DEPARTMENT OF

AUTOMATION&ROBOTICS

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The Diploma Programme, Automation and Robotics, comprises two main areas: (1) Automation, which deals with use of computers or robots, and information technologies for handling different processes and machineries in an industry and (2) Robotics, which combines construction, operation, and application of robots coupled with computer-based control systems, sensory feedback, and information processing. This is a discipline that gives equal emphasis on hardware as well as software development. Hence the curriculum of this Diploma Program gives emphasis on Basics of Robotics, Robotic Programming, Sensors and

Actuators used in Automation and Robotics, electronics, electrical controls & components such as servo systems, hydraulics & pneumatics, Automation tools such as PLC, SCADA, etc.

MESSAGE FROM HOD

Ms.P.S.Mali

HEAD OF DEPT. AUTOMATION&ROBOTICS

Welcome to the Department of Automation and Robotics. The Department, established in the year 2020-21, with an intake of 60, is approved by All India Council for Technical Education and is affiliated to Maharashtra State Board of Technical Education. Automation has become the key word for the development of any industry. And with the onset of the "Make in India movement", there is going to be a huge demand for engineers in the emerging areas of technology. Automation and Robotics is one such emerging field identified by the All India Council for Technical Education.

THE DEPARTMENT HAS WELL QUALIFIED FACULTY MEMBERS AND WELL EQUIPPED LABORATORIES TO IMPART THE REQUIRED TECHNICAL SKILLS IN STUDENTS. REGULAR INDUSTRIAL TRAINING, VISITS AND EXPERT LECTURES ARE ALSO CONDUCTED FOR THE STUDENTS SO THAT THEY BECOME AWARE OF THE RECENT TRENDS IN THE INDUSTRY. ALONG WITH TECHNICAL KNOWLEDGE, THE DEPARTMENT ALSO FOCUSES ON OVERALL PERSONALITY DEVELOPMENT OF STUDENTS. THEY ARE CONSTANTLY ENCOURAGED TO PARTICIPATE IN VARIOUS CO-CURRICULAR ACTIVITIES LIKE TECHNICAL PAPER PRESENTATIONS, QUIZ, PROJECT EXHIBITIONS ETC AND EXTRA CURRICULAR ACTIVITIES SUCH AS SINGING & DANCE COMPETITIONS, LITERARY SKILL COMPETITIONS ETC. THE DEPARTMENT LEAVES NO STONES UNTURNED TO MAKE ITS STUDENTS WELL PREPARED TO FACE THIS CHALLENGING WORLD AND ASPIRES FOR THEIR BRIGHT FUTURE.

DEPARTMENT VISION

ToDevelop automation&robotics engineer with interdisciplinary approach keeping pace with changing technologies

DEPARTMENT PROFILE
• Location: C Wing&D Wing • Total number of Classrooms: 01 • Total number of Laboratories: 05 • Total Faculty: 06 • Supporting Technical Staff: 02

DEPARTMENT MISSION

To provide quality education through effective teaching process to meet the industry requirements .

To apply automation and robotics engineering knowledge for the benefit of society .

To produce professionally sound automation and robotics engineers with ethical values by strengthening the skill sets .

PROGRAM SPECIFIC OBJECTIVE

Maintain various types of Automation and Robotics equipment.

Apply the basic computing knowledge and related software for the implementation and operation of Automation and Robotics systems.

PROGRAMME EDUCATIONAL OBJECTIVE

To prepare students for higher studies & apply technical skills in Electronics & Telecommunication Engineering.

To prepare students for soft skills with ethical values&ability to work in team&to develop prefessionalism with strong foundtion in domain knowledge.

STUDENT ACTIVITIES

Co-curricular activities

Viragpatil&shivrajpatil won the first prize in a 1-day national level technical paper presentation event – ORNATE 2k22 , SIT polytechnic, yadrav; on 20th NOV, 2022.

Pramod Sutar&Abhiraj Sawant won the first prize in a 1-day national level technical quiz event – ORNATE 2k22 SIT polytechnic, yadrav; on 20th NOV, 2022

40 groups are participated in technical paper presentation event -ORNATE 2K22

16 groups are participated in technical Quiz event -ORNATE 2K22

DEPARTMENTAL ACTIVITIES

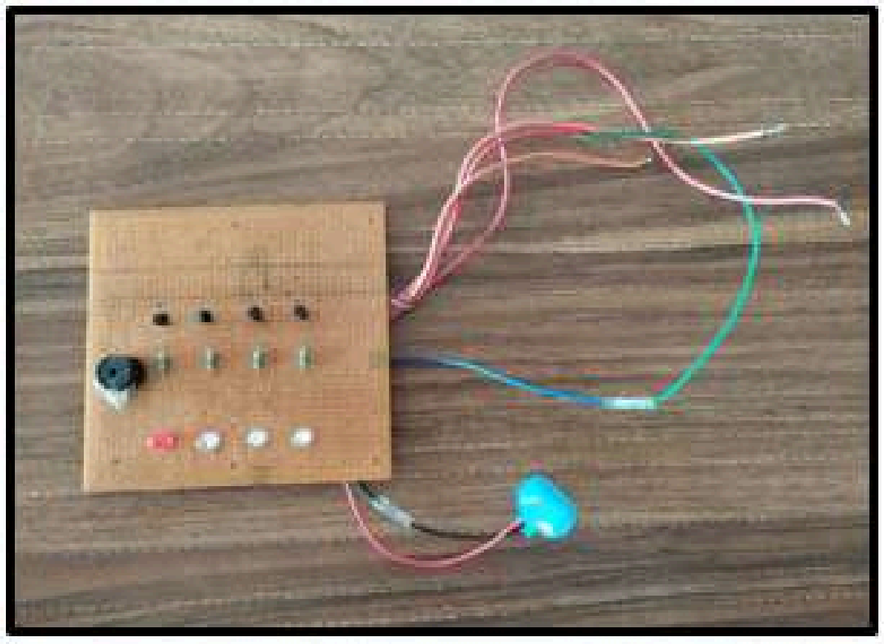
- **WORKSHOP ON PLC&SCADA:-**

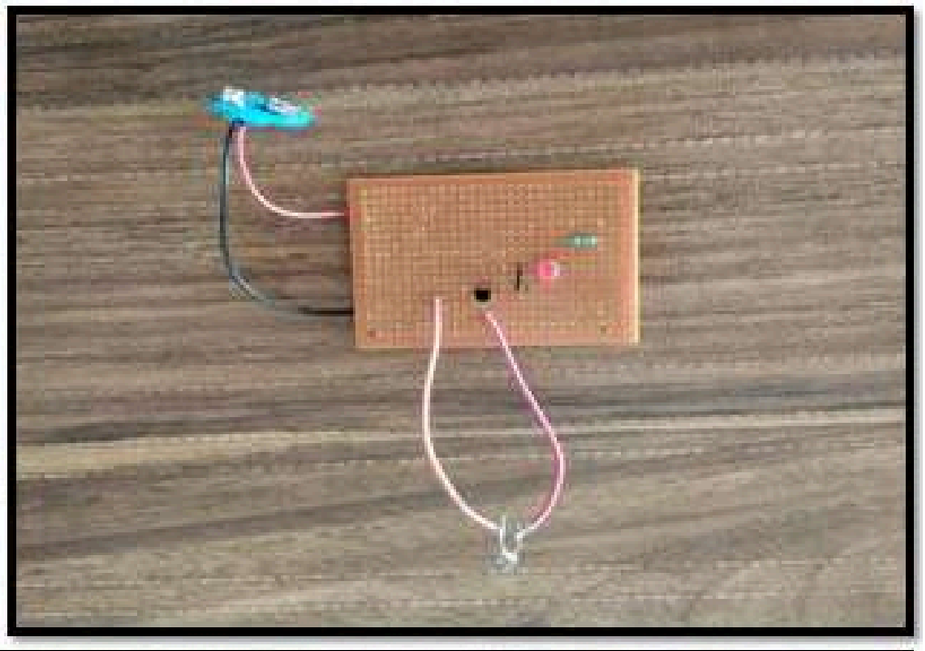
Workshop Guest Feliciationby V.C.GADAGE Sir

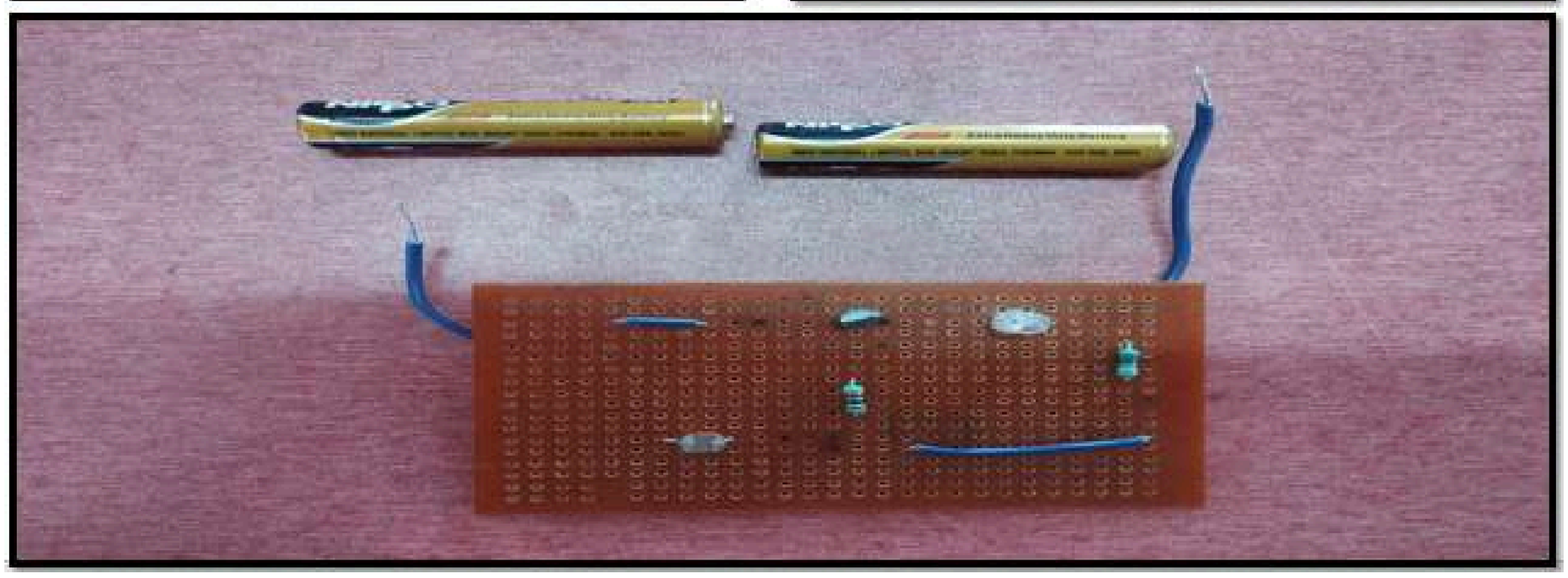
Workshop Glimpses:-

Workshop Conducted By Mr. Mahesh Takle Sir

Project completed by student:-







INDUSTRIAL VISITS

Sr.no	Name Of Company	Class	Date

1	KEN GLOBAL DESGIN PVT.LTD	SY AUTOMATION & ROBOTICS	13/09/2022
2	PROCOM ENTERPRISES	SY AUTOMATION & ROBOTICS	27/09/2022

Industrial Visit at KEN Global Designs


brother

EXPERT LECTURES

Sr. no	Topic	Name of Expert	Class	Date
1.	Personality Development	**Mrs.SupriyaBhendavade** **Police Naik, DYSPOffice, Jaysingpur**	SY	13/08/2022 12:30pm to 01.30pm
2.	ADVANCE ROBOTICS	**Mr. Chetan Hogade** **Owner, Technoave Electronics**	SY	9/11/2022 10.15am to 12.15pm
3.	Personality Development	**Mr. Shrenik Shrikant Bhanage** **Faculty, The Art of Living Foundation**	SY	12/11/2022 2.30pm to 4.20pm

EXPERT LECTURE ON PERSONALITY DEVELOPMENT

EVENTS UNDER AROSA

Mrs. SupriyaBhendawadeMr. ShrenikBhanage

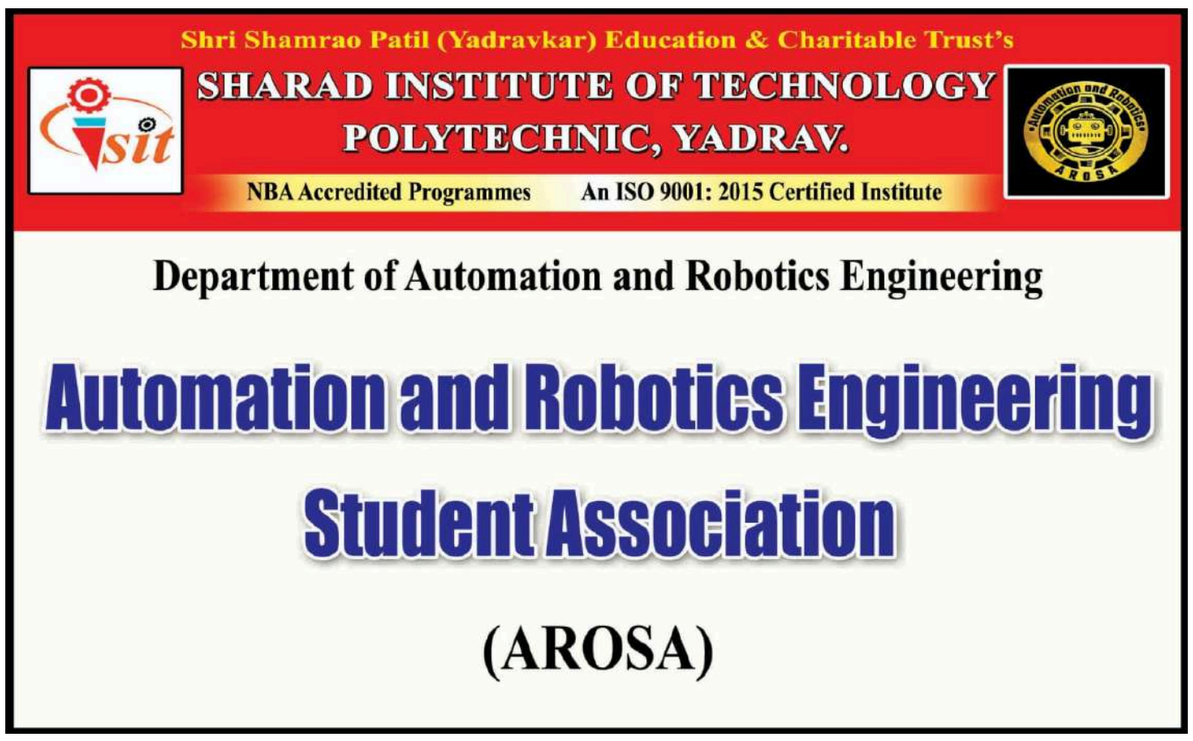
Police Naik DYSP office JayingpurFaculty, Art of Living Foundation

EXPERT LECTURE ON ADVANCE ROBOTICS

Mr. Chetan Hogade

Owner Technowave Elctronics

Establishment Of AROSA
on 15th September 2022



INAUGURATION CEREMONY

STUDENT ACTIVITIES

DESCRIPTION:

Event: ORNATE - '2K22

Organized by: Sharad Institute Of Technology Polytechnic

Title of our Technical project- Sarthi: A module that helps hearing-impaired people in communication.

Name: ViragPatil ,

Shivraj Patil

Program code: A03I

Activity: National level

Level of Activity: National

level Date-Rank: Sharad

Institute Of Technology

Polytechnic,Yadrav,Ich.

We were prized with certificates

BENEFIT OF THE EVENT:

“432 million adults and 34 million children have hearing loss in the world. While others use speech in communication, they make use of sign language and we think it is the normal and convenient way of communication. Hence, we came up with this module that breaks the communication gap and helps the disabled by converting speeches into texts. In this module we make use of three softwares - Python, Arduino and Pyfirmata. Four hardwares - Arduino nano, Voice module, Raspberry pi and Oled display. The output will be having Google translate, Date & time, Pyttsx3 and Speech recognition. In very simple words, the microphone will understand the speech, convert it to text and will display the same on the Oled display which will be attached to a spectacle.

Having a group of 5, we faced many disputes and miscommunications during the project. But ultimately everyone just killed it during the presentation. It was a really great experience taking part in such an event. We had no intention or firm taken to win the competition, it just happened in the flow. And I think that was the best part. No expectations, only fun!

All this extracurricular activity has prepared us to face the real world and its challenges. I'd like to thank our department’ s staff who helped us with the small mistakes that we would never notice. We wish to participate in more events like this in the further semesters. A big thank you to Surender Rawat sir, he guided through a lot of technical difficulties. Lastly, congratulations to us for winning the National Level competition! More yet to come.”

ARTICLES BY STUDENTS

1) Industry 4.0

Since the 1800s, we have experienced three industrial revolutions. Each was powered by a disruptive new technology: the mechanics of the steam engine, the innovation of the assembly line, and the speed of the computer. The reason they were called industrial “revolutions” wasbecause the innovation that drove them didn’t just improve productivity and efficiency a little bit – it completely revolutionized how goods were produced and how work was done.

Industry 4.0 is revolutionizing the way companies manufacture, improve and distribute their products. Manufacturers are integrating new technologies, including Internet of Things (IoT), cloud computing and analytics, and AI and machine learning into their production facilities and throughout their operations.

These smart factories are equipped with advanced sensors, embedded software and robotics that collect and analyze data and allow for better decision making. Even higher value is created when data from production operations is combined with operational data from ERP, supply chain, customer service and other enterprise systems to create whole new levels of visibility and insight from previously siloed information.

This digital technologies lead to increased automation, predictive maintenance, self-optimization of process improvements and, above all, a new level of efficiencies and responsiveness to customers not previously possible.

Developing smart factories pr ncredible opportunity for the manufa lustry to enter the fourth industrial re Analyzing the large amounts of big d ted from sensors on the factory floo real-time visibility of manufacturing and can provide tools for perf redictive maintenance in order to m quipment downtime.

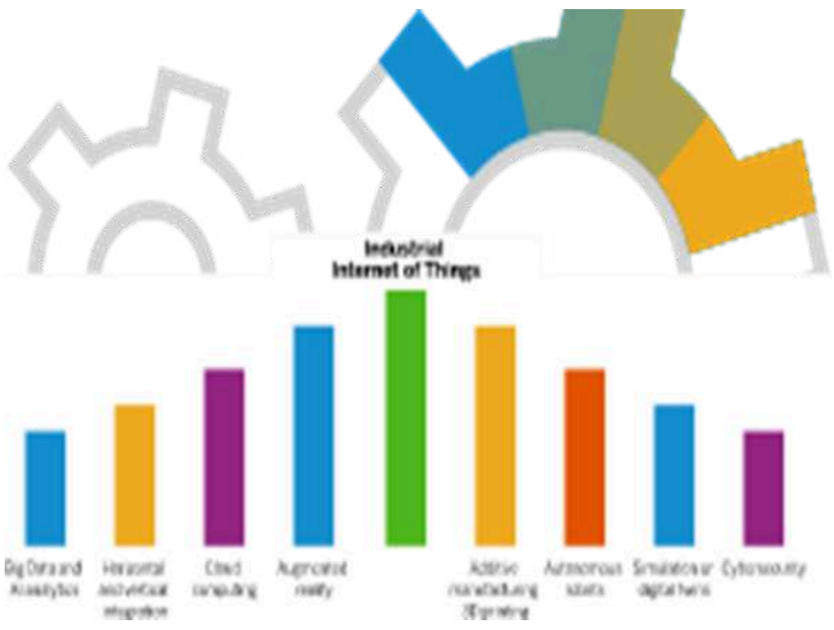
Using high-tech IoT devices factories leads to higher productivity ar d quality. Replacing manual inspectio models with AI-powered visual reduces manufacturing errors and sav and time. With minimal investment control personnel can set up a smart nected to the cloud to monitor manuf rocesses from virtually anywhere. By machine learning algorithms, manufa n detect errors immediately, rather th r stages when repair work is more exp

Industry 4.0 concepts and t s can be applied across all types of in mpanies, including discrete and proces uring, as well as oil and gas, mining ndustrial segments.

Industry 4.0 technologies

Industry 4.0 is built on nine technology pillars. These innovations bridge the physical and digital worlds and make smart and autonomous systems possible. Businesses and supply chains already use some of these advanced technologies, but the full potential of Industry 4.0 comes to life when they're used together.

Industry 4.0, Big Data is collected from a wide range of sources, from factory equipment and Internet of Things (IoT) devices, to ERP and CRM systems, to weather and traffic apps. Analytics powered by artificial intelligence (AI) and machine learning are applied to the data in real time – and insights are leveraged to improve decision-making and automation in every area of supply chain management: supply chain planning, logistics management, manufacturing, R&D and engineering, enterprise asset management (EAM), and procure



Benefits of Industry 4.0

Intelligent products
Develop connected, self-aware products that are capable of sharing information about their health, location, usage level, storage conditions, and more The data these smart products share can help you improve everything from product quality and customer service to logistics and R&D. They can also anticipate service needs, receive remote upgrades, and open the door to new, service-basec business models.

Intelligent factories
Run smart factories – highly digitized, largely autonomous facilities that take full advantage of advanced technologies like Big Data, artificial intelligence, robotics, analytics, and the IoT. Also called Factory 4.0, these plants are self-correcting, employ smart manufacturing 4.0 processes, and make it possible to deliver customized products cost efficiently and at scale.

Intelligent assets
Almost every physical asset deployed today has built-in sensors – which, when connected to the IoT and analytics, are game changers for enterpris asset management. With intelligent assets, technicians can monitor asset performance in real time, anticipate and prevent downtime, employ dynamic and predictive maintenance, take advantage of digital twins, and tightly integrate assets and business processes.

Empowered people
No matter how autonomous your systems get, you will always need people. Empower them with technologies like AI and access to live sensor data – so they know what's happening on the shop floor and are ready to make quick decisions and handle issues as they spring up. Wearable devices and augmented reality apps can also help them solve problems, monitor their health, and keep ther safe.

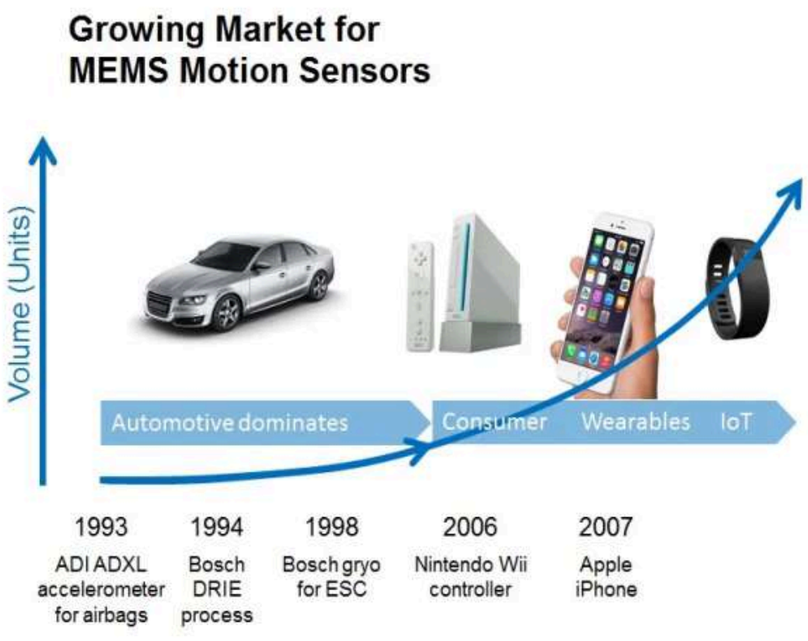
... .ByAnushriShirgave

(AO3I)

2) MEMS AND SENSOR DESIGN

There is an indispensable need for fluid flow rate and direction sensors in various medical, industrial and environmental applications. Besides the critical demands on sensing range of flow parameters (such as rate, velocity, direction and temperature), the properties of different target gases or liquids to be sensed pose challenges to the development of reliable, inexpensive and low powered sensors.

This paper presents an overview of the work done on design and development of Microelectromechanical system (MEMS)-based flow sensors in recent years. In spite of using some similar principles, diverse production methods, analysis strategies, and different sensing materials, MEMS flow sensors can be broadly categorized into three main types, namely thermal sensors, piezoresistive sensors and piezoelectric sensors. Additionally, some key challenges and future prospects for the use of the MEMS flow sensors are discussed briefly.



Objective:

The challenges associated with the defined system are increased power consumption and high complexity of associated circuitry. The antenna selection is introduced to combat these problems while the usage of linear precoding reduces computational complexity. The literature suggests number of antenna selection techniques based on statistical properties of signal. However, each antenna selection technique suits well to specific number of users.

Methods:

In this paper, the random antenna selection is compared with norm-based antenna selection. It is analysed that the random antenna selection leads to inefficient spectral efficiency if the number of users are more than 50 in Multi-User Multiple-Input Multiple Output (MU-MIMO) system.

Results:

The paper proposes the optimization of Energy-Efficiency (EE) with random transmit antenna selection for large number of users in MU-MIMO systems.

Conclusion: Also the computation leads to optimization of number of transmit antennas at the BS for energy efficiency. The proposed algorithm re

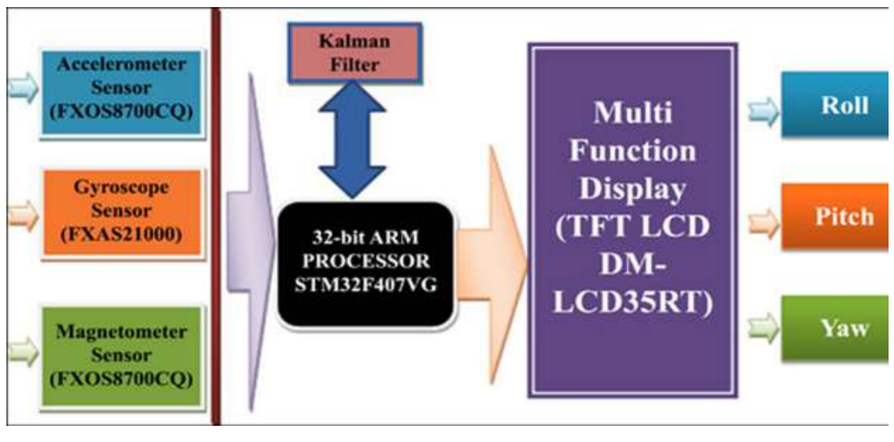
sults in improvement of the energy efficiency by 27% for more

The global health status is highly affected by the growing pace of urbanization, new lifestyles, climate changes, and resource exploitation. Modern technologies pave a promising way to deal with severe concerns toward sustainable development.

Herein, we provided a comprehensive review of some popular biotechnological advancements regarding the progress achieved in water, food, and medicine, as the most substantial fields related to public health.

The emergence of novel organic/inorganic materials has brought about significant improvement in conventional water treatment techniques, anti-fouling approaches, anti-microbial agents, food processing, biosensors, drug delivery systems, and implants.

Particularly, a growing interest has been devoted to nanomaterials and their application for developing novel structures or improving the characteristics of standard components. Also, bioinspired materials have been widely used to improve the performance, efficiency, accuracy, stability, safety, and cost-effectiveness of traditional systems.



What Makes a MEMS?

In the previous section, I stated that MEMS technology is a *conceptually* straightforward solution. As you might expect, coming up with the idea of a microscopic mechanical device is much easier than actually building it.

We use the verb “to machine” to describe the work of turning a piece of metal into a mechanical component such as a gear or a pulley. In the MEMS world, the equivalent term is “to micromachine.” The tiny mechanical structures in a MEMS device are fabricated by physically modifying silicon (or another substrate material) using specialized techniques about which I know almost nothing. These silicon mechanical structures are then combined with silicon integrated circuits, and the resulting electromechanical system is enclosed in packaging and sold as a single device.

As explained in a paper on MEMS published by Loughborough University in England, MEMS devices make use of micromachined structures, sensors, and actuators. Sensors allow a MEMS to detect thermal, mechanical, magnetic, electromagnetic, or chemical changes that can be converted by electronic circuitry into usable data, and actuators create physical changes rather than simply measure them.

… . By Madhura Gurav

(AO3I)

3) INDUSTRIAL INTERNET OF THINGS

The industrial internet of things (IIoT) is the use of smart sensors and actuators to enhance manufacturing and industrial processes. Also known as the industrial internet or Industry 4.0, IioT uses the power of smart machines and real-time analytics to take advantage of the data that “dumb machines” have produced in industrial settings for years. The driving philosophy behind IioT is that smart machines are not only better than humans at capturing and analyzing data in real time, but they’re also better at communicating important information that can be used to drive business decisions faster and more accurately.

Connected sensors and actuators enable companies to pick up on inefficiencies and problems sooner and save time and money, while supporting business intelligence efforts. In manufacturing, specifically, IioT holds great potential for quality control, sustainable and green practices, supply chain traceability, and overall supply chain efficiency. In an industrial setting, IioT is key to processes such as Predictive maintenance (PdM), enhanced field service, energy management and asset tracking.

What industries can benefit from IoT?

Organizations best suited for IoT are those that would benefit from using sensor devices in their business processes.

Manufacturing

Manufacturers can gain a competitive advantage by using production-line monitoring to enable proactive maintenance on equipment when sensors detect an impending failure. Sensors can actually measure when production output is compromised. With the help of sensor alerts, manufacturers can quickly check equipment for accuracy or remove it from production until it is repaired. This allows companies to reduce operating costs, get better uptime, and improve asset performance management.

Automotive

The automotive industry stands to realize significant advantages from the use of IoT applications. In addition to the benefits of applying IoT to production lines, sensors can detect impending equipment failure in vehicles already on the road and can alert the driver with details and recommendations. Thanks to aggregated information gathered by IoT-based applications, automotive manufacturers and suppliers can learn more about how to keep cars running and car owners informed.

Retail

IoT applications allow retail companies to manage inventory, improve customer experience, optimize supply chain, and reduce operational costs. For example, smart shelves fitted with weight sensors can collect RFID-based information and send the data

How does IIoT work?

IIoT is a network of intelligent devices connected to form systems that monitor, collect, exchange and analyze data. Each industrial IoT ecosystem consists of:connected devices that can sense, communicate and store information about themselves;public and/or private data communications infrastructure;analytics and applications that generate business information from raw data;storage for the data that is generated by the IIoT devices; andpeople.

These edge devices and intelligent assets transmit information directly to the data communications infrastructure, where it's converted into actionable information on how a certain piece of machinery is operating. This information can be used for predictive maintenance, as well as to optimize business processes.

What are the risks and challenges of IIoT?

The biggest risks associated with IIoT use pertain to security. It's relatively common for IIoT devices to continue using default passwords, even after they have been placed into production. Similarly, many IIoT devices transmit data as clear text. These conditions would make it relatively easy for an attacker

Security is a big challenge for those who are responsible for ar organization's IIoT devices, but so, too is device management. As ar organization adopts more and more IIoT devices, it will become increasingly important to adopt ar effective device management strategy. More specifically organizations must be able tc positively identify IIoT devices tc prevent the use of rogue devices. Establishing a means of identifying each individual device is also crucia for tasks such as replacing a failec device or performing a device refresh.

Patch management presents another big challenge regarding IIoT devices. It's becoming increasingly commor for device manufacturers to issue periodic firmware updates. Organizations must have an efficient means of checking devices to see if they have the latest firmware installec and deploying new firmware if necessary. Additionally, such a too must adhere to the organization's established maintenance schedule sc as to not disrupt operation

IIoT also allows for enhanced customer satisfaction. When products are connected to the internet of things, the manufacturer can capture and analyze data about how customers use their products, enabling manufacturers anc product designers to build more customer-centriproduct roadmaps.

to intercept the data coming from an IIoT device. Similarly, an attacker could take over an insecure IIoT device and use it as a platform for launching an attack against other network resources.

… . By VrundaBelekar

(AO3I)

EMBEDDED SYSTEM

WHAT IS AN EMBEDDED SYSTEM ?

An embedded system is one that has computer hardware with software

embedded in it as one of its components. We can define an embedded system as "A microprocessor based system that does not look like a computer".

we can say that it is "A combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a dedicated function. In some cases, embedded systems are part of a larger system or product, as is the case of an antilock braking system in a car"

EMBEDDED SYSTEM IS EWERYWHERE ?

Embedded systems span all aspects of modern life and there are many example of their use.

a) Biomedical instrumentation-ECG Recorder. Blood cell recorder, patient monitor system.

b) Communication systems-pagers, cellular phones, cable TV termino fax and transreceivers, video games and so on.

c) Peripheral controllers of a computer-Keyboard controller, DRAM controller, OMA controller, Printer controller, LAN controller, disk an controller.

d)robotic systems, CNC machine controller, close loop engine controller industrial moisture recorder and controller

Architecture:-

An embedded system is a special-purpose computer syers designed to perform certain dedicated functions. It is usually embedded as part of a complete device including hardware and mechanical parts

WHERE THE EMBEDDED SYSTEM EXISTING EARLIER?

Yes, We have been enjoying the grace of embedded system quite a long tim But they were not so popular because in those days most of the embedded systems were designed around a microprocessor unlike today's systems which were built around a microcontroller.

As we know a microprocessor by itself do not possess any memory, ports enc So everything must be connected externally by using peripherals like 8755, 8257, 8255 me. So the embedded system designed using microprocessor was not only complicated in design but also large in size At the same time the speed of microprocessor is also a limitation for high end applications.

LANGUAGES FOR PROGRAMMING EMBEDDED SYSTEM

Asembly language was the pioneer for programming embedded systems till recently. Nowadays there are many more languages to program these system. Some of the languages are C, C++, Ada, Forth, and Java together with its new enhancement 12ME

COMMUNICATION INTERFACE

For embedded systems to interact with the external world, a number of communication interfaces are available. They are :

Serial Communication Interfaces (51)	RS-232, RS-422, RS-485
Synchronous Serial Communication Interface:	
12C ITAG, SPI, SSC and ESSI	
Universal Senal Bus (USB)	
Networks:	
Networks:Ethernet, Controller Area Network, LonWorks, etc	
PLIS), Capture/Compare and Time Processing Units	

The presence of tools to model the software in UMI, SOL is sufficient to Indicate the maturity of embedded software programming

The majority of software for embedded systems is still done in language. Recent survey indicates that approximately 45% of the embedded software is still being done in language.

... .ByMoinKaleigar

(AO3I)