Adi Shankara
INSTITUTE OF ENGINEERING AND TECHNOLOGY
Ph: 0484-2463825
Email: info@adishankara.ac.in
Website: www.adishankara.ac.in

NATIONAL BOARD OF ACCREDITATION
Till 30-06-2025
Rref F.No.26-56-2016-NBA
Dt: 26/08/2022

DEPARTMENT OF ELECTRONICS AND COMMUNICATION

EXPLORE, DREAM, DISCOVER

ISSUE 56 MONTHLY NEWSLETTER OCTOBER 2022

GENESIS

IGNITING THOUGHTS

Contents

Vision

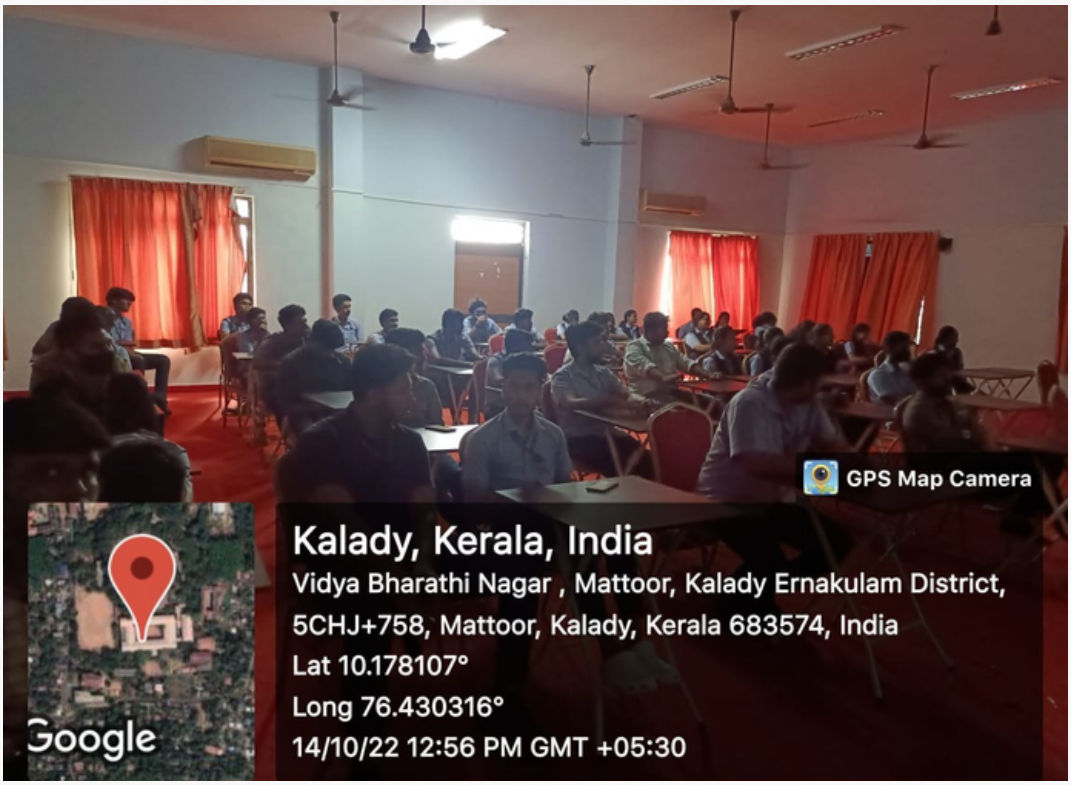
- To be recognized at the national and international level for excellence in education and research in Electronics and Communication Engineering.

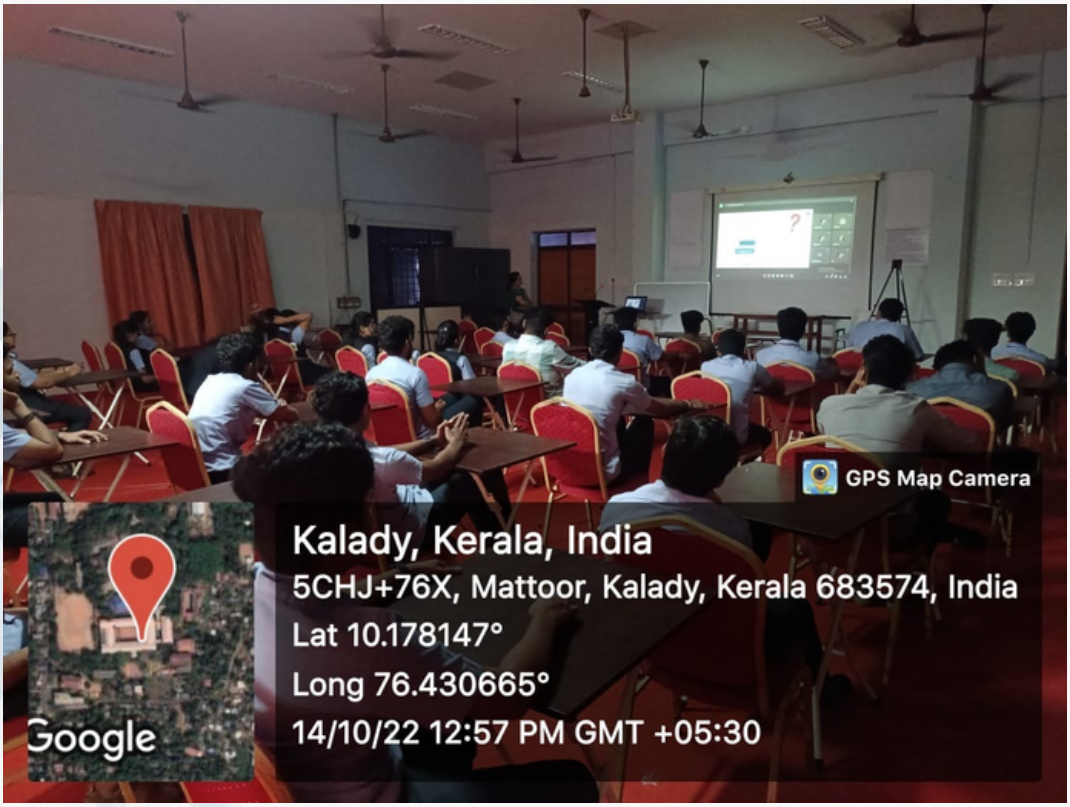
Mission

- Inculcating leadership qualities, adaptability, and ethical values
- Imparting quality education in the field of electronics, communication, and related areas to meet the challenges in the industry, academia, and research
- Nurture the growth of each individual by providing a dynamic and conducive learning environment.

DEPARTMENTAL ACTIVITIES

INTRODUCTORY CLASS FOR GATE EXAM CONDUCTED BY ACE ACADEMY FOR 2021-25 BATCH





CONGRATULATIONS

S5 RESULTS OF 2019-23 BATCH

SIDHARTH AJ
SGPA: 8.3

VYSHNAV CJ
SGPA: 8.67

SONA PAUL
SGPA: 8.59

KATHARIN P JOSE
SGPA: 8.72

HRITHIKA S PAI
SGPA: 9.3

ANDRIA RAJU
SGPA: 8.39

ABHIRAMI K A
SGPA: 8.22

AMAL
SGPA: 8.11

ABHIRAMI
MURALEEDHARAN
SGPA: 8.83

DEVADATT P G
SGPA: 8.08

S3 RESULTS OF 2020-24 BATCH

LIYA SAM
SGPA: 9.5

MALAVIKA S MENON
SGPA: 9.32

AKSHAY KRISHNA
SGPA: 8.27

KATHARIN P JOSE
SGPA: 8.72

ADITHYA KRISHNA M
SGPA: 8.41

AARYA VINOD
SGPA: 8.95

GAEA TITUS E
SGPA: 9.09

ALEENA ANTONY
SGPA: 8.27

NOEL MATHEW SHILLOW
SGPA: 8.5

AVIN SONY
SGPA: 9.5

GIFTSON VARGHESE
SGPA: 8.05

PLACEMENTS

Devadutt P G

Gopika Rajeev

Samuel Sabu Thomas

Students of S7 ECE got placed at Mu Sigma

Mu Sigma
DO THE MATH

TECH TALKS

STAFF ZONE

Emerging Trends in Blockchain Technology and Applications

ALBINS PAUL
ASST PROFESSOR ECE

At present times, Blockchain technology is gaining more attraction with every passing day, as it has revolutionized the traditional trade due to its distributed ledger feature, every record in this ledger is secured by rules of cryptography which makes it more secure and tamper-free. This naturally led to the emergence of various types of cryptocurrency, such as Bitcoin, which builds on a technology commonly known as Blockchain. The rapid evolution of research on Blockchain calls for more research studies for investigating and analyzing the current knowledge in this field through a systematic technical study that shows the impact and significance of the related literature since the inception of the technology in 2013.

Blockchain is a disruptive technology for building consensus and trust in a peer-to-peer network without centralized control. It was first used in bitcoin, the very first cryptocurrency released at the beginning of 2009, to implement a secure ledger of transactions. This secure ledger ensures that once a transaction is placed in the ledger, it cannot be altered without being detected, which is a prerequisite for any digital currency implementation because it must guarantee that no one can double-spend one's money. The interest in blockchain exploded in recent years.The research and development activities related to blockchain technology can be roughly divided into two areas:

1) the applications of blockchain in various industry sectors, such as fintech, medicine, and health, energy and power generation systems, real estate, travel, manufacturing, education, or even government;

2) fundamental research on blockchain technology itself, such as alternative consensus algorithms that consume less energy and provide better scalability, is more robust to cyberattacks and is more scalable. In the former area, interesting issues could arise due to the particular needs of an application. For example, blockchain could be used to secure the data produced from a sensor network.

However, the amount of data could easily exceed the capacity of any current blockchain platform. For the latter area, we have seen alternative consensus algorithms being proposed, such as proof of stake, which are likely to make blockchains more scalable, secure, and robust in the long term.

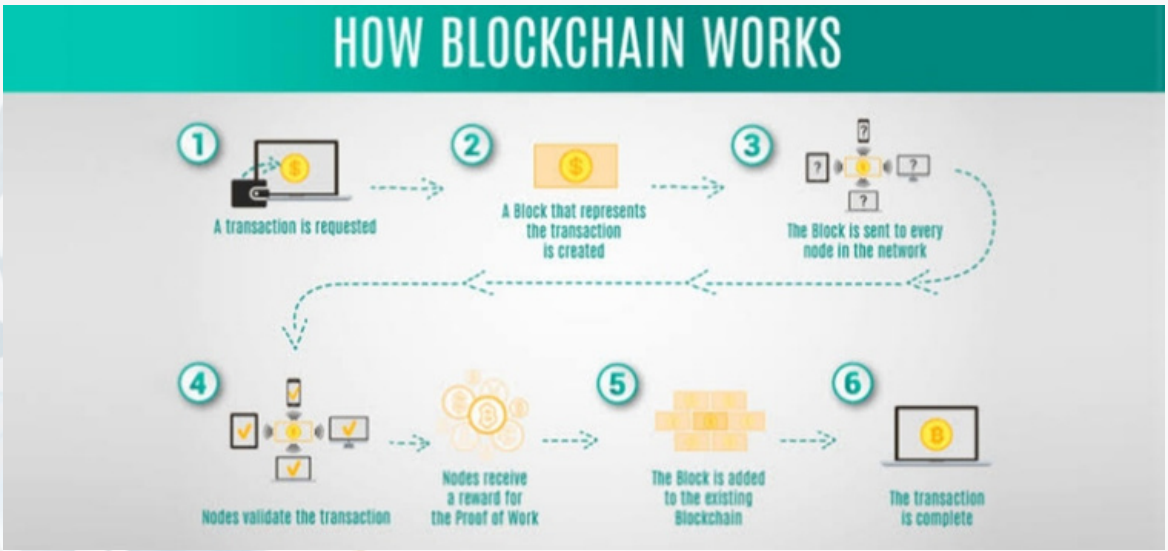
Blockchain overview

In principle, Blockchain can be defined as a digitalized public ledger, in which all digital transactions would be recorded as a data structure "Completed Transaction Blocks" or in chronological order, and this is stored across a network in a distributed manner.

The structure of Blockchain

Like a public ledger, the information of all transactions is stored in a sequence of blocks that make up the Blockchain. A reference hash belonging to the previous block (the parent block) links these blocks to each other. While "Genesis block" refers to the starting block with no parent block. One major Blockchain instance, is composed of the block header (80-byte long) which includes metadata, such as block version (4-byte), Merkle tree root hash (32-byte), timestamp (4-byte), nBits (4-byte), nonce (4-byte), and parent block hash (32-byte), as well as the block body. For example, in an untrustworthy environment, say the Block chain network, an asymmetric cryptography-based digital signature is used to validate and authenticate transactions.

In this process, a private key and public key pair are owned by each participant in the network. While the public key used in decryption is visible to everyone and is distributed throughout the network, the transaction is signed or encrypted using the private key, which facilitates the decryption of the subsequent transaction

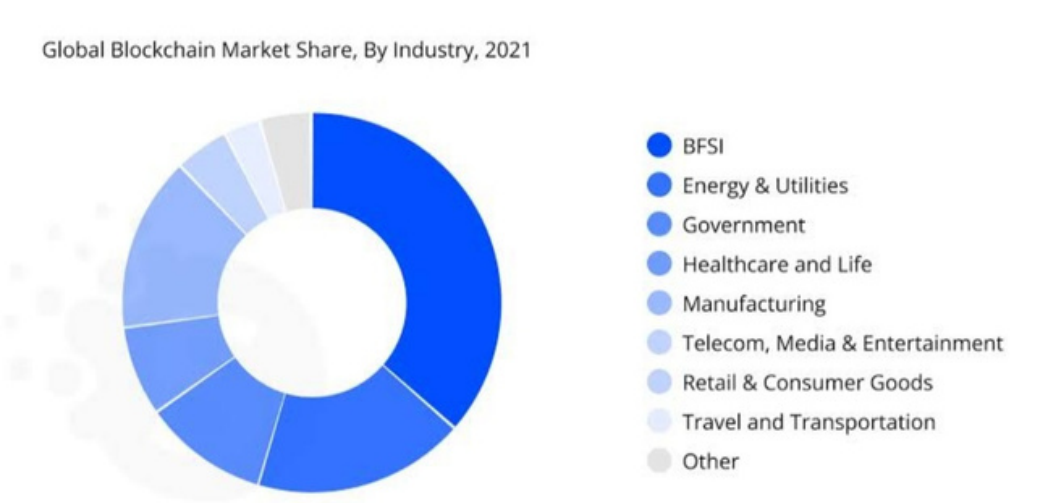


How Blockchain works?

In a decentralized Blockchain network, a private key cryptography-based digital signature is employed at a node to initiate a transaction, considered digital assets transferred as a data structure between peers in the network. An unconfirmed transaction pool is used to store all transactions, and a flooding protocol, known as Gossip protocol, is used to propagate those transactions in the network. Then, based on some preset criteria, these transactions need to be chosen and validated by peers.

Emerging Trends in Blockchain Technology

A new wave of the Internet, or so-called web 3.0, based on blockchain technology, is approaching ahead of schedule. It gathers supporters worldwide by offering decentralization, data security, and online freedom. Not surprisingly, the blockchain market experiences unprecedented growth: from $7 billion in 2022, it could grow to $164 billion in 2029!



Central Bank Digital Currencies (CBDC): The blockchain industry is changing the traditional financial system. One of the latest trends in blockchain technology is the adoption of digital currencies by central banks of different countries. This tendency implies that banks will create digital coins analogous to fiat money.

Blockchain-as-a-Service (BaaS)

BaaS is one of the leading blockchain technology trends for 2022. Companies like Microsoft and Amazon have already implemented it. Blockchain-as-a-service will act as a cloud service where users can create digital products using blockchain fundamentals.

Blockchain to Enhance Social Networking

By 2025, there will be about 4.4 billion social network users globally. Using blockchain on social networks will help solve inherent problems such as privacy breaches, data control, or content authenticity.

NFT Boom

Non-fungible tokens, or NFTs, started gaining momentum in 2021. These tokens will also remain relevant in the future. They've evolved into a means for artists to generate vast amounts of money at auctions by providing their digital works of art in exchange.

Blockchain in eCommerce

The eCommerce industry has been actively involved in blockchain technologies. These innovations help improve supply chain management and provide customer data protection. Another blockchain technology trend in eCommerce is the digital identification of users. An example of a blockchain use case in eCommerce is the Fluz app.

STUDENT'S ZONE

Micro Electronic Pill

Elsa Paul, S7 EC A

A microelectronic pill is a multichannel sensor for remote biomedical measurements using microtechnology. This has been developed for the internal study and detection of diseases and abnormalities in the gastrointestinal GI tract where restricted access prevents the use of traditional endoscopy. The measurement parameters for detection include real-time remote recording of temperature, pH, conductivity, and dissolved oxygen in GI tract. The capsule, after ingested by patients, could measure pressure, temperature and pH value in the gastrointestinal tract and transmit the data to the data recorder outside the body through a 434 MHz radio frequency data link. After the capsule passed out from the body, the data saved in the recorder were downloaded to a workstation via special software for further analysis and comparison.

The microelectronic pill is a small capsule shaped electronic pill that can be comfortably swallowed by any normal patient. It consists of lens, antenna, transmitters, camera or sensors and battery. It can reach regions such as small intestine and provides the video wirelessly to the receiving device connected to the monitoring system outside the human body and kept at distance of 1 meter. The invention of semiconductors provides ease in development of concise electronic pill capable to carry and transmit huge amount of data at a time without affecting the human body.

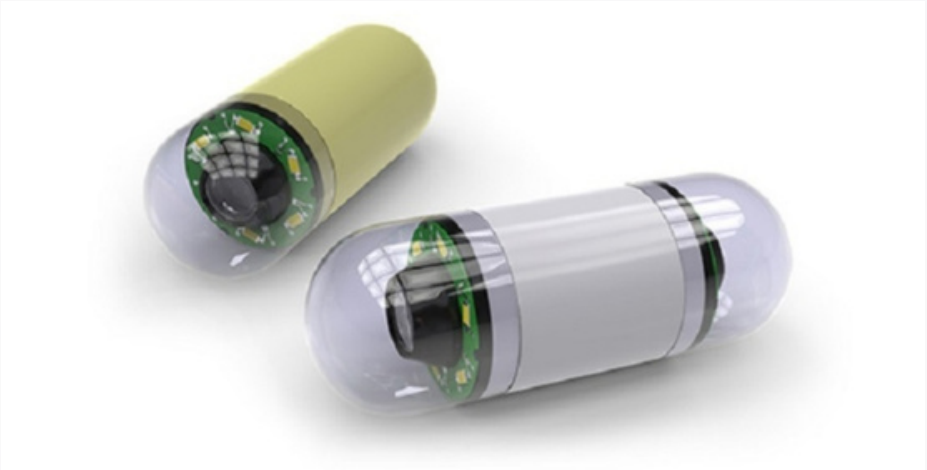


FIG 1 MICROELECTRONIC PILL

HISTORY

Jerome Schentag, professor of pharmaceutical science at the University of Buffalo, invented the computer-controlled "smart pill," which can be electronically tracked and instructed to deliver a drug to a predetermined location in the gastrointestinal tract. David D'Andrea was the co-inventor. UB reporter Ellen Goldbaum describes the smart pill as a combination of microminiature electronics, mechanical and software engineering, and pharmaceutical sciences. "This capsule represents a significant advance in medical technology," said D'Andrea to UB reporters, "With the Smart Pill, we have been able to miniaturize a complex electronic system and put it into a capsule about one inch long. You're not just taking a pill, you're swallowing the instrument.

CONSTRUCTION

It is a medical monitoring system. Measurement parameters of electronic pills include temperature analysis, pH measurements, conductivity and dissolved oxygen. And they can also capture images and sent it into a system. Electronic pills are swallowable. It has a 16mm diameter, a length of 55mm and 5gram weight. This pill is covered by chemically resistant polyether-terketone (PEEK) coating.

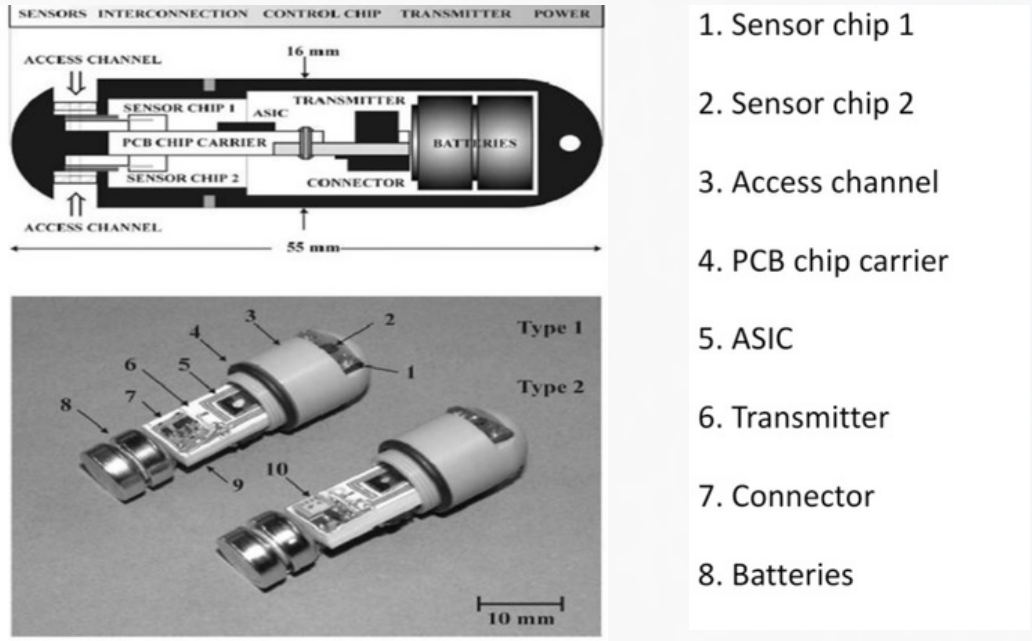


FIG 2 CONSTRUCTION OF PILL

When it moves through gastro-intestinal track it starts to detect diseases and abnormalities. A small electronic pill can easily reach areas such as small intestine and large intestine and can deliver real time information to an external system. Total information will be displayed in a monitor. The electronic pill travels to the digestive system, collects data and sends it into the computer with a distance of 1 meter and more. Main parts of electronic pills are four sensors, an ASIC chip, a radio transmitter and a power source.

This device consists of 4 microelectronic sensors. First one is Silicon Diode: which is used to identify the body temperature. Silicon diodes are the commonly used temperature sensors in electronic equipments. This temperature sensor is attached in the substrate. The main advantage of this sensor is that, it is a silicon integrated circuit at very low cost. Second one is ISFET (Ion-Sensitive Field-Effect Transistor). ISFET is used for measuring ion concentration in solution. There are so many diseases which occur due to abnormal pH level. They are; reflux of oesophagus, inflammatory bowel disease, hypertension, activity of fermenting bacteria, pancreatic disease, level of acid excretion and effect of GI specific drugs on target organs. Another one is a Direct Contact Gold Electrode. It helps to measure conductivity. Gold has the best conductivity compared to other elements, so it gives accurate value. Conductivity measures are done by measuring the contents of water and salt absorption, breakdown of organic compounds into charged colloids and the bile secretion.

Three-Electrode Electrochemical Cell is the fourth sensor in electronic pill. It is used to calculate rate of dissolved oxygen and identify the activity of aerobic bacteria in small intestine and large intestine. All these sensors are controlled by application specific integrated circuit. Also, all the other components of the electronic pills are connected to ASIC.

ASIC consist of analog signal conditioning, 10bit analog to digital convertor/digital to analog convertor, relaxation oscillator circuit (OSC) and digital signal processing circuit. All these circuits are powered by two SR48 Ag2O batteries. It has 35 hours working capacity and supply voltage is about 3.1 V. Power consumption is 15.5 mW. Sensors are fabricated on two silicon chips that are located at the front end of the capsule. Both pH and oxygen sensors are enclosed by two separate 8 nL electrolyte chambers containing a 0.1 KOH solution retained in a 0.2% calcium alginate gel. Oxygen sensor is covered by 12 μm thick film of teflon and the pH sensor is covered by 12 μm thick film of nafion. Both sensors are protected by a 15 μm thick dialysis membrane of polycarbonate. All the datas are collected by ASIC and are send it into the base station. From this base station doctors identify the problem. Here the radio transmitter transmits all the datas to the receiving end. Size of the radio transmitter is about 8x4x3 mm. Frequency shift Keying is the modulation scheme used in this radio transmitter. Data transfer rate is 1 kbps. Frequency is about 40.01 KHz at 20o C. 10 kHz is the bandwidth of the signal that was generated by the radio transmitter. It consumes 2.2 mA of current at 6.8 mW power.

REFERENCE

[1] Dhalla, A.K.; Al-Shamsie, Z.; Beraki, S.; Dasari, A.; Fung, L.C.; Fusaro, L.; Garapaty, A.; Gutierrez, B.; Gratta, D.; Hashim,"A robotic pill for oral delivery of biotherapeutics: Safety, tolerability, and performance in healthy subjects". Drug Deliv Transl. Res.2021, in press.

[2] Emily M. Jordan, Mario Milazzo, Sue Anne Chew, Serena Danti, Biomaterials and devices for immunotherapy, Engineering Technologies and Clinical Translation, 10.1016/B978-0-323-90949-5.00004-8, (97-133), (2022).

[3] Mimee, Mark, Phillip Nadeau, Alison Hayward, Sean Carim, Sarah Flanagan, Logan Jerger, Joy Collins et al. "An ingestible bacterial-electronic system to monitor gastrointestinal health." Science 360, no. 6391 (2018): 915-918.

STAFF ACHIEVEMENTS

Jaimy James

- Attended Faculty Development Program(FDP) ,MACHINE LEARNING FOR INTERDISCIPLINARY ENGINEERING APPLICATIONS on 12 to 23 september at AICT ATAL FDP at CUSAT.

STUDENTS ACHIEVEMENTS

Clenitta Joseph M

- Mtech CE, Completed NPTEL courseon Python for Data Science

EDITORIAL BOARD

Dr BOBBY MATHEWS C
HEAD OF DEPARTMENT(HOD).
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Ms ANJANA S
ASSISTANT PROFESSOR
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Ms NEETHA K
ASSISTANT PROFESSOR
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Mr Samuel Sabu Thomas
S7 ECB

Ms Reshmi R
S7 ECB

Ms Titya Ramchandran
S5 ECB

Ms Sereen Sabu
S5 ECB

Ms Anit Sunil
S3 ECA

Mr Jeffin Paul
S3 ECB