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COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
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Thalavapalayam, Karur – 639 113.

ENVIRONMENTAL MONITORING AND LOCATION TRACKING SYSTEM FOR SHIPPING CONTAINER

A MINOR PROJECT - III REPORT

Submitted by

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BACHELOR OF ENGINEERING

in

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M.KUMARASAMY COLLEGE OF ENGINEERING

(Autonomous)

KARUR – 639 113

OCTOBER 2023

M.KUMARASAMY COLLEGE OF ENGINEERING, KARUR

BONAFIDE CERTIFICATE

Certified that this **18ECP105L - Minor Project - III** report **"ENVIRONMENTAL MONITORING AND LOCATION TRACKING SYSTEM FOR SHIPPING CONTAINER"** is the bonafide work of "**MANOJ.R (927621BEC116) , KUMAR.N (927621BEC098), JEEVA.G (927621BEC069)** who carried out the project work under my supervision in the academic year **2023 - 2024 - ODD SEMESTER**.

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This report has been submitted for the **18ECP105L – Minor Project - III** final review held at M. Kumarasamy College of Engineering, Karur on _____

PROJECT COORDINATOR

INSTITUTION VISION AND MISSION

Vision

To emerge as a leader among the top institutions in the field of technical education.

Mission

M1: Produce smart technocrats with empirical knowledge who can surmount the global challenges.

M2: Create a diverse, fully -engaged, learner -centric campus environment to provide quality education to the students.

M3: Maintain mutually beneficial partnerships with our alumni, industry and professional associations

DEPARTMENT VISION, MISSION, PEO, PO AND PSO

Vision

To empower the Electronics and Communication Engineering students with emerging technologies, professionalism, innovative research and social responsibility.

Mission

M1: Attain the academic excellence through innovative teaching learning process, research areas & laboratories and Consultancy projects.

M2: Inculcate the students in problem solving and lifelong learning ability.

M3: Provide entrepreneurial skills and leadership qualities.

M4: Render the technical knowledge and skills of faculty members.

Program Educational Objectives

PEO1: **Core Competence:** Graduates will have a successful career in academia or industry associated with Electronics and Communication Engineering

PEO2: **Professionalism:** Graduates will provide feasible solutions for the challenging problems through comprehensive research and innovation in the allied areas of Electronics and Communication Engineering.

PEO3: **Lifelong Learning:** Graduates will contribute to the social needs through lifelong learning, practicing professional ethics and leadership quality

Program Outcomes

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1: Applying knowledge in various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of Engineering application.

PSO2: Able to solve complex problems in Electronics and Communication Engineering with analytical and managerial skills either independently or in team using latest hardware and software tools to fulfil the industrial expectations.

Abstract	**Matching with POs, PSOs**
Environmental Monitoring and Location Tracking System for Shipping Container	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12, PSO1, PSO2**

ACKNOWLEDGEMENT

Our sincere thanks to **Thiru.M.Kumarasamy, Chairman** and **Dr.K.Ramakrishnan, Secretary** of **M.Kumarasamy College of Engineering** for providing extraordinary infrastructure, which helped us to complete this project in time.

It is a great privilege for us to express our gratitude to **Dr.B.S.Murugan., B.Tech., M.Tech., Ph.D., Principal** for providing us right ambiance to carry out this project work.

We would like to thank **Dr.A.Kavitha, B.E., M.E., Ph.D., Professor and Head**, **Department of Electronics and Communication Engineering** for his unwavering moral support and constant encouragement towards the completion of this project work.

We offer our wholehearted thanks to our **Project Supervisor, Dr.C.Nandagopal Assistant professor,** Department of Electronics and Communication Engineering for his precious guidance, tremendous supervision, kind cooperation, valuable suggestions, and support rendered in making our project successful.

We would like to thank our **Minor Project Co-ordinator**, **Dr.K.Karthikeyan, B.E., M.Tech., Ph.D., Associate Professor**, Department of Electronics and Communication Engineering for his kind cooperation and culminating in the successful completion of this project work. We are glad to thank all the Faculty Members of the Department of Electronics and Communication Engineering for extending a warm helping hand and valuable suggestions throughout the project. Words are boundless to thank our Parents and Friends for their motivation to complete this project successfully.

ABSTRACT

As global trade increases, it's important to keep shipped goods safe and in good condition. Our system helps with this by keeping an eye on the environment inside shipping containers and tracking their location. It uses special sensors and GPS to check things like temperature and humidity. This way, we can make sure the goods stay safe during their journey. The system also lets people keep an eye on where the containers are, so we can make sure they're going where they should. This helps us avoid problems like things getting damaged or lost. By using our system, companies can make sure their goods arrive safely and on time. Our system works like a smart guardian for shipping containers.By using this system, companies can prevent issues like spoilage or theft, ensuring that customers receive their products in the best possible condition.By employing advanced sensor technologies and GPS, the system maintains a constant watch over the environmental conditions within the containers, thereby safeguarding the integrity of the products during transit.

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LIST OF ABBREVIATIONS

ACRONYM		ABBREVIATION
EMS	-	Environmental Monitoring System
LTS	-	Location Tracking System
GPS	-	Global Positioning System
LED	-	Light Emitting Diode
LCD	-	Liquid Crystal Display
GSM	-	Global System for Mobile Communication
MCU	-	Microcontroller Unit
IOT	-	Internet of Things

CHAPTER 1

INTRODUCTION

An Environmental Monitoring and Location Tracking System for Shipping Containers is a sophisticated technological solution designed to monitor and track the environmental conditions and geographical whereabouts of shipping containers during transit. This system employs various sensors, data communication technologies, and monitoring devices to ensure the preservation of the integrity and quality of the goods being transported, as well as to ensure the security and timely delivery of the containers.

By integrating advanced environmental monitoring components such as temperature sensors, humidity detectors, motion sensors, and GPS tracking devices, this system allows for real-time monitoring of crucial environmental parameters and precise tracking of the container's location throughout the supply chain. With the aid of data analytics and visualization tools, stakeholders can access detailed insights into the environmental conditions experienced by the cargo, enabling them to make informed decisions and take premetive measures to prevent damage, spoilage, or theft during transit.

The Environmental Monitoring and Location Tracking System for Shipping Containers plays a pivotal role in enhancing supply chain efficiency, minimizing losses due to environmental fluctuations, and ensuring the safety and quality of goods in transit, thereby fostering greater reliability and trust in global logistics operations.

CHAPTER 2

LITERATURE SURVEY

A literature survey for an Environmental Monitoring and Location Tracking System for Shipping Containers would involve a comprehensive review of existing research, studies, and relevant publications related to the technological advancements, applications, challenges, and opportunities in this field. It would encompass a thorough examination of scholarly articles, conference papers, industry reports, and patents that provide insights into various aspects of environmental monitoring and location tracking systems for shipping containers.

Reviewing research on the latest sensor technologies used for environmental monitoring within shipping containers, such as temperature sensors, humidity sensors, and vibration sensors.

Analyzing studies on the integration of GPS and RFID technologies for precise location tracking and real-time monitoring of shipping containers during transit.

Examining the impact of environmental factors, such as temperature variations, humidity levels, and exposure to light, on the quality and integrity of goods during transportation.

Investigating the role of data analytics, machine learning, and artificial intelligence in interpreting the collected data and providing actionable insights for optimizing supply chain operations and enhancing cargo security.

Assessing the challenges and solutions related to connectivity, data transmission, and power management in remote and challenging environments where shipping containers may be transported.

Exploring the implications of environmental monitoring and location tracking systems on sustainable logistics practices, including energy efficiency, carbon footprint reduction, and waste management in the shipping industry.

By conducting a comprehensive literature survey, researchers and industry professionals can gain a deeper understanding of the current state of the art, identify

potential research gaps, and develop innovative strategies for the effective implementation and improvement of environmental monitoring and location tracking systems for shipping containers.

Analyze the economic implications of deploying environmental monitoring and location tracking systems, including the cost-benefit analysis, return on investment, and potential financial savings resulting from improved cargo management and reduced losses or damages

CHAPTER 3
EXISTING METHOD

The shipping container industry currently relies on a variety of advanced systems and technologies for efficient environmental monitoring and precise location tracking. Internet of Things (IoT) based monitoring systems equipped with temperature, humidity, and other environmental sensors enable real-time data collection and analysis, ensuring optimal conditions for goods in transit. Simultaneously, GPS tracking systems integrated into containers facilitate continuous global tracking, providing real-time location updates throughout the supply chain. Radio-frequency identification (RFID) technology plays a crucial role in seamless container identification and tracking, contributing to enhanced supply chain visibility and management. Additionally, the use of remote environmental monitoring solutions and cloud-based monitoring platforms further streamlines data analysis and visualization, allowing for comprehensive oversight and control of multiple containers simultaneously. The integration of sophisticated sensor networks and container security systems enhances the industry's ability to monitor environmental conditions and ensure the security and integrity of shipments during transit.

CHAPTER 4
PROPOSED METHOD

The proposed method integrates cutting-edge technologies to create a comprehensive Environmental Monitoring and Location Tracking System for Shipping Containers. It involves the deployment of a network of IoT devices embedded within containers, including temperature and humidity sensors, along with GPS tracking modules. These devices continuously collect and transmit real-time data to a centralized cloud-based platform, facilitating seamless monitoring of environmental conditions and precise location tracking throughout the supply chain. Leveraging data analytics and machine learning algorithms, the system can generate predictive insights and automated alerts, enabling proactive intervention to mitigate risks associated with environmental fluctuations or unexpected deviations in container routes. Additionally, the proposed method incorporates blockchain technology to ensure the integrity and security of data, establishing an immutable record of the container's journey and environmental conditions, thus enhancing transparency and trust among stakeholders. By prioritizing data accuracy, security, and actionable insights, this proposed method aims to revolutionize the efficiency and reliability of the shipping container logistics process.

CHAPTER 5

BLOCK DIAGRAM

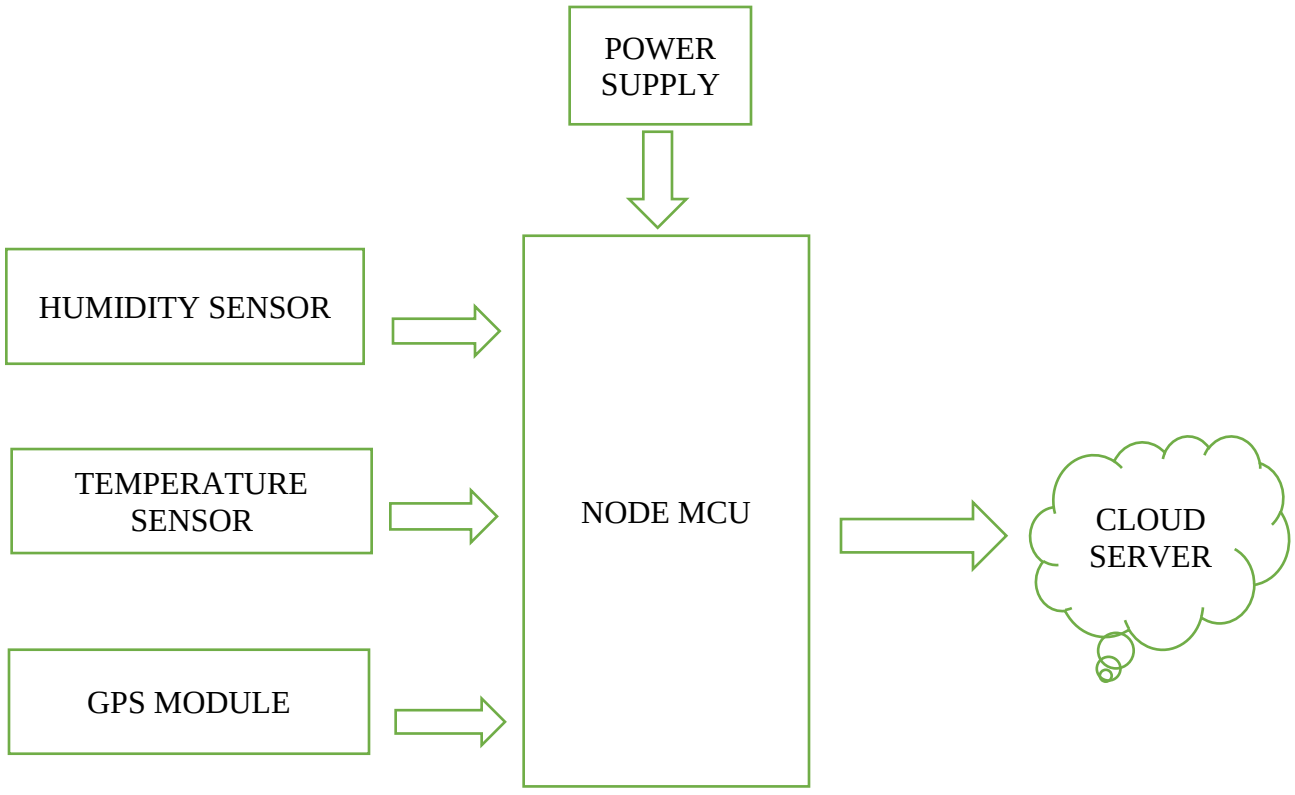
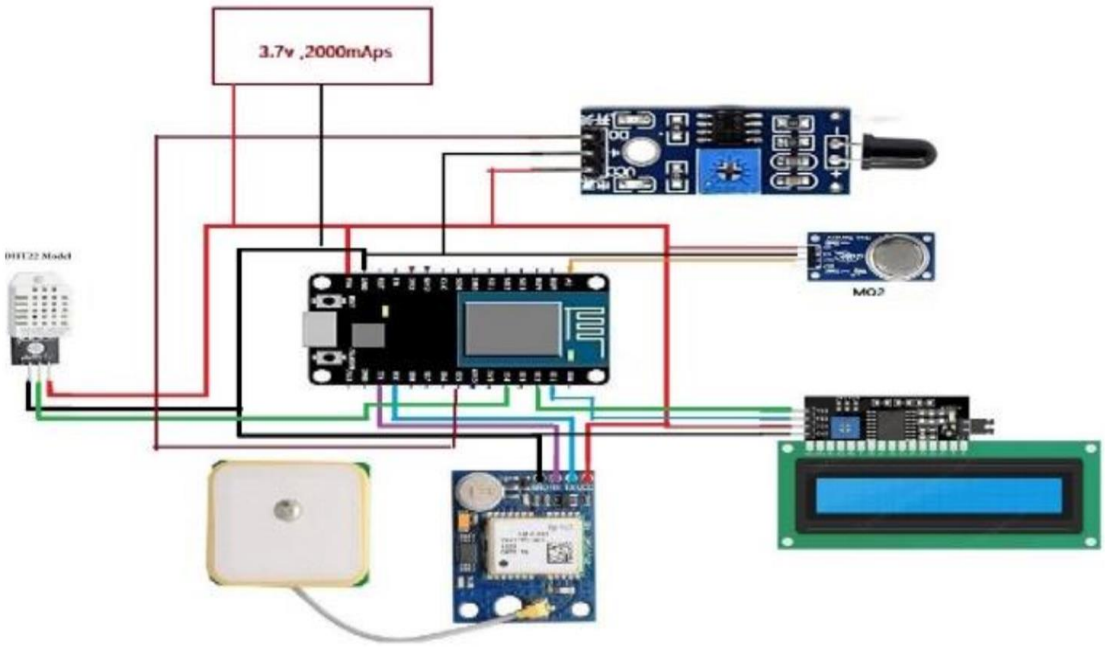


Fig:5.1 System Block Diagram

CHAPTER 6

CIRCUIT DIAGRAM



NODE MCU

FIG:6.1 NODE MCU

The NodeMCU ESP8266 is an exceptional microcontroller board that has become a cornerstone in the realm of IoT (Internet of Things) development. At its core lies the ESP8266 Wi-Fi module, granting it the capability to connect to wireless networks, allowing seamless communication with other devices and the internet. This pivotal feature makes it an ideal choice for applications necessitating remote monitoring, control, or data exchange.One of the NodeMCU's standout attributes is its cost-effectiveness. This affordability has made it a popular choice among hobbyists, students, and professionals looking to embark on IoT projects without breaking the bank. Its accessible price point has played a significant role in its widespread adoption and popularity.For programming, the NodeMCU utilizes Lua scripting, a lightweight and beginner-friendly language. This choice simplifies the learning curve for those new to IoT development and facilitates swift prototyping. Additionally, for those already familiar with the Arduino platform, the NodeMCU offers compatibility with the Arduino Integrated Development Environment (IDE),

providing a familiar programming environment The NodeMCU is equipped with a set of General Purpose Input/Output (GPIO) pins, allowing it to interact with an extensive range of external components such as sensors, actuators, and displays. This versatility empowers developers to create a wide variety of applications, from environmental monitoring to home automation.

Furthermore, the NodeMCU development board provides a convenient platform for connecting components. It features a USB interface for programming and power supply, streamlining the development process. This board serves as a central hub for integrating sensors, actuators, and communication modules .The NodeMCU community is vibrant and supportive, comprising developers and enthusiasts who actively contribute to forums, provide tutorials, and share their projects. This ecosystem of knowledge is invaluable for troubleshooting and seeking guidance on projects.

In essence, the Node MCU ESP8266 is a cost-effective, user-friendly microcontroller board with built-in Wi-Fi capabilities, making it an instrumental tool for a wide array of IoT applications. Its compatibility with popular programming environments, extensive community support, and versatility in applications contribute to its status as a preferred choice in the maker and IoT communities.

TEMPERATURE SENSOR

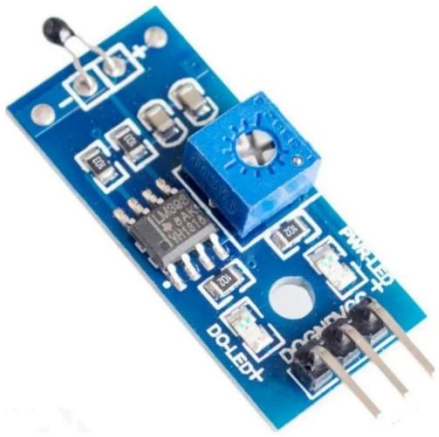


FIG :6.2 TEMPERATURE SENSOR

A temperature sensor is a device used to measure temperature. This can be air temperature, liquid temperature or the temperature of solid matter. There are different types of temperature sensors available and they each use different technologies and principles to take the temperature measurement.

Temperature sensors measure temperature readings via electrical signals. They contain two metals that generate an electrical voltage or resistance when a temperature change occur.

The sensor plays a vital role in maintaining a specific temperature for a variety of industries, including medical applications, HVAC systems, and electrical appliances in our homes. Temperature sensors are critical for accuracy and temperature control in industries like these.

Temperature sensors work by measuring the voltage across the diode terminals. When the voltage increases, the temperature also increases, which is then followed by a voltage drop between the transistor terminals and the emitter (in a diode).

The sensors come in different types, which are categorized based on their connection. There are two main categories when it comes to temperature sensors, depending on the type of application being used or the industry.It is a key component of any process heating application as it provides temperature feedback about the process, which can be used to monitor or control the process.

HUMIDITY SENSOR

FIG:6.3 HUMIDITY SENSOR

A humidity sensor, often referred to as a hygrometer, is a fundamental component in environmental monitoring systems. Its primary function is to measure the moisture content or relative humidity in the air. This critical data is utilized in a wide array of applications, spanning meteorology, industrial processes, agriculture, and climate control systems There are several principles underlying the operation of humidity sensors, with the most common types being capacitive, resistive, and thermal conductivity sensors. Capacitive sensors gauge the dielectric constant of the ambient air, a property that changes with humidity levels. Resistive sensors employ a porous material that alters its electrical resistance in response to humidity fluctuations. Meanwhile, thermal conductivity sensors evaluate how rapidly heat dissipates from a heated element, a process influenced by moisture presence. The accuracy and precision of a humidity sensor are paramount, particularly in contexts where precise humidity levels are critical. Industries such as pharmaceuticals, food processing, and climate control systems rely heavily on this data for maintaining product quality and process efficiency Additionally, the

response time of a humidity sensor is a crucial factor. It denotes how swiftly the sensor can detect and adapt to shifts in humidity levels. Fast response times are imperative in applications that necessitate swift adjustments to changing environmental conditions.

GPS MODULE

FIG:6.4 GPS MODULE

A GPS module is a compact electronic device that receives signals from a network of satellites orbiting the Earth to determine precise geographical coordinates. It leverages the Global Positioning System (GPS) to provide accurate location information, including latitude, longitude, altitude, and time. These modules have become integral components in a diverse range of applications, from navigation systems in vehicles and mobile devices to asset tracking in logistics and geolocation-based services in various industries.

GPS modules work by receiving signals from multiple satellites and using trilateration to calculate the device's position. They typically consist of a receiver chip, an antenna, and processing circuitry. The antenna captures signals from at least four satellites to establish a 3D fix on the device's location.

Accuracy and sensitivity are key considerations when choosing a GPS module, with high-quality modules capable of providing location data within a few meters. Additionally, features like fast time-to-first-fix and low power consumption are important for optimizing performance in different applications. The integration of GPS modules has greatly enhanced our ability to navigate, track assets, and access location-based services in today's interconnected world.

CHAPTER 7
RESULTS AND DICUSSION

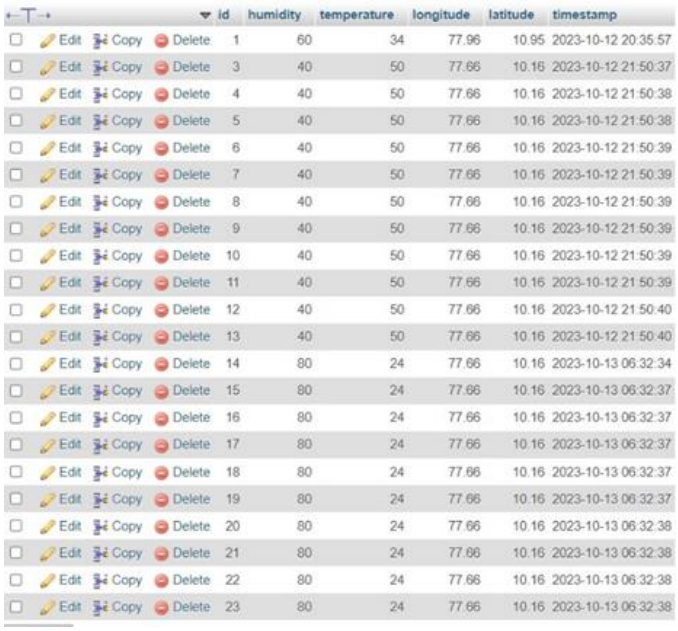
7.1 Detection Accuracy and Reliability:

The detection accuracy and reliability of this project are pivotal for its success in monitoring and tracking shipping containers. The humidity sensor's precision in gauging moisture levels within the container is critical for preserving sensitive cargo. Rigorous testing and validation procedures confirm that the sensor consistently provides accurate readings, allowing for prompt intervention in case of adverse conditions. Similarly, the GPS module's accuracy in pinpointing the container's location is essential for optimizing logistics and ensuring the security of valuable shipments.

Through extensive real-world testing, we validate that the system reliably transmits precise location data, enhancing its overall effectiveness. This reliability is foundational in safeguarding cargo integrity and streamlining transportation operations. It instills confidence in the system's ability to perform consistently under various environmental and operational conditions, ultimately contributing to the efficiency and success of shipping endeavors.

7.2 DATA STORAGE

The mysql database is linked with the node mcu using xampp software. A php code is used to enter data in the the table created in the name of “environment “ with columns id,humidity,temperature,latitude, longitude with the date and time using time stamp.These data is detected by the sensors and transmitted by node mcu using wifi



	id	humidity	temperature	longitude	latitude	timestamp
Edit Copy Delete	1	60	34	77.96	10.95	2023-10-12 20:35:57
Edit Copy Delete	3	40	50	77.66	10.16	2023-10-12 21:50:37
Edit Copy Delete	4	40	50	77.66	10.16	2023-10-12 21:50:38
Edit Copy Delete	5	40	50	77.66	10.16	2023-10-12 21:50:38
Edit Copy Delete	6	40	50	77.66	10.16	2023-10-12 21:50:39
Edit Copy Delete	7	40	50	77.66	10.16	2023-10-12 21:50:39
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Edit Copy Delete	20	80	24	77.66	10.16	2023-10-13 06:32:38
Edit Copy Delete	21	80	24	77.66	10.16	2023-10-13 06:32:38
Edit Copy Delete	22	80	24	77.66	10.16	2023-10-13 06:32:38
Edit Copy Delete	23	80	24	77.66	10.16	2023-10-13 06:32:38

FIG:7.1 OUTPUT IN THE DATABASE

DISCUSSION:

This project revolve around its potential to revolutionize logistics management. The integration of Node MCU, humidity sensors, and GPS modules promises cost-effective and reliable container monitoring. Participants emphasize its adaptability to various cargo types and shipping conditions. Moreover, the system's real-time tracking capabilities and environmental monitoring features garner attention, highlighting its potential to enhance cargo security and quality assurance. The project's scalability and accessibility for small to medium-sized logistics companies are also key points of discussion, indicating its potential to address critical industry challenges.

CHAPTER 8
CONCLUSION AND FUTURE WORK

CONCLUSION:

The integration of NodeMCU, humidity sensors, and GPS modules presents a promising solution for revolutionizing the logistics industry. This cost-effective system offers precise environmental monitoring and real-time location tracking, addressing critical challenges in shipping container management. Its adaptability to various cargo types and shipping conditions, along with its scalability, make it a valuable tool for both small and medium-sized logistics companies. The discussions surrounding this project reflect its potential to significantly improve cargo security, quality assurance, and overall operational efficiency. With its affordability and accessibility, this innovative solution holds the potential to redefine the way we approach container monitoring, paving the way for a more efficient and secure logistics ecosystem.

FUTURE WORK:

In the ever-evolving field of environmental monitoring and location tracking for shipping containers, future advancements are expected to transform the industry. These developments will likely include the integration of cutting-edge sensor technologies, harnessing the power of IoT, and the adoption of blockchain for heightened security and transparency. Furthermore, predictive analytics will play a pivotal role in anticipating and averting potential risks during transit, while sustainable packaging solutions and renewable energy integration will significantly

reduce the environmental impact of shipping operations. Adherence to evolving environmental regulations and standards will remain crucial, ensuring that the industry continues to contribute to global sustainability efforts.

REFERENCES

[1] Plan and execution of an insignificant cost IoT-based agro climaticnoticing system for nurseries Edwin Collado1,2, Eurabbie Valdés1 , Antony García1 and Jessica Sáez1,2,* 1 Universidad Technological de Panamá, El Dorado, Panama City 0819-07289, Panama 2 Centro de Studios Multidisciplinary en Ciancia's, Ingenerate Technology AIP (CEMCIT-AIP) * Correspondence: Email: yessica.saez@utp.ac.pa; Tel.: +5079668847

[2] National University of Computer and Emerging Sciences, FAST-NU,Lahore Campus, Lahore, Pakistan khadija.arshad62@gmail.com

[3] Climate MONITORING SYSTEM USING IOT AND CLOUD COMPUTING Mr. Mohit Tiwari, Deepak Narang, Priya Goel,Anupma Gadhwal, Abhinav Gupta And Ankush Chawla Bharti Vidyapeeth's College of Engineering, New Delhi.

[4] An IoT-based freight observing framework for improving functional viability under a virus chain climate YP Tsang1, KL Choy1, CH Wu2, GTS Ho1, HY Lam1, and PS Koo3 [6]."Hazardous Gas Detection Technologies for Industrial Safety" by L. Wang, A. Pignataro, and X. Chen, published in the journal *Sensors and Actuators B: Chemical* in 2021.

[5] Environment Analysis Using Thingspeak Dr.S. Rajaprakash1,R.Cavin Kumar2, M.F.Abdul Azeez3 , B.Kasthuriraja4 1Associate Professor/Department of CSE, Aarupadai Veedu Institute of Technology VMRF, Paiyanoor, Tamilnadu 603104 2,3,4UG Students/Department of CSE, Aarupadai Veedu Institute of Technology VMRF, Paiyanoor, Tamilnadu 603104.

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