NEXT GEN SYSTEMS

CODE CURRENT

JUNE 2023

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Scientist of the Quarter

Vision of the Institution

To be the most preferred knowledge provider.

Mission of the Institution

Builders Engineering College endeavors to prepare rural students for successful career through academic and applied research.

About the Department

Established in 2009, the Department commenced with an initial intake of 60 students. It boasts 10 fully-equipped laboratories, each adhering to university norms and furnished with cutting-edge technology. The ECE Computer Centre provides students access to special software packages such as MENTOR GRAPHICS, PSPICE, MATLAB, Xilinx ISE, MULTISIM, MODELSIM, and KIEL. The department stands out with its distinctive offerings, including advanced trainer kits, ARM Processors, Altera development boards, CPLD Trainer kits, and Wireless Sensor Networks trainer kits. These resources empower students to engage in real-time projects and practical learning experiences. The department actively engages with professional bodies such as IEEE, IETE, and ISTE, providing a valuable platform for both faculty members and students. Additionally, an incubation centre has been established to foster and cultivate a culture of innovation, particularly in the realm of IoT systems, utilizing LoRaWAN technology.

Vision of the Department

To be the renowned department in creating highly talented, skilled and well-disciplined professional in Electronics and Communication Engineering.

Mission of the Department

- Providing quality education through effective teaching learning processes.
- Focus on research and excellence in electronics and communication to nurture the spirit of innovation and creativity.
- Enabling students for successful practice of the profession by nurturing career improvements and to develop human and social intellectual qualities.

Programme Specific Outcomes (PSOs)

- To design and develop complex systems in the research areas of next generation Communication Systems, RF and Power systems.

- To design and develop systems in the domains of IoT based Embedded Systems, Advanced Signal and Image Processing and latest Semiconductor technologies.

Program Educational Objectives (PEOs)

- Shall be successful in their professional careers, academic pursuits and research

- Shall study and build abilities on a continual basis in order to deliver high-impact, energy-efficient and futuristic solutions

- Shall demonstrate strong communication skills, a professional mindset and ethics in order to create and build real-world multidisciplinary solutions that are technically sound, economically feasible, and socially acceptable.
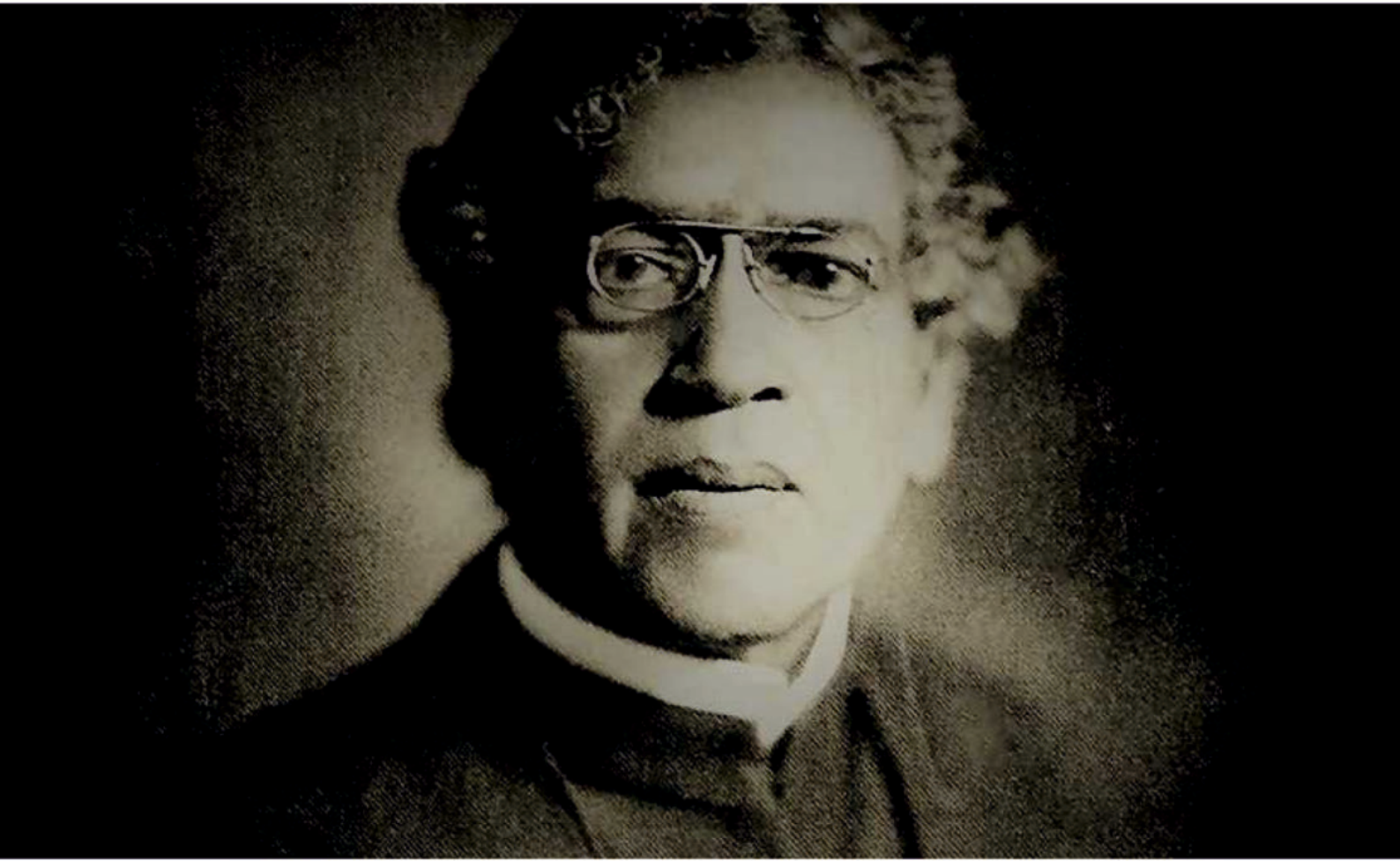
Sir Jagadish Chandra Bose

Sir Jagadish Chandra Bose (1858–1937) was a renowned Indian scientist, physicist, biologist, biophysicist, botanist, and archaeologist. He made significant contributions to various fields of science, particularly in the study of radio waves, plant science, and the invention of the crescograph.

Some key points about Sir Jagadish Chandra Bose:

Radio Waves:
Bose is credited with the demonstration of the generation and reception of radio waves, which he conducted in the late 19th and early 20th centuries. His work preceded and laid the groundwork for the development of radio communication.

Crescograph:
Bose invented the crescograph, a device that measured plant growth, demonstrating that plants, like animals, have sensitivity and reactions to external stimuli. This work contributed to the field of plant biology.

NEXT-GENERATION WIRELESS: A GUIDE TO THE FUNDAMENTALS OF 6G

An Introduction to 6G:

With the deployment of 5G well underway, vendors and service providers can help consumers, industry, and government unleash a multitude of use cases with far-reaching benefits. However, 6G goes much further. 6G technologies will provide unprecedented performance, reliability, and security, fully connecting society for the first time

Vision :

Physical and cognitive augmentation will make humans far more efficient and productive than they are today. The ubiquitous nature of 6G will enable new industries and business models. By fully connecting the physical, digital, and human worlds, 6G will help us manage the opportunities and challenges of growth and sustainability. Part of the 6G vision is to support and enable the United Nations Sustainable Development Goals. These goals promote global health, education, quality of life, justice, and inclusion by creating ubiquitous wireless intelligence. A wide range of technologies, such as artificial intelligence (AI), advanced sensors, optics, cloud computing, high-speed digital, satellite, and robotics, will rapidly advance in the next decade, enabling new use models made possible by 6G. In communications, 6G will enable multisensory technologies to create new ways for people to interact with each other and their surroundings, using not just sight and sound but also touch, smell, and taste. 6G will likely eliminate the physical and temporal distance between people through holographic imaging, seamlessly connecting human-to-human and human-to-machine worlds. AI will power networks, allowing fully automated infrastructure optimization and autonomous service provisioning. The use of digital twins, exact real-time replicas of physical processes, will be widespread. These virtual models combine past and present data with machine learning to dynamically monitor, improve, optimize, and enhance many processes. Technologies employing precise timing and data orchestration will transform manufacturing and industrial processes as well as the networks that serve them. The environment in which all-inclusive communications will be available will extend to land, sea, air, and space. Finally, 6G will significantly improve society's ability to respond to and manage emergencies whenever they arise. These are some 6G technology and use case examples, and this eBook briefly introduces each topic. While not all of these examples will come to fruition in 6G, they will drive new technology that will benefit humanity for decades, providing connected intelligence, global coverage, digital inclusion, and the assurance of health and safety.

Prof. S.D. Vijayakumar
Associate Professor
Dept. of ECE

IoSH (Internet of Smart Health)

Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the internet. When devices/objects can represent themselves digitally, they can be controlled from anywhere. The connectivity then helps us capture more data from more places, ensuring more ways of increasing efficiency and improving safety and IoT security.

Internet of Things is transforming the healthcare industry completely by redefining how apps, devices and people interact and connect with each other in delivering healthcare solutions. That is, IoT is constantly offering new tools as well as efficiencies that make up an integrated healthcare system with the view of ensuring patients are cared for better, health care costs are reduced significantly and treatment outcomes are improved.

Advantages of smart health: The major advantages of the Internet of Things in that healthcare organizations can take advantage of including the following: Decreased Costs: Patient monitoring can be done on a realtime basis, thus significantly cutting down on unnecessary visits by doctors, hospital stays and re-admissions.

Improved Outcomes of Treatment: Connectivity of health care solutions through cloud computing or other virtual infrastructure gives caregivers the ability to access real time information that enables them to make informed decisions as well as offer treatment that is evidence based.

Disease Management: When patients are monitored on a continuous basis and health care providers by accessing real time data, diseases are treated before they get out of hand. Reduced Errors: Accurate collection of data, automated workflows combined with data driven decisions are an excellent way of cutting down on waste, reducing system costs and most importantly minimizing on errors.

Reduced Errors: Accurate collection of data, automated workflows combined with data driven decisions are an excellent way of cutting down on waste, reducing system costs and most importantly minimizing on errors.

Enhanced Patient Experience: The connectivity of the health care system through the internet of things, places emphasis on the needs of the patient like proactive treatments, improved accuracy when it comes to diagnosis, timely intervention by physicians and enhanced treatment outcomes result in accountable care that is highly trusted among patients.

Enhanced Management of Drugs: Creation as well as management of drugs is a major expense in the healthcare industry. Even then, with IoT processes and devices, it is possible to manage these costs better. Early intervention. Healthy, active people can also get benefited by IoT-driven monitoring their daily activities for well-being. A senior living alone, for example, may want to have a monitoring device that can help to detect a fall or other interruption in blood pressure, blood sugar levels etc. in everyday activity and report it to any immediate responders or family members. For that matter, an active athlete such as a hiker or biker can obtain benefit from such a solution at any age, particularly if it's available as a piece of wearable technology.

Risks of network connected healthcare devices:

- Healthcare providers, whether hospitals, doctors' offices, or insurance companies, collect and maintain an enormous amount of data, which has to be carefully managed and protected. when a nurse or doctor is dealing with a patient's immediate health issue, IT policy is going to rank second to the care of the patient.

- Health Information Exchanges (HIEs), where healthcare information is exchanged electronically across organizations within a region, community, or hospital system, is intended to help healthcare providers have access to important patient information – but again, simply through the exchange of information, such networks put that information at risk.

- As part of the digital evolution, patients now want to communicate with their healthcare providers via email, which is notoriously one of the riskiest activities on the Internet.

- Mobile apps and websites have begun to play a large part in doctor-patient interactions. Apps provide convenient ways for healthcare providers and patients to exchange information and engage with each other. But speed and convenience come at a cost: attacks on mobile devices are increasing, and these apps are very hackable.

Ms. G. Manjula
IV ECE

Chat GPT

What is ChatGPT?

ChatGPT is a natural language processing tool driven by AI technology that allows you to have human-like conversations and much more with the chatbot. The language model can answer questions and assist you with tasks, such as composing emails, essays, and code.

Who made ChatGPT?

ChatGPT was created by OpenAI, an AI and research company. The company launched ChatGPT on November 30, 2022.

How can you access ChatGPT?

- You can access ChatGPT simply by visiting chat.openai.com and creating an OpenAI account.

- You can also still use the old URL for the chatbot, which is chat.openai.com/chat. OpenAI simplified the original URL for user convenience.

- Once you sign in, you can start chatting away with ChatGPT. Get your conversation started by asking a question. You can ask as many questions as you'd like.

Is there a ChatGPT App?

Yes, an official ChatGPT app is available for both iPhone and Android users.

However, when looking on the app store, make sure to download the app that is created by OpenAI because there are a plethora of copycat fake apps listed on the App Store and Play Store that are not ChatGPT-affiliated.

What is ChatGPT used for?

ChatGPT has many functions in addition to answering simple questions. ChatGPT can compose essays, describe art in great detail, create AI art prompts, have philosophical conversations, and even code for you.

How to use ChatGPT to:

- Write an essay
- Create an app
- Write code
- Build your resume
- Write Excel formulas
- Summarize content
- Write a cover letter
- Start an Etsy business
- Create charts and tables
- Write Adruino drivers

How does ChatGPT work?

ChatGPT runs on a language model architecture created by OpenAI called the Generative Pre-trained Transformer (GPT). The specific GPT used by ChatGPT is fine-tuned from a model in the GPT-3.5 series, according to OpenAI.

However, with a subscription to ChatGPT Plus, you can access ChatGPT with GPT-4, Open AI's most advanced model.

Is ChatGPT better than Google?

ChatGPT is a language model created to hold a conversation with the end user. A search engine indexes web pages on the internet to help the user find the information they asked for. Therefore, one is not better than the other as they suit different purposes.

Ms. V. Soundarya
IV - ECE

HUMAN AREA NETWORK

LAN

Peripheral computers

Human area network

Human area network

Human area network

Human area network

Wearable computers
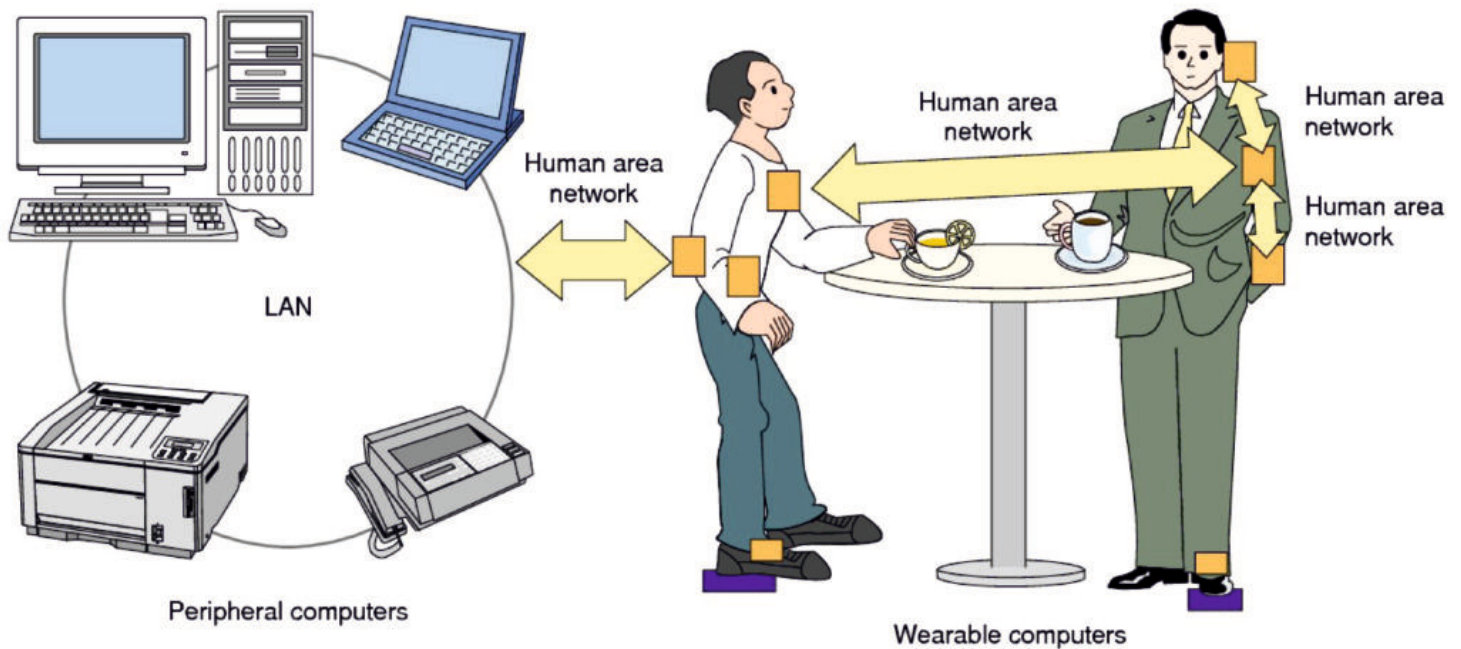
The electro-optic sensor combining an electro-optic crystal with laser light and recently reported an application of this sensor for measuring high frequency electronic devices. The electro optic has three key features: 1) It can measure electric fields from a device under test without contacting it, which minimizes measurement disturbances, 2) Ultra wide band measurement is possible, and 3) It supports one point contact measurement that is independent of the ground. NTT utilized this feature to fabric an intra-body communication receiver for its human area networking technology, which is called Red Tacton. The operating principle is illustrated below:
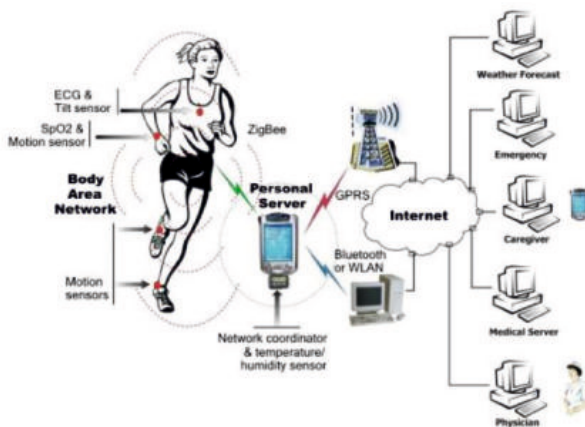
We can represent the electric field induced towards the body by the transmitters signal electrode is represented by Ea. The system requires a ground close to the transmitter signal electrode, so the electric field Eb induced from body can follow a return path to the transmitter ground. Moreover, since people are usually people are standing on a floor or a ground, the electric field Ec escapes from the body to ground, mainly from the feet. The electric field Es that reaches the receiver is Es=Ea-(Eb + Ec). This change is detected by laser light and transformed into digital data by a detector circuit.

Transmission Steps:

- The Red Tacton transmitter induces a weak electric field on the surface of the body.

- The Red Tacton receiver senses changes in the weak electric field on the surface of the body caused by the transmitter.

- It relies on th eprinciple that the optical properties of the electro-optic crystal varies according to the changes in the weak electric field.

- It detects the changes in the optical properties of an electro-optic crystal using an laser beam and converts the result into an electrical signal in a detector circuit.

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III - ECE