposed with a PV array as a second energy source. The possible peak power which can be installed is determined by the useful area on the anti-noise barrier as explained in section 2. For the proposed hybrid power generation a peak power of 70 kWP is projected.
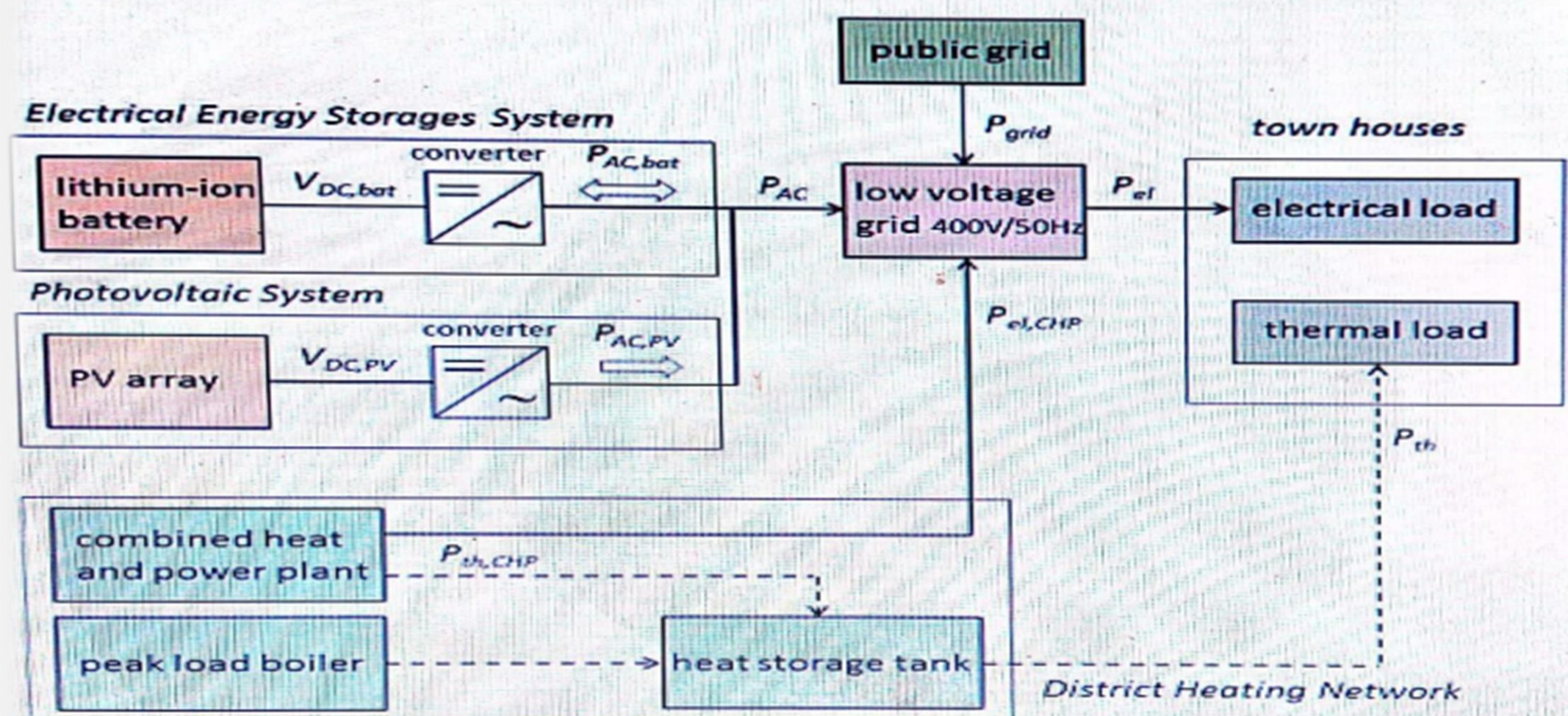
In sum this will result in a theoretical available power of 120 kWel. To evaluate the expected power demand of the consumers standard load profiles are used [6]. The standard H0 load profiles applicable for household customers separated into a winter, summer and transition day for two scenarios. In the first scenario it is assumed that the neighborhood comprises 120 two-person households, in the second scenario 120 four persons households are assumed. The factual power demand will be in between these two boundaries. The maximal power demand varies between 80 kWel and 120 kWel. In particular the highest power demand occurs during the noontime and in the evening hours. It is obviously that the PV system can only generate power during the day.

Consequently an electric energy storage device is required. As mentioned in section 1 for the decentralized power generation a lithium-ion battery is suitable. Two parameters are required for the design of the battery, first the rated power, second the capacity. Taking both scenarios into account the rated power of the battery should be in the range between 30 kWel (a: two-person household) and 70 kWel (b: four-person household). Based on this analysis the rated power of the battery is set to 50 kWel. The required capacity can be determined by the power balance.

It should be taken into account that the PV array supplies power during the daytime. Fig. 6 shows the measured module temperature and solar irradiation of a reference PV array with a peak power of 4 kWP for a cloudless summer day in Frankfurt. The DC power was scaled to a 70 kWP system. These results indicate that sufficient power is supplied by the PV array; however the power varies with the weather and the time of a year. For the design of the battery only the energy demand in the evening time is essential. Taking into account that the power demands of three or four-person households are correspondingly higher a battery with an available capacity of approximately 100 kWh seems to be reasonable for the proposed decentralized power generation.

Analysis of the decentralized power generation

Due to the complexity of this topology a detailed analysis of the operational behavior is required. To date no sufficient experiences exist on the operation of PV systems and lithium ion batteries. Recently published research reports deal with different topics regarding battery storage technologies. However no validated results for a decentralized hybrid power generation in the medium power range are known so far. Thus the goal is to find an optimized operation strategy. To evaluate the energy flows the knowledge of the operational behavior of the subsystems is essential. In this case the energy generation and consumption at different times of a day as well as of different times of a year is of particular interest. This could be established by the use of an applicable simulation model.

The advantage of this approach is an easy parameterization of plant data, a variation of environmental conditions and load profiles. For this purpose models of each subsystem are developed which are capable to analyze the dynamic behavior. The standard load profiles are stored in ASCII files which include the thermal and electrical power demand as described in section 3, Pth and Pel, with a sampling interval of 15 minutes. The neighborhood is represented by the consumer model. The thermal power demand Pth is transferred into a power request for the power management. In dependence on the available energy of the heat storage tank Eth the CHP is switched on and off (CHP controller). The electrical power management adjusts PAC so that the demandPel is covered by the available electrical power of the CHP Pel,CHP and the converted DC power of the battery and PV array .
To achieve sufficient simulation accuracy physical models of the used lithium-ion battery and PV modules have been integrated in the model.

Artificial intelligence in power system

ARTIFICIAL INTELLIGENCE IN POWER SYSTEM

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- ❑ Its advantages and disadvantages
- ❑ How expert systems can be used in power systems
- ❑ Artificial Neural Networks (ANNs)
- ❑ Its advantages and disadvantages
- ❑ How ANN can be used in power systems
- ❑ Fuzzy Logic systems (FL).
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• Practical Application Of AI Systems In Power System Protection
• Current Application Of AI Systems In Power System
• Conclusion

POWER SYSTEM An electric power system is a network of electrical components used to supply, transmit and use electric power. Power systems engineering is a subdivision of electrical engineering that deals with the generation, transmission, distribution and utilization of electric power and the electrical devices connected to such systems like generators, motors and transformers .

ARTIFICIAL INTELLIGENCE Commonly, artificial intelligence is known to be the intelligence exhibited by machines and software, for example, robots and computer programs. ❑ The term is generally used to the project of developing systems equipped with the intellectual processes features and characteristics of humans, like the ability to think, reason, find the meaning, generalize, distinguish, learn from past experience or rectify their mistakes.

NEED FOR AI IN POWER SYSTEMS Power system analysis by conventional techniques becomes more difficult because of:

(i) Complex, versatile and large amount of information which is used in calculation, diagnosis and learning.

(ii) Increase in the computational time period and accuracy due to extensive and vast system data handling.

Artificial Intelligence Techniques Three major families of AI techniques are considered to be applied in modern power system protection

- ▪ Expert System Techniques (XPSs)
- ▪ Artificial Neural Networks (ANNs)
- ▪ Fuzzy Logic systems (FL)

EXPERT SYSTEM

• An expert system obtains the knowledge of a human expert in a narrow specified domain into a machine implementable form.
• Expert systems are computer programs which have proficiency and competence in a particular field.
• They are also called as knowledge based systems or rule based systems.
• Expert systems use the interface mechanism and knowledge to solve problems which cannot be or difficult to be solved by human skill and intellect. EXPERT SYSTEM

EXPERT SYSTEMS Advantages:

• It is permanent and consistent.
• It can be easily documented.
• It can be easily transferred or reproduced.

Disadvantages:

Expert Systems are unable to learn or adapt to new problems or situations.

How expert systems can be used in power systems:

• Since expert systems are basically computer programs, the process of writing codes for these programs is simpler than actually calculating and estimating the value of parameters used in generation, transmission and distribution.
• Any modifications even after design can be easily done because they are computer programs.
• Virtually, estimation of these values can be done and further research for increasing the efficiency of the process can be also performed.

ARTIFICIAL NEURAL NETWORKS (ANN)

• Artificial Neural Networks are biologically inspired systems which convert a set of inputs into a set of outputs by a network of neurons, where each neuron produces one output as a function of inputs.
• A fundamental neuron can be considered as a processor which makes a simple non linear operation of its inputs producing a single output.
• The understanding of the working of neurons and the pattern of their interconnection can be used to construct computers for solving real world problems of classification of patterns and pattern recognition.
• They are classified by their architecture: number of layers and topology: connectivity pattern, feed forward or recurrent.

ARTIFICIAL NEURAL NETWORKS (ANN) Advantages:

• Speed of processing.
• They do not need any appropriate knowledge of the system model.
• They have the ability to handle situations of incomplete data and information, corrupt data.
• They are fault tolerant.

• ANNs are fast and robust. Disadvantages:
• Large dimensionality.
• Results are always generated even if the input data are unreasonable.
• They are not scalable i.e. once an ANN is trained to do certain task, it is difficult to extend for other tasks without retraining the neural network.

How ANNs can be used in power systems:

• As ANNs operate on biological instincts and perform biological evaluation of real world problems, the problems in generation, transmission and distribution of electricity can be fed to the ANNs so that a suitable solution can be obtained.
• Given the constraints of a practical transmission and distribution system, the exact values of parameters can be determined.
• For example, the value of inductance, capacitance and resistance in a transmission line can be numerically calculated by ANNs taking in various factors like environmental factors, unbalancing conditions, and other possible problems.

FUZZY LOGIC Benefits of using fuzzy logic

FUZZY LOGIC

• Fuzzy logic or Fuzzy systems are logical systems for standardization and formalization of approximate reasoning.
• It is similar to human decision making with an ability to produce exact and accurate solutions from certain or even approximate information and data.
• Fuzzy logic is the way like which human brain works, and we can use this technology in machines so that they can perform somewhat like humans.
• Fuzzification provides superior expressive power, higher generality and an improved capability to model complex problems at low or moderate solution cost.

FUZZY LOGIC Applications:

(i)   Stability analysis and enhancement
(ii) Power system control
(iii) Fault diagnosis
(iv) Security assessment
(v)   Load forecasting
(vi) Reactive power planning and its control (vii) State estimation

How fuzzy logic can be used in power systems:

• Fuzzy logic can be used for designing the physical components of power systems.

• They can be used in anything from small circuits to large mainframes.

• They can be used to increase the efficiency of the components used in power systems.

• As most of the data used in power system analysis are approximate values and assumptions, fuzzy logic can be of great use to derive a stable, exact and ambiguity-free output.

Practical Application Of AI Systems In Transmission Line

• If any fault occurs in the transmission line, the fault detector detects the fault and feeds it to the fuzzy system. Only three line currents are sufficient to implement this technique and the angular difference between fault and pre-fault current phasors are used as inputs to the fuzzy system. Fuzzy systems can be generally used for fault diagnosis.

• Artificial Neural Networks and Expert systems can be used to improve the performance of the line. The environmental sensors sense the environmental and atmospheric conditions and give them as input to the expert systems. The expert systems are computer programs which provide the value of line parameters to be deployed as the output.

Current Application Of AI Systems In Power System :

(i) Operation of power system like unit commitment, hydro- thermal coordination, economic dispatch, congestion management, maintenance scheduling, state estimation, load and power flow.

(ii) Planning of power system like generation expansion planning, power system reliability, transmission expansion planning, reactive power planning.

(iii) Control of power system like voltage control, stability control, power flow control, load frequency control.

(iv) Control of power plants like fuel cell power plant control, thermal power plant control.

(v) Control of network like location, sizing and control of FACTS devices.

(vi) Electricity markets like strategies for bidding, analysis of electricity markets.

(vii) Automation of power system like restoration, management, fault diagnosis, network security.

Conclusion

• The main feature of power system design and planning is reliability. conventional techniques don't fulfill the probabilistic essence of power systems. This leads to increase in operating and maintenance costs. Plenty of research is performed to utilize the current interest AI for power system applications. • A lot of research is yet to be performed to perceive full advantages of this upcoming technology for improving the efficiency of electricity market investment, distributed control and monitoring, efficient system analysis, particularly power systems which use renewable energy resources for operation.

Nupur Patra
1701298272

INTRODUCTION-POWER THEFT :
DEFINITION

- It is the use of electrical power without a contract with a supplier with total or partial bypassing of the metering system or interfering with this system in such a way so as to adulterate its measurements.
- Contract is understood here as a valid obligation to deliver power and to pay for it.

HOW IT OCCURS?
1.SLOWING DOWN THE METER:

- A common method of tampering older meters is to attach magnets to the outside of the meter.
- When this happens, the rotor disc is exposed to a high magnetic field. Hence, the resultant opposing magnetic field to the rotor is highly increased leading to slowing down of rotor or perfect stopping of the disc rotation.
- The electricity meter is thus manipulated and ultimately power is consumed without being paid for. ex-neodymium magnets.

2.INVERTING THE METER/FEEDER:

Another common form of electricity theft is to invert the meter (pull the meter out of the socket and plug the meter back in upside-down, which causes the meter to run backwards and the kWh register to countdown instead of up).

3.BYPASSING THE FEEDER/METER:

□Usually, the bypass supplies power to large and stable loads which will not trip fuses in the case of overloads. Ex-jumper cables. □The rest of the circuits are supplied normally through the meter, so the bill, which is close to average, does not suggest a theft.

DIFFERENT WAYS OF MONITORING POWERTHEFT:

- GSM based power theft monitoring
- Microcontroller based power theft monitoring
- Power theft monitoring using PLC.

MICRO-CONTROLLER BASEDPOWER THEFT MONITORING:OVERVIEW:

- The whole system architecture is based on integrating wireless network with existing electrical grid.

- The proposed module also incorporates different data aggregation algorithms and effective solutions needed for the different pathways of the electricity distribution system.

THE PROPOSED ARCHITECTURE:
The Architecture Consists Of Four Modules Namely:

1. Controlling Station (CS)
2. Wireless Transformer Sensor Node (WTSN)
3. Transmission Line Sensor Node (TLSN)
4. Wireless Consumer Sensor Node (WCSN)

ARCHITECTURE

- WCSN is a module which acts as a consumer power metering device that measures the power consumed by the consumer and send the data periodically to the WTSN.
- Each feeder of the transformer has a WTSN which monitors power through each line and collects data from WCSN ,aggregates it and sends to the CS.□TLSN is another module associated with distribution line, mounted in each distribution line posts .

DIFFERENT PARTS AND THEIR FUNCTIONS: ZIGBEE:

- We are using XBee-PRO OEM RF Module whish uses the zigbee technology.
- Itis engineered to support the unique needs of low-cost, low-power and low data rate wireless sensor network providing reliable delivery of data between devices. ZIGBEE MODULE
- The XBee-PRO OEM RF Modules interface to a host device through a logic-level asynchronous serial port.

CURRENT TRANSFORMER CIRCUITRY:

- We are using Allegro ACS709 current sensor IC chip.
- The ACS709 consists of a Hall sensor integrated circuit (IC) with a copper conduction path located near the surface of the silicon die.
- Applied current flows through the copper conduction path, and the analog output voltage from the Hall sensor IC linearly tracks the magnetic field generated by the applied current.

MICROCONTROLLER:

- The LPC2148 microcontroller is based on a16-bit/32-bitARM7TDMI-S CPU with embedded high-speed flash memory ranging from 32 kB to 512 kB.
- A 128-bitwide memory interface architecture enable 32-bitcode execution at the maximum clock rate.
- Due to their tiny size and low power consumption, LPC2148is ideal for applications where miniaturization is a key requirement.
- Serial communication interfaces ranging from multipleUARTs, on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways

LCD:

- LCD stands for Liquid Crystal Display.
- As the output of the circuit should be displayed in some form or the other, LCD display is selected as it can display 16characters at a time.
- It is also easy to interface with the microcontroller without any decoder. So it's better than the seven segment display.

WORKING OF WIRELESS SENSOR NETWORK:

- The sensor network monitors the electrical grid for a specified period of time, which may be daily, monthly or yearly.
- Thus the WTSN stores the maximum demand for each consumer including the losses.
- The measured data from each WCSN is send to the neighboring TLSN.
- The aggregated data is then sent to the next nearby WTSN. Thus the data transfers from WCSN to the corresponding WTSN through TLSN.
- The collected data is compared with the measured data by the energy meter.
- Normally these two data are almost same.
- If there is any difference (dmc) in the collected data and the measured data, there may be a line fault or a power theft in that's egment.
- Large value of dmc indicates a line fault and small value of dmc indicate a power theft .

ADVANTAGES:

- The proposed system provides the solution for some of the main problems faced by the existing Indian grid system, such as wastage of energy, power theft, manual billing system, and transmission line fault.
- This method will reduce the energy wastage and save a lot of energy for future use.
- We can detect the location from where the power is being stolen which was not possible before.
- Optimized use of energy.

CONCLUSION:

- This method reduces the heavy power and revenue losses that occur due to power theft by the customers.
- By this design it can be concluded that power theft can be effectively curbed by detecting where the power theft occurs and informing the authorities.
- Also an automatic circuit breaker may be integrated to the unit so as to remotely cut off the power supply to the house or consumer who tries to indulge in power theft.
- The ability of the proposed system to inform or send data digitally to a remote station using wireless radio link adds a large amount of possibilities to the way the power supply is controlled by the electricity board.
- This system will reduce the energy wastage and save a lot for future use.

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Claytronics

Current research

Curr**Claytronics** is an abstract future concept that combines nanoscale robotics and computer science to create individual nanometer-scale computers called claytronic atoms, or *catoms*, which can interact with each other to form tangible 3D objects that a user can interact with. This idea is more broadly referred to as programmable matter. Claytronics has the potential to greatly affect many areas of daily life, such as telecommunication, human-computer interfaces, and entertainment.

ent research is exploring the potential of modular reconfigurable robotics and the complex software necessary to control the "shape changing" robots. "Locally Distributed Predicates or LDP is a distributed, high-level language for programming modular reconfigurable robot systems (MRRs)". There are many challenges associated with programming and controlling a large number of discrete modular systems due to the degrees of freedom that correspond with each module. For example, reconfiguring from one formation to one similar may require a complex path of movements controlled by an intricate string of commands even though the two shapes differ slightly.

In 2005, research efforts to develop a hardware concept were successful on the scale of millimeters, creating cylindrical prototypes 44 millimeters in diameter which interact with each other via electromagnetic attraction. Their experiments helped researchers verify the relationship between mass and potential force between objects as "a 10-fold reduction in size [which] should translate to a 100-fold increase in force relative to mass". Recent advancements in this prototype concept are in the form of one millimeter diameter cylindrical robots fabricated on a thin film by photolithography that would cooperate with each other using complex software that would control electromagnetic attraction and repulsion between modules.

Today, extensive research and experiments with claytronics are being conducted at Carnegie Mellon University in Pittsburgh, Pennsylvania by a team of researchers which consists of Professors Todd C. Mowry, Seth Goldstein, graduate and undergraduate students, and researchers from Intel Labs Pittsburgh

Hardware

The driving force behind programmable matter is the actual hardware that is manipulating itself into whatever form is desired. Claytronics consists of a collection of individual components called claytronic atoms, or catoms. In order to be viable, catoms need to fit a set of criteria. First, catoms need to be able to move in three dimensions relative to each other and be able to adhere to each other to form a three-dimensional shape. Second, the catoms need to be able to communicate with each other in an ensemble and be able to compute state information, possibly with assistance from each other. Fundamentally, catoms consist of a CPU, a network device for communication, a single pixel display, several sensors, an onboard battery, and a means to adhere to one another.

Meld

Meld is a declarative language, a logic programming language originally designed for programming overlay networks. By using logic programming, the code for an ensemble of robots can be written from a global perspective, enabling the programmer to concentrate on the overall performance of the claytronics matrix rather than writing individual instructions for every one of the thousands to millions of catoms in the ensemble. This dramatically simplifies the thought process for programming the movement of a claytronics matrix.

Current catoms

The researchers at Carnegie Mellon University have developed various prototypes of catoms. These vary from small cubes to giant helium balloons The prototype that is most like what developers hope catoms will become is the planar catom These take the form of 44 mm diameter cylinders. These cylinders are equipped with 24 electromagnets arranged in a series of stacked rings along the cylinder's circumference. Movement is achieved by the catoms cooperatively enabling and disabling the magnets in order to roll along each other's surfaces. Only one magnet on each catom is energized at a time. These prototypes are able to reconfigure themselves quite quickly, with the uncoupling of two units, movement to another contact point, and recoupling taking only about 100 ms. Power is supplied to the catoms using pickup feet on the bottom of the cylinder. Conductive strips on the table supply the necessary power.

Future design

In the current design, the catoms are only able to move in two dimensions relative to each other. Future catoms will be required to move in three dimensions relative to each other. The goal of the researchers is to develop a millimeter scale catom with no moving parts, to allow for mass manufacturability. Millions of these microrobots will be able to emit variable color and intensity of light, allowing for dynamic physical rendering. The design goal has shifted to creating catoms that are simple enough to only function as part of an ensemble, with the ensemble as a whole being capable of higher function.

As the catoms are scaled down, an onboard battery sufficient to power it will exceed the size of the catom itself, so an alternate energy solution is desired. Research is being done into powering all of the catoms in an ensemble, utilizing the catom-to-catom contact as a means of energy transport. One possibility being explored is using a special table with positive and negative electrodes and routing the power internally through the catoms, via "virtual wires." Another major design challenge will be developing a genderless unary connector for the catoms in order to keep reconfiguration time at a minimum. Nanofibers provide a possible solution to this challenge. Nanofibers allow for great adhesion on a small scale and allow for minimum power consumption when the catoms are at rest.

Software

Organizing all of the communication and actions between millions of sub-millimeter scale catoms requires development of advanced algorithms and programming languages. The researchers and engineers of Carnegie Mellon-Intel Claytronics Research Lab launched a wide range of projects to develop the necessary software to facilitate communication between catoms. The most important projects are developing new programming languages which work more efficiently for claytronics. The goal of a claytronics matrix is to dynamically form three-dimensional shapes. However, the vast number of catoms in this distributed network increases complexity of micro-management of each individual catom. So, each catom must perceive accurate position information and command of cooperation with its neighbors. In this environment, software language for the matrix operation must convey concise statements of high-level commands in order to be universally distributed. Languages to program a matrix require a more abbreviated syntax and style of command than normal programming languages such as C++ and Java.

The Carnegie Mellon-Intel Claytronics Research Project has created two new programming languages: Meld and Locally Distributed Predicates (LDP).

Locally distributed predicates (LDP)

LDP is a reactive programming language. It has been used to trigger debugging in the earlier research. With the addition of language that enables the programmer to build operations in the development of the shape of the matrix, it can be used to analyze the distributed local conditions. It can operate on fixed-size, connected groups of modules providing various functions of state configuration. A program that addresses a fixed-size module rather than the entire ensemble allows programmers to operate the claytronic matrix more frequently and efficiently. LDP further provides a means of matching distributed patterns. It enables the programmer to address a larger set of variables with Boolean logic, which enables the program to search for larger patterns of activity and behavior among groups of modules.

Distributed watch points

Performance errors for thousands to millions of individual catoms are hard to detect and debug, therefore, claytronics matrix operations require a dynamic and self-directed process for identifying and debugging errors. Claytronics researchers have developed Distributed Watchpoints, an algorithm-level approach to detecting and fixing errors missed by more conventional debugging techniques. It establishes nodes that receive surveillance to determine the validity of distributed conditions. This approach provides a simple and highly descriptive set of rules to evaluate distributed conditions and proves effective in the detection of errors.

Algorithms

Two important classes of claytronics algorithms are shape sculpting and localization algorithms. The ultimate goal of claytronics research is creating dynamic motion in three-dimensional poses. All the research on catom motion, collective actuation and hierarchical motion planning require shape sculpting algorithms to convert catoms into the necessary structure, which will give structural strength and fluid movement to the dynamic ensemble. Meanwhile,

localization algorithms enable catoms to localize their positions in an ensemble. A localization algorithm should provide accurate relational knowledge of catoms to the whole matrix based on noisy observation in a fully distributed manner.

Future applications

As the capabilities of computing continue to develop and robotic modules shrink, claytronics will become useful in many applications. The featured application of claytronics is a new mode of communication. Claytronics will offer a more realistic sense to communication over long distance called pario. Similar to how audio and video provide aural and visual stimulation, pario provides an aural, visual and physical sensation. A user will be able to hear, see and touch the one communicating with them in a realistic manner. Pario could be used effectively in many professional disciplines from engineering design, education and healthcare to entertainment and leisure activities such as video games.

The advancements in nanotechnology and computing necessary for claytronics to become a reality are feasible, but the challenges to overcome are daunting and will require great innovation. In a December 2008 interview, Jason Campbell, a lead researcher from Intel Labs Pittsburgh, said, "my estimates of how long it is going to take have gone from 50 years down to just a couple more years. That has changed over the four years I've been working on the project".

Swetasingdha Panda
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Power Batteries with Blood

Batteries are practically essential devices but present a whole host of problems, Over time they can have trouble retaining a charge, Some stop working altogether, Others overheat or leak or even explode. They are also rigid and sometimes bulky, Then how about, instead of your standard AA or lithium, a flexible, incredibly thin battery that could be powered by blood or sweet, The Battery is not only as thin as paper, it essentially is paper. At least 90 percent of the battery is made from cellulose, which makes up traditional paper and other paper products. Aligned carbon nanotubes make up the other 10 percent, give the paper its conductive abilities and also make it black.

The nanotubes are imprinted in the very fabric of the paper, creating what's called a Nano composite paper. Several sheets could be lumped together to power medical implants, such as pacemakers, artificial hearts or advanced prosthetics. The battery would easily fit under the skin without causing any discomfort. Because the ionic liquid used doesn't freeze or evaporate like water, the battery could be employed at a wide range of temperatures: from-100 degrees Fahrenheit up to 300 degrees Fahrenheit… while many exciting announcements have been made in the field of bio batteries, it may be some time before we see the replacing nickel-cadmium, lithium-ion or the several other types of traditional batteries. Even so, the small, flexible, long-lasting and environmentally friendly battery technologies discussed here show the great possibilities researchers see in bio-batteries, especially for the field of medicine, with that in mind, Scientists seem to be exploring every possible option in bio-battery and fuel-cell technology: One research team even devised a fuel cell that ran off of gin and vodka.

Aditya Ranjan Patra
1921298031

29h March, Current Affairs:
- The Ministry of Family and Health Welfare reveal that the government has identified 1,091 confirmed cases of the novel coronavirus across India. The figure also includes 25 individuals who died after testing positive for the infection.
- Prime Minister Narendra Modi on Saturday called for donations to the newly instituted PM-CARES Fund. The fund will be a public charitable trust under the name of 'Prime Minister's Citizen Assistance and Relief in Emergency Situations Fund'.

27th March, Current Affairs:
- The Reserve Bank of India (RBI) Governor Shaktikanta Das today announced cut in benchmark interest rate, Repo Rate by 75 basis points to 4.4 per cent to deal with the hardship caused due to the outbreak of COVID-19. •
- Total number of confirmed cases of COVID 19 climbed to 724 including 47 foreign nationals. Health and Family Welfare Ministry has confirmed that 67 patients have been cured and discharged and 17 deaths have been reported in the country so far.
- British Prime Minister Boris Johnson has tested positive for coronavirus and is self-isolating at his Downing Street residence.

26th March, Current Affairs:
- Finance Minister Nirmala Sitharaman on Thursday unveiled a Rs 1.7 lakh-crore fiscal stimulus package to help the poor and migrants tackle the financial difficulties arising from the coronavirus (COVID-19) outbreak. She also announced a medical insurance cover of Rs 50 lakh per person for those on the frontline of the fight against the deadly coronavirus outbreak, including doctors, nurses and sanitation workers.
- The Union Government today has extended the ban on international flights till 14th April.

25th March, Current Affairs:
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- The number of confirmed coronavirus cases in India went up to 606, including 10 deaths, according to the health ministry. As per the Indian Council of Medical Research, more than 22 thousand six hundred samples from 21 thousand 804 individuals have been tested for COVID-19.
- The Norwegian Academy of Science and Letters named Israeli-American Hillel Furstenberg from Hebrew University of Jerusalem, Israel and Russian-American Gregory Margulis from Yale University, USA as winners of the Abel Prize 2020.

24th March, Current Affairs:
- Prime Minister Narendra Modi has announced that the entire country will be out under a curfew-like lockdown from midnight today. •
- Japan's Prime Minister Shinzo Abe and the head of the International Olympic Committee agreed to postpone the Tokyo 2020 Games by a year due to Coronavirus Pandemic. •
- Indian Finance Minister announced an increase in the threshold for default under the Insolvency and Bankruptcy Code (IBC) to Rs 1 crore. Currently, the threshold of triggering insolvency cases stands at Rs 1 lakh. Ms Sitharaman also said that the deadline for filing income tax returns for the financial year 2018-19 has been extended to June 30, 2020 from March 31, 2020. The interest rate on delayed payment of returns has also been cut to 9 per cent from 12 per cent. •
- Chief Minister Shivraj Singh Chouhan proved his majority by winning the trust vote in the Assembly today. •
- orld Tuberculosis Day is observed on 24th March every year to raise public awareness. •
- Former Chief Minister of Jammu and Kashmir Omar Abdullah was released from detention after 7 months.

23rd March, Current Affairs:

- All domestic commercial airlines will cease their operations from tonight.
- A total of 15,189 deaths have been recorded, the majority in Europe with 9,197 fatalities. Italy is the hardest-hit country with 5,476 deaths, followed by China where the virus first emerged last year with 3,270, and Spain with 2,182.
- The Indian Council of Medical Research has recommended the use of Hydroxychloroquine to treat Corona Virus.
- Shaheed Diwas or Martyr's Day is celebrated today. 22nd March, Current Affairs:
- The entire country is observing Janata Curfew today following Prime Minister Narendra Modi's appeal for people to voluntarily stay indoors to check the spread of Corona virus.
- The Centre and state governments have decided to completely lock down 75 districts across the country where coronavirus cases have been reported to stop all services except the emergency services.
- Indian railway decided to suspension of all its passenger services from March 22 midnight to March 31 midnight amid the coronavirus pandemic.
- At least 17 jawans were martyred and 14 others were injured in a Naxal attack in Sukma, Chhattisgarh.
- World Water Day 2020 is observed today.

21st March, Current Affairs:

- The Reserve Bank of India on Friday decided to infuse additional liquidity with a second tranche of bond purchase worth ₹30,000 crores amid the Covid-19 pandemic.
- Every year, the United Nations celebrate International Day of Forest on March 21.
- For the third year in a row, Finland has been named the world's happiest country. The annual United Nations World Happiness Report released its 2020 edition which revealing that the Finland is number one once again.

20th March, Current Affairs:

- Kamal Nath resigned today as Madhya Pradesh Chief Minister without facing a test of strength in the State Assembly.
- Seven years after Nirbhaya case, the four of her killers were hanged today morning at 5.30 am in Tihar Jail.
- Union Health Ministry today confirmed that total positive cases of Novel Coronavirus in the country reached 223 including 191 Indians and 32 foreign nationals. Out of the total cases, 23 patients have been cured and discharged.
- Legenda
- Indian footballer P K Banerjee died today in Kolkata after battling prolonged illness. He was 83. • Today is World Sparrow Day.

19th March, Current Affairs:

- The number of COVID-19 cases tested positive in India crossed 180 today. According to the World Health Organisation (WHO), as of March 18, there were 207,860 confirmed COVID-19 cases and 8,657 deaths in 166 countries.
- Former Chief Justice of India (CJI) Justice Ranjan Gogoi today took oath as a Rajya Sabha member. • No international flights will be allowed to land in India from Sunday for a week, the government announced today escalating measures to fight coronavirus.

18th March, Current Affairs:

- The total number of reported novel coronavirus cases in India has climbed to 160, with 12 fresh cases reported from various parts of the country on Wednesday.
- Swiss firm Roche Diagnostics India has received the license for conducting coronavirus tests after approval from drug regulator DCGI, making it the first private firm to get such permission.
- The Reserve Bank will inject liquidity of ₹10,000 crore through open market operations to maintain financial stability in the system in the wake of coronavirus outbreak in the country.
- Yes Bank has resumed operations and all its banking services are available for its customers now.

15th March, Current Affairs:
- Today is World Consumer Rights Day. This day is celebrated on the 15th of March every year to raise global awareness about consumer rights and needs.
- The President of United States of America Donald Trump has declared national emergency over the spread of corona virus. • The number of coronavirus cases in the country reached 107 today, with Maharashtra reporting the highest number of cases - 31.

14th March, Current Affairs:
- The government has declared the novel coronavirus outbreak in the country a "notified disaster" for the purpose of providing assistance under the State Disaster Response Fund (SDRF).
- Scientists at the National Institute of Virology, Pune have isolated 11 strains of the Covid-19. India has become the fifth country to successfully isolate the virus strain after Japan, Thailand, the United States and China.
- The government has declared face masks and hand sanitizers as essential commodities for the next 100 days. The move is aimed at stepping up efforts to boost supply and prevent hoarding of these items in its fight to check the spread of coronavirus disease.

13th March, Current Affairs:
- Former Jammu and Kashmir Chief Minister Farooq Abdullah, released today after over seven months in house arrest.
- The Union Cabinet has approved a four per cent hike in Dearness Allowance - DA for 48 lakh Central government employees and Dearness Relief to 65 lakh pensioners. • Saurashtra won their maiden Ranji Trophy title today on the back of their first innings lead against Bengal in the final played at the Saurashtra Cricket Association Stadium. • India vs South Africa ODI Series called off due to Coronavirus. Also the start of the Indian Premier League (IPL) 2020 has been postponed to April 15th from March 29 as a "precautionary measure" against the coronavirus pandemic.

12th March, Current Affairs:

- The government has suspended all visas to India after World Health Organisation declared it a pandemic. The Union health ministry said all existing visas - except diplomatic, official, UN/International organisations, employment and project visas -- will be suspended till April 15.
- Insolvency and Bankruptcy Code (Amendment) Bill 2020 has been passed by the Parliament with Rajya Sabha giving its nod today.
- The World Health Organization today said that the Novel Coronavirus outbreak is a controllable pandemic if countries step up measures to tackle it.

10th March, Current Affairs:
- Ashraf Ghani sworn in for a second term as the President of Afghanistan.
- Senior Congress leader, former Union Minister and four-time parliamentarian Jyotiraditya Scindia resigned from the Congress Party. Also 21 Congress MLAs in Madhya Pradesh have quit the Kamal Nath government.
- The first batch of 58 Indian pilgrims from Tehran, Iran landed at the Indian Air Force Station at Hindon in Ghaziabad.
- Festival of colours Holi is being celebrated across the country today.

8th March, Current Affairs:
- International Women's Day is celebrated today.
- President Ram Nath Kovind gave away the Nari Shakti Puraskar to 15 women in Rashtrapati Bhawan on the occasion of International Women's Day today.
- Australia women's cricket team registered 85-run win over India to clinch the ICC Women's T20 World Cup, a record fifth time in their history.

7th March, Current Affairs: •
- Union Minister for Youth Affairs and Sports Kiren Rijiuju inaugurated the five-day Khelo India Winter games at Gulmarg in Jammu and Kashmir today.
- US President Donald Trump signed an 8.3 billion US Dollars measure to help tackle the coronavirus outbreak. Current Affairs QA - 7th March, 2020

Student Farewell~2016-2020 Batch
14/MAR/2020

Women's Day Celebration
8/MAR/2020

Felicitation on 10 year completion
~Lellihan 2020~
29/FEB/2020

Annual Day Meet
~Lellihan 2020~
29/FEB/2020

Cultural Time
~Lellihan 2020~
29/FEB/2020

With your perseverance and endurance to teach people what they ought to know, you have changed the negative attitude of many of us to work. As you move to your new place today, may God's mercy and endless blessings be upon you. May you continue to be a guidance and inspiration for all.

Prof. Sushree Shataroopa Mohapatra
Faculty

Principal Farewell
31/DEC/2020

Expert talk on "5 G COMMUNICATION TECHNOLOGY"

SEMINAR ON "HIGH VOLTAGE DC"

SEMINAR ON "Solar Energy Society of India"

STUDENT ACHIEVEMENT

Sl.No.	Name of the Student	Year of Study	Date/Place of Event	Event	Achievement
01	Shreehari Sahoo	2018-2022	GIFT,BBSR	Annual Day Event-Lelihan 2019	2ND PRIZE IN Mano Action
02	Dular Gope	2016-2020	GIFT,BBSR	Annual Day Event-Lelihan 2019	1st Prize in Quiz
03	Sushil Kumar	2016-2020	GIFT,BBSR	Annual Day Event-Lelihan 2019	2nd Prize in Quiz
04	Sujan Mandal	2016-2020	GIFT,BBSR	Annual Day Event-Lelihan 2019	1st Prize in Guitar
05	Tanmay Kumar Mallick	2018-2022	GIFT,BBSR	Annual Day Event-Lelihan 2019	3rd prize in Painting
06	Chinmaya Kumar Nayak	2018-2022	GIFT,BBSR	Annual Day Event-Lelihan 2019	2nd prize in painting
07	Ritik Roshan Das	2017-2021	GIFT,BBSR	Annual Day Event-Lelihan 2019	2nd Prize in Duet Song
08	Ritesh Borah	2016-2020	GIFT,BBSR	Annual Day Event-Lelihan 2019	1st Prize in Duet Song
09	Prasad Maharana	2017-2021	16.03.2018, IIT kharagpur	IOT`	Consolation prize
10	Kisan Mahapatro	2017-2021	16.03.2018, IIT kharagpur	IOT`	Consolation prize
11	Subhrajit Subudhi	2017-2021	16.03.2018, IIT kharagpur	IOT`	Consolation prize
12	Prasad Maharana	2017-2021	19.10.2019 IIT, BOMBAY	IOT	Consolation prize
13	Kisan Mahapatro	2017-2021	19.10.2019 IIT, BOMBAY	IOT	Consolation prize
14	Chandan Parida	2017-2021	GIFT,BBSR	Annual Sports (Octathlon)2020	2nd Prize Tabletennis Doubles
15	Kisan Mahapatro	2017-2021	GIFT,BBSR	Annual Sports (Octathlon)2020	2nd Prize in Kho kho
16	Prasad Maharana	2017-2021	GIFT,BBSR	Annual Day Event-Lelihan 2020	1st Prize in Tabla

EVIDYUT

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