MSc. Project Abstract

YEAR - 2022

1. **Name of student:** Rakesh Barman & Jitu Kalita

   Name of Supervisor: Prof. Utpal Sarma

   Title of project: Liquid Level Measurement and Control using Ultrasonic Sensor

   Abstract: In this work, a liquid level measurement system was designed that employs an ultrasonic sensor (HC-SR04) to measure water level in a tank. Data from the sensor will be transmitted to a NodeMCU (ESP8266) and communicated through Wi-Fi to an Android app for display. The device will aid in monitoring the water level and taking appropriate action. It is a useful appliance for everyday use and may lead to the development of more advanced equipment in the future.

2. **Name of student:** Ashiesh Sharma

   Name of Supervisor: Dr. Pranjal Borah

   Title of project: Study And Design of Anechoic Chamber using CST

   Abstract: This work presents the basic concept and design principles of an anechoic chamber, which has been documented yearly since the 1930s. It explains how electromagnetic waves interact with absorber materials, including insertion and return losses. The study aims to optimise the design of a pyramidal radar absorber, and a simulation is conducted using CST Microwave Studio.

3. **Name of student:** Priyangshu Pragyan Borah

   Name of Supervisor: Dr. Pranjal Borah

   Title of project: Design and Simulation of a Helical Antenna for Low Frequency Radio Astronomical Observation

   Abstract: The advancement of wireless communication technology has rapidly progressed over the last decade, with the antenna serving as a crucial component. Various antenna types are used in diverse applications, and many studies have been conducted on their construction. This project aims to model and construct a helical antenna, measuring its S11 parameters, radiation pattern, and bandwidth, among other factors. Helical antennas are highly useful in the field of wireless communication.

4. **Name of student:** Rahul Choudhury

   Name of Supervisor: Dr. Pranjal Borah

   Title of project: Study and Design of a Low Noise Amplifier

   Abstract: Low noise amplifiers are essential components in communication systems, primarily used to amplify very weak signals while reducing ambient noise. This project focuses on designing an LNA with a 200 MHz centre frequency, first simulated using Multisim software, and then fabricated. The simulation results are compared to the measured results to verify the amplifier's performance.

5. **Name of student:** Devasish Barman

   Name of Supervisor: Dr. Manash Protim Goswami

   Title of project: Character Detection of Ancient Assamese Manuscript

   Abstract: Historical document processing involves using computer vision, document analysis and recognition, natural language processing, and machine learning to digitise ancient manuscripts and make them accessible to the public. In India and Assam, Kaitheli is a popular script with a rich history. Optical Character Recognition (OCR) is critical for identifying these documents, and Convolutional

Neural Networks (CNNs) have shown promise in this area. In this project, CNNs are used to identify 29 classes of fundamental characters in Ancient Kaitheli manuscripts. The study also tests different design variables to choose the optimal one and achieves 100% recognition accuracy for ancient Kaitheli characters.

6. **Name of student:** Dipankar Saharia

    Name of Supervisor: Dr. Madhurjya M. Borgohain

    Title of project: Synthesis and Characterization of Fe doped Ga_2O_3 by liquid phase precursor method

    Abstract: Iron (Fe) doped Gallium Oxide was synthesised through a liquid phase precursor method and PVP at high temperature. The researchers kept the doping amount of Fe constant and conducted experiments by varying the doping amounts at 5%, 10%, 15%, and 20%. The properties of the materials changed as the doping amount varied. The stirring temperature was set at (600 -1000) Celsius, and the samples were placed on a furnace at a fixed temperature of 6000 Celsius for 1 hour. The size of the materials was investigated using X Ray Diffraction and Scanning Electron Microscopy, while the composition of Iron (Fe) doped Gallium Oxide (Ga_2O_3) was studied using EDAX.

7. **Name of student:** Dikshita Sharma

    Name of Supervisor: Dr. Madhurjya M. Borgohain

    Title of project: Synthesis and Characterization of CeO_2 nanoparticles

    Abstract: This study describes the synthesis and characterisation of CeO_2 and doped CeO_2 nanoparticles using a co-precipitation method. Various metal ions, including Zr, Ti, and Sn, were doped into CeO_2 to investigate their effect on its structural and optical properties. Characterisation techniques, such as XRD, TEM, EDS, and UV-Vis spectroscopy, were used to analyse the synthesised nanoparticles. The results showed that doped CeO_2 nanoparticles had potential applications in catalysis, optoelectronics, and energy conversion due to their excellent catalytic, optical, and electronic properties.

8. **Name of student:** Riki Baruah

    Name of Supervisor: Dr. Debashis Saikia

    Title of project: Design and fabrication of Low-Cost Capacitive Sensor sensing system for salinity detection in water

    Abstract: Inter Digital (IDT) Sensors are widely used for different applications. In this study, IDT sensors with sensitive fringing field measurement abilities have been designed and optimised. A detailed investigation of different configurations of the IDT sensors has been carried out using Finite Element Method (FEM). The designed sensors are later fabricated and used to measure different levels of salinity present in the water.

9. **Name of student:** Minakshi Baishya

    Name of Supervisor: Dr. Debashis Saikia

    Title of project: Estimation of moisture content of citrus leaves, based on image processing techniques

    Abstract: Digital image processing is one of the quick and affordable methods of performing studies on plants. By simply taking a digital image and extracting usable information from it, image processing is widely employed in agricultural research. The most noticeable characteristics of leaves, such as shape, colour, texture, etc. can provide a wealth of essential information. With the help of this method, the

moisture content of plant leaves can also be monitored. The processing of images can be done by using digital computers.

10. **Name of student:** Mridupan Kalita

Name of Supervisor: Dr. Debashis Saikia

Title of project: Studies on design and implementation of E-nose in tea quality classification

Abstract: There are certain gases which are harmful to humans. To detect these types of gases, E-nose is essential. Also, gas sensors have a major role in this project. The gas sensors give voltage values as output which are found from different tea samples.

11. **Name of student:** Janak Nath & Rimjim Shibam

Name of Supervisor: Nairit Barkataki

Title of project: RFID based Library Management System

Abstract: Libraries are crucial for humans to learn and remember information, but the previous library system had issues. The new technology of RFID enables easy and productive management of library operations through identifying numerous tagged things, including books. This study proposes an RFID-based library management system that simplifies book transactions and reduces manual bookkeeping. The system uses passive RFID tags that electronically store data, which is read by an RFID reader, and computes the cost for each day a book is absent. Data is sent to a server via MQTT Protocol and stored in a MySQL database, and a prototype has been developed for practical implementation in the departmental library.

12. **Name of student:** Ankur Jyoti Kalita

Name of Supervisor: Nairit Barkataki

Title of project: Automatic Material Classification of Targets from GPR Data using Deep Learning Techniques

Abstract: Ground Penetrating Radar (GPR) is a non-invasive technique that categorises underground objects based on their electromagnetic properties. It is a preferred method in various fields like geology, civil engineering, archaeology, and military to identify buried objects. Buried objects like landmines and archaeological artefacts made of various materials can be identified using GPR and deep learning algorithms. This study proposes an ANN model that can automatically classify buried objects from GPR A-Scan data. The model achieves an overall accuracy of 95% and performs well in classifying three object classes: aluminium, iron, and limestone.

YEAR - 2021

13. **Name of student:** Gitartha Saikia

Name of Supervisor: Dr. Pranjal Borah

Title of project: Design and Simulation of Microstrip Patch Antenna Using WIPL-D Simulation Software

Abstract: In the past decade, wireless communication applications have rapidly developed, and antennas have become a major component. Different types of antennas are used for various applications, and researchers are working on different fabrication methods. This project focuses on simulating a microstrip patch antenna and analysing its S11 parameters, radiation pattern, and bandwidth. Microstrip antennas have numerous advantages in wireless communication, including being low-cost, lightweight, low-profile, easy to design, and capable of integrating microwave circuits.