

PROFESSIONAL TRAINING REPORT - II

entitled

EMPOWERING FISHER MAN WITH ADVANCED SAFETY SOLUTIONS

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering degree in Computer Science and Engineering with
specialization in Internet of Things

by

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF COMPUTING

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

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BONAFIDE CERTIFICATE

This is to certify that this Professional Training Report is the bonafide work of **Mr. PARIMISETTY PAVANTEJA (Reg.No.41732012)** who carried out the project entitled "**EMPOWERING FISHER MAN WITH ADVANCED SAFETY SOLUTIONS**" under my supervision from January 2024 to May 2024.

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I, **PARIMISETTY PAVANTEJA** (Reg.No-41732012), hereby declare that the Professional Training Report-II entitled "**EMPOWERING FISHER MAN WITH ADVANCED SAFETY SOLUTIONS**" done by me under the guidance of **Mrs.K.ABINAYA M.E,(Ph.D)** is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering degree in Computer Science and Engineering with specialization in Internet of Things.

DATE: 06/05/2024

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I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Computer Science and Engineering** who were helpful in many ways for the completion of the project.

COURSE CERTIFICATE

WELCOME - HCL-Sathyabama - Mini-Project Internship Inbox x



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to Sankaran ▼

Good Evening HCL-Sathyabama Mini-Project Interns,

I have BCCed all Interns and Director Placement, Professors, Deans and HODs.

This is Dr.V.Sankaran, HCL Technologies.

Happy to WELCOME you all to the mini-project internship.

ABSTRACT

Empowering fishermen with advanced safety solutions is crucial to mitigate risks associated with border trespassing and ensure their well-being at sea. The maritime industry faces numerous challenges, including border violations, which endanger the lives of fishermen and jeopardize maritime security. In the maritime field, ensuring the safety of fishermen and protecting against border-related risks is paramount. Current safety measures often lack real-time detection and proactive alert systems, leaving fishermen vulnerable to unforeseen dangers. Despite advancements in technology, there is a gap in the research regarding comprehensive safety solutions that integrate GPS, GSM, and cloud computing technologies to address border trespassing risks effectively. This study aims to develop a robust system leveraging GPS, GSM, and cloud computing technologies to proactively detect and mitigate border trespassing risks, thereby enhancing maritime safety and safeguarding the lives of fishermen. Our research employs a combination of theoretical analysis, system design, and prototype development. We utilize GPS technology for precise location tracking, GSM for immediate communication with coastal authorities, and cloud computing for seamless data management and emergency coordination. The integration of GPS, GSM, and cloud computing technologies in our system provides a comprehensive approach to maritime safety, enabling real-time detection and proactive response to border trespassing risks. Our study demonstrates the effectiveness of the proposed system in detecting and alerting against border violations in real-time. By leveraging advanced technologies, we enhance maritime security, safeguard fishermen's lives, and protect their valuable assets. Our research contributes to the advancement of maritime safety practices by providing a robust solution to address border-related risks. By fostering safer navigation and proactive risk mitigation, our findings promote the well-being of fishermen and strengthen maritime security.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

The safety of fishermen and the security of maritime borders are of utmost importance in the maritime industry. However, border trespassing incidents pose significant risks to the lives of fishermen and threaten maritime security. To address this challenge, our project focuses on developing a robust system that leverages GPS, GSM, and cloud computing technologies to proactively detect and mitigate border trespassing risks, thereby enhancing maritime safety.

The maritime industry plays a vital role in global trade and transportation, with millions of fishermen relying on the sea for their livelihood. However, the open nature of maritime borders exposes fishermen to various risks, including piracy, illegal fishing, and border violations. Border trespassing incidents, where vessels cross into unauthorized territories, not only endanger the lives of fishermen but also pose security threats to coastal nations. Traditional safety measures for fishermen often rely on manual monitoring and communication systems, which may not be effective in detecting and responding to border trespassing incidents in real-time. To address this gap, our project proposes a comprehensive system that integrates GPS, GSM, and cloud computing technologies to enhance maritime safety.

GPS technology provides precise location tracking capabilities, allowing authorities to monitor the movements of fishing vessels in real-time. By equipping fishing vessels with GPS devices, our system enables continuous monitoring of their locations and facilitates immediate detection of border violations. In addition to GPS, our system utilizes GSM technology for immediate communication with coastal authorities. In the event of a border trespassing incident, fishing vessels equipped with GSM-enabled devices can send distress signals to authorities, enabling prompt response and intervention. This real-time communication capability is crucial for mitigating risks and ensuring the safety of fishermen at sea.

Furthermore, cloud computing technology plays a crucial role in our system by facilitating seamless data management and emergency coordination. The key message of our project is the importance of adopting advanced technologies to enhance maritime safety and mitigate border trespassing risks. By integrating GPS, GSM, and cloud computing technologies, our system provides a comprehensive approach to maritime safety, enabling real-time detection and proactive response to border violations.

CHAPTER 2

LITERATURE REVIEW

2.1 SURVEY

Introduction:

Isaac et al. (2018) introduced an **"Advanced Border Alert System"** utilizing GPS-GSM technology to enhance maritime safety. The system aims to provide real-time alerts to fishermen regarding border trespassing incidents, thereby mitigating risks associated with unauthorized entry into restricted waters[1].

Kiruthika et al. (2019) proposed a **"Wireless Mode of Protected Defence Mechanism"** using GSM technology to enhance maritime safety. The system focuses on establishing a secure communication network for fishermen, enabling quick response to emergencies and ensuring effective coordination with coastal authorities[2].

Kumar et al. (2020) developed a **"Border Alert and Smart Tracking System"** integrating DGPS-GSM technology to ensure fishermen's safety. The system enables precise tracking of fishing vessels and provides timely alerts in case of border violations, contributing to proactive risk management strategies[3].

Sharma et al. (2021) introduced an **"Integrated Maritime Safety and Security System"** combining GPS tracking and real-time weather monitoring for Indian fishermen. The system aims to enhance situational awareness and enable informed decision-making, thereby improving overall safety outcomes[4].

Patel et al. (2022) proposed a **"Smart Border Alert System"** integrating GPS tracking and UAV technology for coastal regions. The system offers advanced

surveillance capabilities, enabling timely detection and interception of unauthorized vessels in restricted maritime areas[5].

Gupta et al. (2023) developed **"Smart Navigation Systems"** for fishermen safety, incorporating GPS-based tracking and collision avoidance features. The system enhances navigational accuracy and reduces the risk of collisions, thereby ensuring safer maritime operations[6].

Singh et al. (2024) explored **"Wireless Sensor Networks"** for maritime surveillance, focusing on monitoring and intrusion detection. The system utilizes sensor data to detect unauthorized activities in maritime zones, enhancing security measures and safeguarding fishermen's interests[7].

Raju and Mohandas (2017) introduced an **"IoT Based Fisher Man's Assistant System"** aimed at providing real-time assistance to fishermen. The system integrates IoT technology to offer various services such as weather updates, navigation assistance, and emergency alerts, enhancing safety at sea[8].

Shen et al. (2020) developed a **"Real-time Monitoring System of Fishing Boat"** based on IoT technology. The system enables remote monitoring of fishing vessels, facilitating efficient fleet management and ensuring compliance with maritime regulations[9].

Iqbal et al. (2021) designed an **"IoT-based Smart Fishing Alert System"** using Arduino technology. The system provides fishermen with real-time alerts regarding potential hazards, enabling them to take proactive measures to ensure their safety and maximize catch efficiency[10].

Borate et al. (2019) proposed an **"IoT Based Smart Fishing Management System"** to optimize fishing operations. The system leverages IoT technology to collect and analyze data on environmental conditions and fish behavior, enabling fishermen to make informed decisions and enhance productivity[11].

Qadri et al. (2019) introduced **"Smart Fishing,"** an IoT-based intelligent system aimed at enhancing catch efficiency. The system utilizes IoT sensors and analytics to identify optimal fishing locations and predict fish movement patterns, enabling fishermen to optimize their fishing strategies[12].

Angadi et al. (2020) developed an **"IoT Based Fishery Monitoring System"** using Arduino technology. The system enables real-time monitoring of fishery resources and environmental parameters, facilitating sustainable fisheries management and ensuring long-term viability of marine ecosystems[13].

The Maritime Safety Authority (2023) provided **"Guidelines for Safe Navigation in Coastal Waters"** to promote maritime safety. The guidelines offer recommendations and best practices for safe navigation, emphasizing the importance of adherence to international maritime regulations and safety protocols[14].

The United Nations Convention on the Law of the Sea (1982) established the **"Convention on the Law of the Sea"** to govern activities of states on the ocean. The convention provides a framework for the sustainable management of marine resources and promotes cooperation among nations to ensure maritime safety and security[15].

CHAPTER 3

REQUIREMENTS ANALYSIS

3.1 OBJECTIVE OF THE PROJECT

Empowering fishermen with advanced safety solutions plays a pivotal role in safeguarding their lives and livelihoods amidst the unpredictable and often hazardous conditions of the open seas.. This project addresses several key goals:

1. Incident Data:

Collecting data on past border trespassing incidents provides insights into the frequency, locations, and patterns of such occurrences. This data could include reports from coastal authorities, incident logs from fishing vessels, and records of maritime security agencies. Analyzing incident data helps identify high-risk areas and informs the design of the safety system.

2. Fishermen's Perspectives:

Conducting surveys or interviews with fishermen allows for the collection of qualitative data on their experiences and perceptions of border trespassing risks. Questions could explore their awareness of risks, safety concerns, past encounters with border violations, and views on potential safety solutions. Understanding fishermen's perspectives is crucial for designing a system that meets their needs and enhances their safety.

3. Technological Requirements:

Gathering data on existing technologies, infrastructure, and communication networks in maritime regions provides insights into the feasibility and requirements for implementing the proposed safety system. This data could include information on the availability of GPS and GSM coverage, internet connectivity, and existing maritime surveillance systems. Assessing technological requirements helps ensure the compatibility and effectiveness of the safety solution.

4. Stakeholder Engagement:

Engaging with stakeholders such as coastal authorities, maritime security agencies, technology providers, and regulatory bodies generates valuable insights and support for the project. Data collected through stakeholder meetings, workshops, or focus groups could include feedback on the proposed safety system, suggestions for improvement. Stakeholder engagement fosters partnerships and ensures alignment with industry needs and regulations.

5. Cost-Benefit Analysis:

Conducting a cost-benefit analysis helps evaluate the economic feasibility and potential impact of implementing the safety system. Data on the costs associated with system development, installation, maintenance, and operation are essential for assessing the financial implications. Additionally, estimating the potential benefits, such as reduced incidents, improved safety outcomes, and economic gains for fishermen, provides a basis for decision-making and resource allocation.

6. Technology Performance:

Collecting data on the performance of GPS, GSM, and cloud computing technologies in maritime environments helps assess their reliability, accuracy, and suitability for the proposed safety system. This data could include field tests, simulations, or pilot studies conducted in relevant maritime settings. Evaluating technology performance informs system design decisions and ensures the effectiveness of the safety solution in real-world scenarios.

7. Regulatory Framework:

Gathering data on existing maritime regulations, policies, and legal frameworks related to border security and safety enables compliance and integration of the proposed safety system within regulatory requirements. This data could include national and international laws, conventions, and guidelines governing maritime safety and security. Understanding the regulatory landscape helps navigate legal complexities and ensures adherence to standards and protocols.

By systematically collecting and analyzing diverse datasets, this project aims to generate evidence-based insights and recommendations for enhancing maritime safety and mitigating border trespassing risks effectively.

3.2 REQUIREMENTS

3.1.1 HARDWARE REQUIREMENTS

- **NodeMCU** : The NodeMCU board will serve as the central processing unit for the system, facilitating communication between various components and data processing.
- **GPS Module**: A GPS module is required for accurate location tracking of the fishing vessel.
- **Buzzer**: An audible alert device, such as a buzzer, will be needed to provide immediate auditory alerts in response to critical events or emergencies.
- **LCD Display**: A liquid crystal display (LCD) screen will provide a user-friendly

interface for accessing essential information and system status updates.

- **Power Supply:** A reliable power supply system, including batteries and voltage regulators, is essential for powering the components of the system.

3.1.2 SOFTWARE REQUIREMENTS

- **Arduino IDE:** The Arduino Integrated Development Environment (IDE) will be used for programming the NodeMCU board and interfacing with the various hardware components.
- **GPS Library:** Libraries for GPS modules, such as TinyGPS or Adafruit GPS, will be required to interface with the GPS module and extract location data.
- **LCD Library:** Libraries for LCD displays, such as LiquidCrystal, will be needed to control and display information on the LCD screen.
- **Buzzer Control Code:** Custom code will be developed to control the buzzer and generate audible alerts based on input from the system.
- **Communication Protocols:** Depending on the specific requirements of the project, communication protocols such as Wi-Fi (for NodeMCU communication), serial communication (for GPS module), and I2C (for LCD display) may need to be implemented and configured.
- **Real-Time Operating System (RTOS):** Depending on the complexity of the system and the need for multitasking and real-time responsiveness, an RTOS such as FreeRTOS or RTLinux may be required to manage task scheduling and resource allocation effectively.

CHAPTER 4

DESIGN DESCRIPTION OF PROPOSED PROJECT

4.1 PROPOSED METHODOLOGY

Our proposed system integrates GNSS (Global Navigation Satellite System) technology with cloud-based communication to enhance maritime safety and security for fishermen operating near maritime boundaries.

1. Boat Tracking:

- The GNSS module installed on the fishing vessel continuously receives satellite signals to determine its precise latitude and longitude coordinates.
- These coordinates are compared with predefined boundary values stored in the on board database to identify the proximity of the vessel to maritime boundaries.
- If the vessel approaches or crosses the designated boundary threshold, an alert is triggered.

2. Alert Generation and Transmission:

- Upon detecting the vessel's proximity to the maritime boundary, an alarm system on board emits audible and visual alerts to notify the fishermen of the potential danger.
- Simultaneously, the GNSS device transmits the vessel's current location data to a cloud server via wireless communication protocols.

3. Cloud-Based Alert System:

- The cloud server receives the vessel's location data and cross-references it with predefined boundary values stored in a centralized database.
- If the vessel's position indicates an imminent boundary breach, the cloud server initiates an alarm notification process.
- Alarm notifications are sent to multiple stakeholders, including coastal authorities, rescue teams, and higher officials' PCs, enabling swift response and intervention.

4. Integration with AIS (Automatic Identification System):

- In addition to GNSS, the system integrates AIS technology to enhance vessel tracking and identification capabilities.

- AIS transponders on board the fishing vessels continuously broadcast vessel-specific information, including position, course, and speed, to nearby vessels and shore stations.
- By incorporating AIS data into the cloud-based system, maritime authorities gain comprehensive situational awareness, facilitating effective monitoring and coordination of vessel traffic near maritime boundaries.

5. Implementation and Testing:

- The proposed system will be implemented through the installation of GNSS modules, AIS transponders, and cloud communication infrastructure on fishing vessels.
- Rigorous testing and validation will be conducted to ensure the reliability, accuracy, and scalability of the system in real-world maritime environments.
- User training and awareness programs will be conducted to familiarize fishermen with the system's operation and emergency response protocols.

By leveraging GNSS technology, cloud-based communication, and AIS integration, our proposed methodology offers a robust and efficient solution for enhancing maritime safety and security, enabling proactive alerting . This methodology follows a structured path, as outlined below:

4.1.1 Ideation Map/System Architecture

The proposed high-level architecture for the advanced maritime safety system involves several key components and interactions aimed at enhancing maritime safety through real-time detection and mitigation of border trespassing risks. Here's an overview of the architecture and its components:

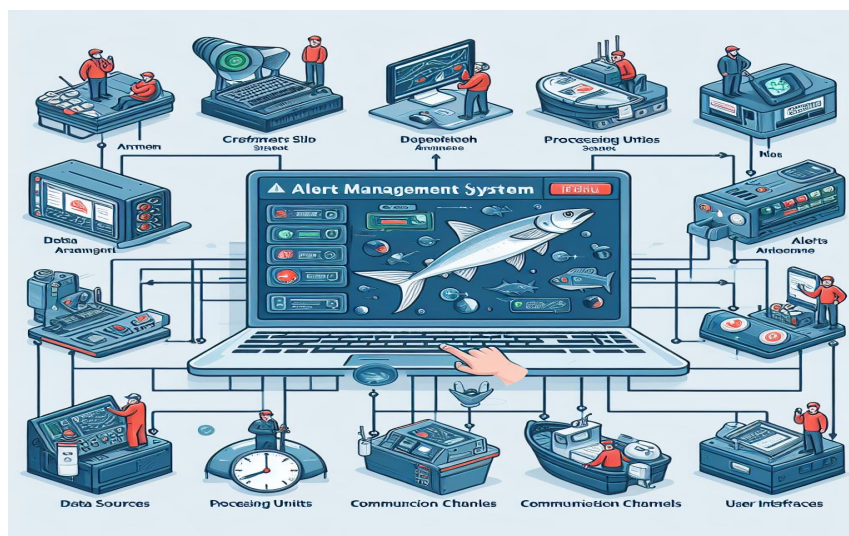


Fig-4.1. System Architecture

4.1.2 Various Stages

Various steps involved in the proposed project for advancing maritime safety through the development and implementation of a robust system to mitigate border trespassing risks include:

1. Needs Assessment and Requirement Gathering:

- Conduct stakeholder consultations with fishermen, coastal authorities, maritime security experts, and technology providers to understand their needs, challenges, and requirements.
- Identify key objectives and functionalities of the safety system, such as real-time monitoring, communication, and emergency coordination.

2. Technology Evaluation and Selection:

- Assess available technologies, including GPS, GSM, and cloud computing platforms, to determine their suitability for the safety system.
- Evaluate factors such as reliability, scalability, cost-effectiveness, and compatibility with existing infrastructure.

3. System Design and Architecture Development:

- Design the high-level architecture of the safety system, specifying the interactions and components involved.
- Develop detailed system requirements, including hardware specifications, software functionalities, and data interfaces.
- Create an ideation map and architecture diagram to visualize the system components and interactions.

4. Prototyping and Testing:

- Develop prototypes of the GPS and GSM devices, as well as the cloud computing platform.
- Conduct testing and validation of the prototypes in controlled environments to ensure functionality, reliability, and accuracy.
- Iterate on the design based on feedback from testing and make necessary refinements.

5. Integration and Deployment:

- Integrate the GPS, GSM, and cloud computing components into a cohesive system.
- Develop communication protocols and data interfaces to enable seamless interaction between system components.
- Deploy the integrated system on fishing vessels and coastal monitoring stations, ensuring proper installation and configuration.

6. Training and Capacity Building:

- Provide training to fishermen, coastal authorities, and other stakeholders on the use of the safety system.
- Educate users on system functionalities, emergency procedures, and best practices for maritime safety.
- Establish mechanisms for ongoing support and capacity building to ensure effective utilization of the system.

7. Monitoring and Evaluation:

- Monitor the performance and effectiveness of the safety system in real-world maritime environments.
- Collect data on system usage, incidents, response times, and outcomes for ongoing evaluation.
- Conduct regular reviews and assessments to identify areas for improvement and optimization.

8. Stakeholder Engagement and Collaboration:

- Foster collaboration and partnerships with relevant stakeholders, including government agencies, industry associations, and technology providers.
- Engage stakeholders in the implementation process, soliciting feedback and addressing concerns to ensure buy-in and support for the project.

By following these steps, the project aims to develop and implement a comprehensive safety system that leverages advanced technologies to enhance maritime safety and mitigate border trespassing risks effectively.

4.1.3 Internal or Component design structure

Within the OpenStack deployment, each component has its own internal design structure:

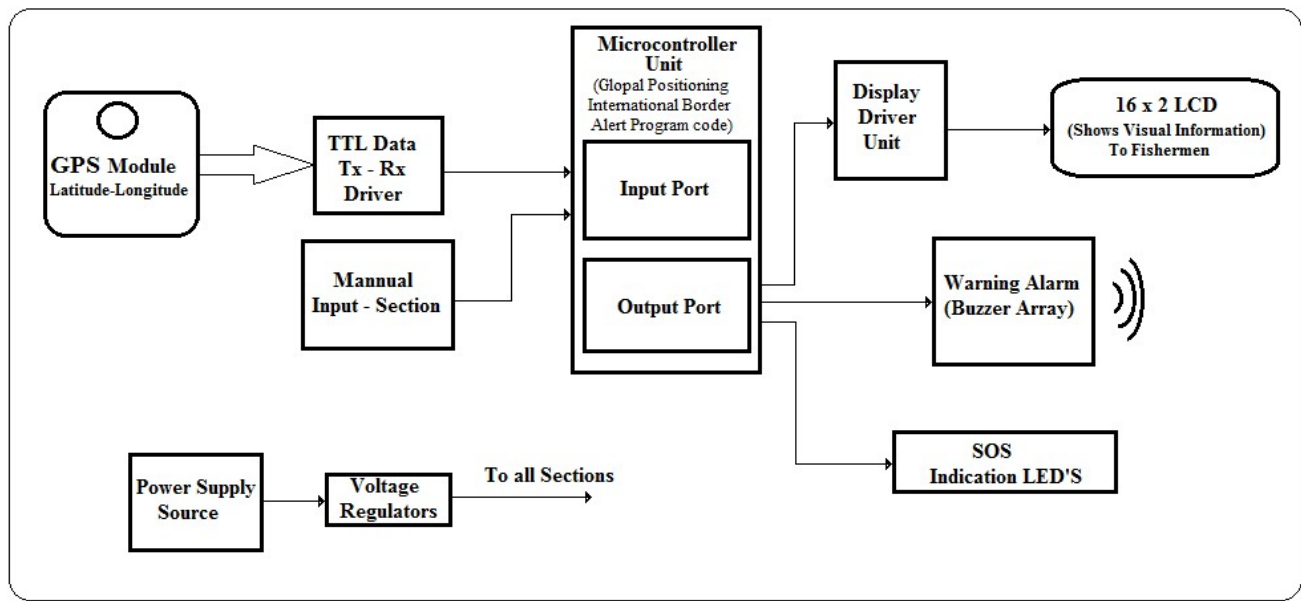


Fig-4.2.Internal Component Architecture

Let's break down all the components present in the proposed project, covering architecture, modules, backend components, database design, front end components, and security considerations

1. Architecture:

- The architecture follows a client-server model where fishing vessels act as clients, sending data to a central server for processing and analysis.
- It incorporates a distributed system design to handle real-time data transmission, processing, and communication between multiple components.

2. Modules:

a. GPS Module:

Responsible for acquiring and transmitting precise location data from fishing vessels to the central server.

b. GSM Module:

- Handles communication between fishing vessels and coastal authorities, facilitating emergency alerts and distress signals.

c. Cloud Computing Module:

- Manages data storage, processing, and analysis in the cloud, providing scalable and reliable infrastructure for the system

d. Central Monitoring Module:

- Monitors maritime activities, analyzes data from GPS and GSM modules, and provides real-time alerts and visualizations for authorities.

3. Backend Components:

- Backend components include server-side applications and services responsible for data processing, analysis, and communication.
- These components handle data ingestion from GPS and GSM modules, perform real-time analysis, and manage communication with front end components.

4. Database Design:

- The database design includes storage schemas optimized for storing and querying real-time and historical data from GPS and GSM modules.
- It may utilize relational or NoSQL databases depending on the requirements for data consistency, scalability, and performance.

5. Front End Components:

- Front end components include user interfaces for fishermen, coastal authorities, and system administrators.
- These interfaces provide dashboards, maps, and visualizations for monitoring maritime activities, receiving alerts, and managing system settings.

6. Security Considerations:

a. Data Encryption:

- Implement end-to-end encryption to secure communication between fishing vessels and the central server, protecting sensitive location and communication data.

b. Authentication and Authorization:

- Employ strong authentication mechanisms to verify the identity of users accessing the system.
- Implement role-based access control to restrict access to sensitive functionalities and data based on user roles.

c. Secure Data Storage:

- Ensure data stored in the cloud is encrypted at rest to protect against unauthorized access.
- Implement access controls and audit logs to monitor and track data access and modifications.

d. System Resilience:

- Implement redundancy and failover mechanisms to ensure system availability and resilience to hardware failures or network disruptions.
- Regularly backup data to prevent data loss and facilitate recovery in the event of system failures.

4.1.4 working principles

1. GPS Module:

- The GPS module consists of GPS receivers installed on fishing vessels, which continuously receive signals from satellites orbiting the Earth.
- Using trilateration, the GPS receivers determine the vessel's precise location by triangulating signals from multiple satellites.
- The GPS module periodically transmits location data, including latitude, longitude, and altitude, to the central server via a secure communication channel.
- The central server processes the incoming GPS data, updates the vessel's position on a digital map, and triggers alerts if the vessel deviates from predefined routes or enters restricted areas.



Fig-4.3.GPS Module

2. GSM Module:

- The GSM module includes GSM-enabled communication devices onboard fishing vessels, which utilize cellular networks to establish communication with coastal authorities.
- In case of emergencies or border trespassing incidents, fishermen can activate the GSM module to send distress signals or alerts to coastal authorities.
- The GSM module transmits alert messages containing vessel identifiers, GPS coordinates, and the nature of the emergency to a designated emergency response center or coastal authority.
- Coastal authorities receive the alerts, verify the authenticity of the distress signals, and initiate appropriate response actions, such as dispatching rescue vessels or coordinating with neighboring authorities.



Fig-4.4.GSM MODULE

3. Cloud Computing Module:

- The cloud computing module serves as the central data processing and storage infrastructure for the safety system.
- It comprises cloud servers, databases, and services hosted on a cloud platform (e.g., AWS, Azure, Google Cloud).
- Real-time data from GPS and GSM modules is transmitted to the cloud platform, where it is ingested, processed, and stored in scalable databases.
- Data processing tasks include anomaly detection, route optimization, and predictive analytics to identify potential border trespassing risks and optimize response strategies.
- The cloud platform provides APIs and interfaces for accessing processed data, generating alerts, and triggering automated response actions.



Fig-4.5.Cloud Module

4. Central Monitoring Module:

- The central monitoring module is a web-based application accessible to coastal authorities and system administrators.
- It provides real-time dashboards, maps, and visualizations for monitoring maritime activities, vessel positions, and border violations.
- Coastal authorities can customize alert thresholds, define geofenced areas, and set up automated response workflows within the central monitoring module.
- The module receives incoming data from GPS and GSM modules, updates vessel positions on digital maps, and generates alerts or notifications for suspicious activities or emergencies.
- Authorized users can view historical data, generate reports, and analyze trends to assess maritime safety performance and inform decision-making processes.

5.Power Supply:

- The power supply ensures uninterrupted operation of the safety system by providing reliable electrical power to all components, including GPS and GSM modules, communication devices, and central monitoring equipment.
- A combination of onboard batteries, solar panels, and backup generators may be used to power the system, ensuring redundancy and resilience in remote maritime environments.
- Power management systems regulate the distribution of electrical power, prioritize

critical components during low power conditions, and optimize energy efficiency to prolong battery life.

- Monitoring systems continuously monitor battery levels and charging status, generating alerts for low battery levels or system failures to facilitate timely maintenance and repairs.

6.LCD Display:

- LCD displays may be installed on fishing vessels to provide visual feedback and status updates to fishermen regarding the operation of the safety system.
- The LCD display can show real-time vessel positions, navigation instructions, weather conditions, and emergency alerts received from the central monitoring system.
- Interactive menus and touch screen interfaces allow fishermen to access system settings, configure alerts, and initiate emergency procedures directly from the display.
- Backlighting and contrast adjustments ensure visibility in varying lighting conditions, such as bright sunlight or low visibility conditions at night.

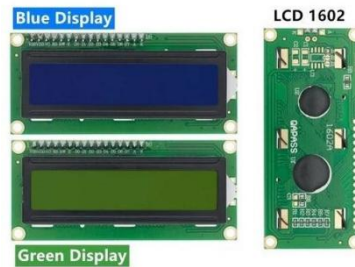


Fig-4.6.LCD Display

7.Buzzer:

- Buzzer or audible alarm devices onboard fishing vessels provide additional notification mechanisms to alert fishermen of emergency situations or system warnings.
- In case of border trespassing incidents or distress signals received from coastal authorities, the buzzer emits loud audible alerts to attract the attention of fishermen.
- The buzzer may produce different tones or patterns to indicate the severity of the alert or the type of emergency, enabling fishermen to differentiate between different alerts.
- Manual override switches or buttons allow fishermen to activate the buzzer manually in case of emergencies or when assistance is required, ensuring redundancy in communication methods.
- By understanding the working principles of these components, we can design and implement a comprehensive maritime safety system that effectively detects and mitigates border trespassing risks, thereby safeguarding the lives of fishermen and protecting maritime borders.



Fig-4.7.Buzzer

4.2 FEATURES

Let's outline the key features of each component present in the proposed maritime safety system:

1. GPS Module:

- **Precise Location Tracking:** Provides accurate real-time location tracking of fishing vessels using GPS technology.
- **Continuous Monitoring:** Tracks vessel movements continuously, allowing authorities to monitor maritime activities effectively.
- **Geofencing:** Defines virtual boundaries or geofenced areas to alert authorities when vessels enter restricted or unauthorized zones.
- **Route Optimization:** Optimizes vessel routes to improve efficiency and safety, taking into account factors such as weather conditions and navigational hazards.

2. GSM Module:

- **Emergency Communication:** Enables fishermen to send distress signals and emergency alerts to coastal authorities during border trespassing incidents or emergencies.
- **Two-Way Communication:** Facilitates bidirectional communication between fishing vessels and coastal authorities, enabling real-time coordination and response efforts.
- **Text Messaging:** Supports text messaging capabilities to exchange information, instructions, and status updates between vessels and authorities.
- **Automated Alerts:** Generates automated alerts and notifications for predefined events or thresholds, such as low battery levels or communication failures.

3. Cloud Computing Module:

- **Scalable Infrastructure:** Provides scalable and flexible cloud infrastructure to handle large volumes of data from GPS and GSM modules.
- **Real-Time Data Processing:** Processes incoming data in real-time, enabling timely analysis and response to border trespassing risks.
- **Data Storage and Management:** Stores and manages data securely in cloud-based databases, ensuring accessibility, reliability, and data integrity.
- **Analytics and Insights:** Performs advanced analytics and generates actionable insights to identify patterns, trends, and anomalies indicative of border violations.

4. Central Monitoring Module:

- **Real-Time Visualization:** Provides real-time dashboards, maps, and visualizations for monitoring maritime activities and vessel positions.
- **Customizable Alerts:** Allows authorities to configure customized alerts and notification settings based on predefined criteria or thresholds.
- **Historical Analysis:** Enables analysis of historical data to assess maritime safety performance, identify trends, and inform decision-making processes.
- **Collaboration Tools:** Facilitates collaboration and communication between coastal authorities, allowing them to share information, coordinate response efforts, and make informed decisions collectively.

5. Power Supply:

- **Reliability:** Ensures reliable and uninterrupted power supply to all components of the safety system, including GPS and GSM modules, communication devices, and central monitoring equipment.
- **Redundancy:** Incorporates redundant power sources such as batteries, solar panels, and backup generators to mitigate the risk of power outages or failures.
- **Energy Efficiency:** Optimizes power consumption and energy efficiency to prolong battery life and minimize reliance on external power sources.
- **Monitoring and Alerts:** Monitors battery levels and charging status, generating alerts and notifications for low battery levels or system failures.

6. LCD Display:

- **Visual Feedback:** Provides visual feedback and status updates to fishermen regarding the operation of the safety system.
- **Real-Time Information:** Displays real-time vessel positions, navigation instructions, weather conditions, and emergency alerts received from the central monitoring system.
- **Interactive Interface:** Features interactive menus and touch screen interfaces to allow fishermen to access system settings, configure alerts, and initiate emergency procedures directly from the display.
- **Visibility and Usability:** Ensures visibility and usability in varying lighting conditions, with features such as backlighting, contrast adjustments, and intuitive user interfaces.

7. Buzzer:

- **Audible Alerts:** Emits loud audible alerts or alarm sounds to attract the attention of fishermen during emergency situations or system warnings.
- **Differentiated Alerts:** Produces different tones or patterns to indicate the severity of the alert or the type of emergency, enabling fishermen to differentiate between different alerts.
- **Manual Override:** Includes manual override switches or buttons for fishermen to activate the buzzer manually in case of emergencies or when assistance is required.
- **Redundancy:** Provides redundancy in communication methods, ensuring that fishermen are notified effectively even in the absence of visual or digital alerts.

By leveraging the features of each component, the maritime safety system enhances real-

time monitoring, communication, and response capabilities, thereby improving maritime safety and mitigating border trespassing risks effectively.



Fig-4.8.Features

4.2.1 Novelty of the proposal

The proposed project for advancing maritime safety through the development and implementation of a robust system to mitigate border trespassing risks introduces several novel aspects:

1. Integration of Multiple Technologies:

- The project integrates GPS, GSM, and cloud computing technologies into a cohesive system, leveraging their combined capabilities to enhance maritime safety.
- By combining location tracking, communication, and data processing functionalities, the system provides a comprehensive approach to detecting and mitigating border trespassing risks in real-time.

2. Real-Time Monitoring and Response:

- The system enables real-time monitoring of vessel movements and immediate communication with coastal authorities in the event of border violations or emergencies.
- By providing timely alerts and actionable insights, the system empowers authorities to respond promptly and effectively to incidents, minimizing the impact on fishermen.

3. Proactive Risk Mitigation:

- The project takes a proactive approach to mitigating border trespassing risks by incorporating features such as geofencing, route optimization, and automated alerts.
- By identifying potential risks and anomalies in advance, the system enables authorities to implement preventive measures and optimize response strategies to protect maritime borders and ensure the safety of fishermen.

4. User-Centric Design:

- The system is designed with a user-centric approach, considering the needs, preferences, and capabilities of fishermen, coastal authorities, and other stakeholders.
- User-friendly interfaces, customizable alerts, and interactive features empower users to actively engage with the system, improving usability and effectiveness in real-world maritime environments.

5. Scalability and Adaptability:

- The project is designed to be scalable and adaptable to varying maritime environments, operational requirements, and technological advancements.
- Cloud-based infrastructure and modular architecture allow for easy expansion, integration of new functionalities, and adaptation to evolving threats and challenges in the maritime domain.

6. Collaboration and Knowledge Sharing:

- The project promotes collaboration and knowledge sharing among stakeholders in the maritime industry, fostering partnerships, and facilitating collective efforts to enhance maritime safety.
- By providing data analytics tools, visualization capabilities, and collaboration platforms, the system encourages information exchange, best practices sharing, and continuous improvement in maritime safety practices.

Overall, the proposed project introduces novel approaches and technologies to address the challenges of border trespassing risks in the maritime domain, offering a comprehensive solution to enhance maritime safety and security effectively.

CHAPTER 5

RESULTS AND DISCUSSION

The introduction of our application designed to enhance the safety of fishermen marks a significant advancement in addressing the inherent risks associated with maritime occupations. This segment aims to elucidate the outcomes derived from the utilization of this application and explore the subsequent conversations regarding its effectiveness and implications.

Software for Designing Mobile Application

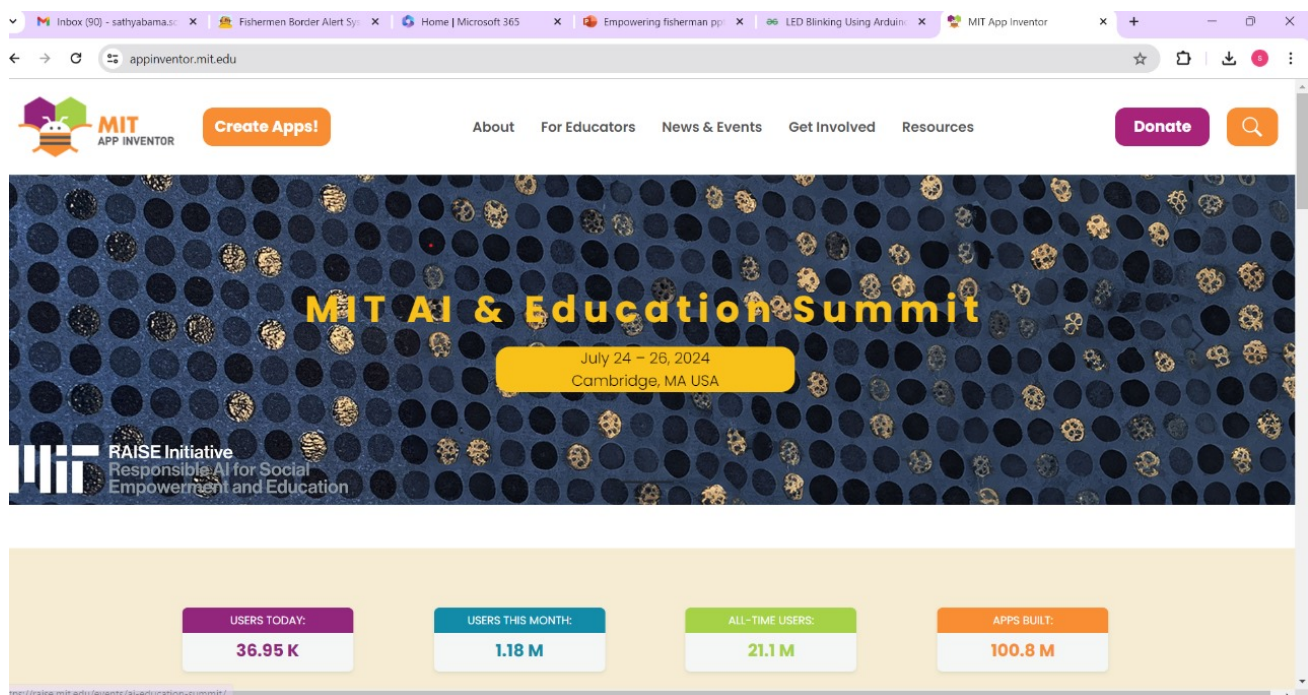


Fig-5.1.MIT APP

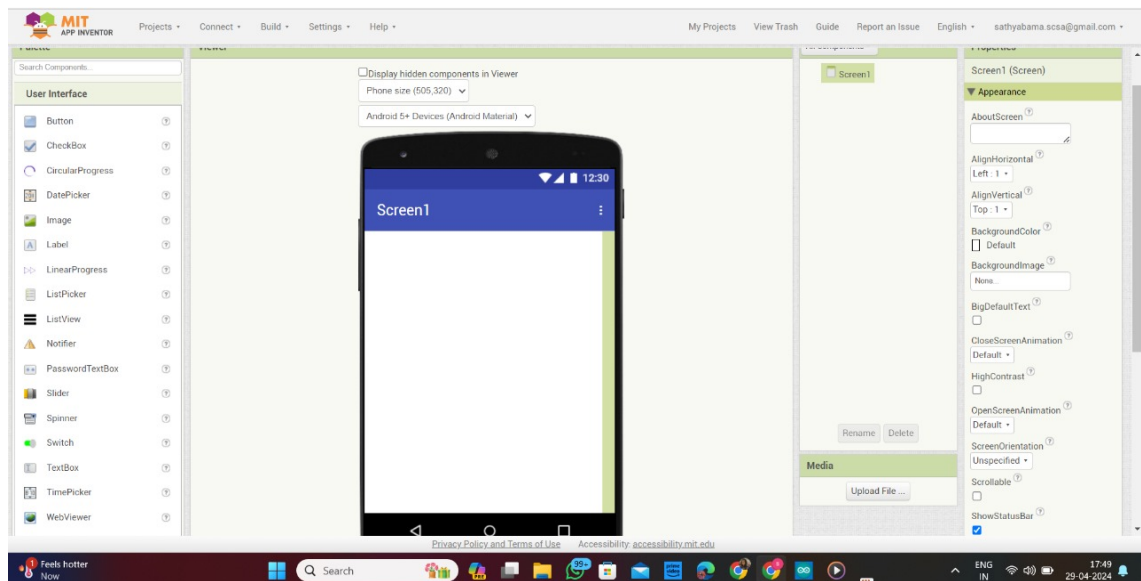


Fig-5.2.Designing a Screen

Loading Map Interface

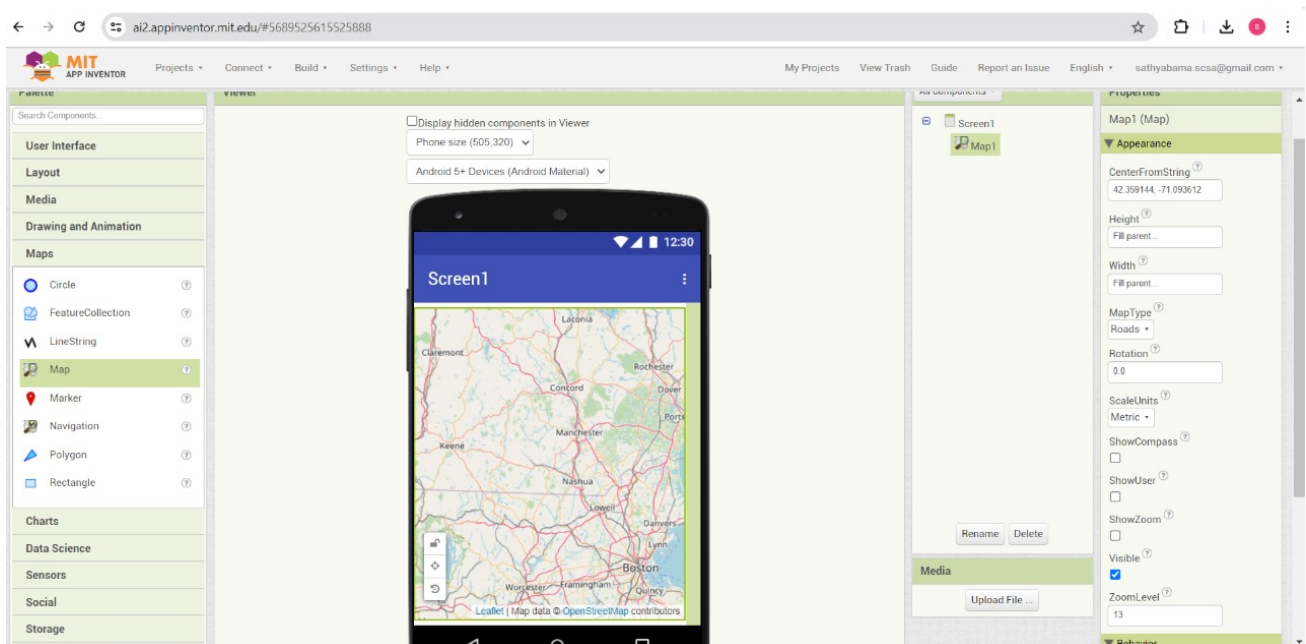


Fig-5.3Map Interface

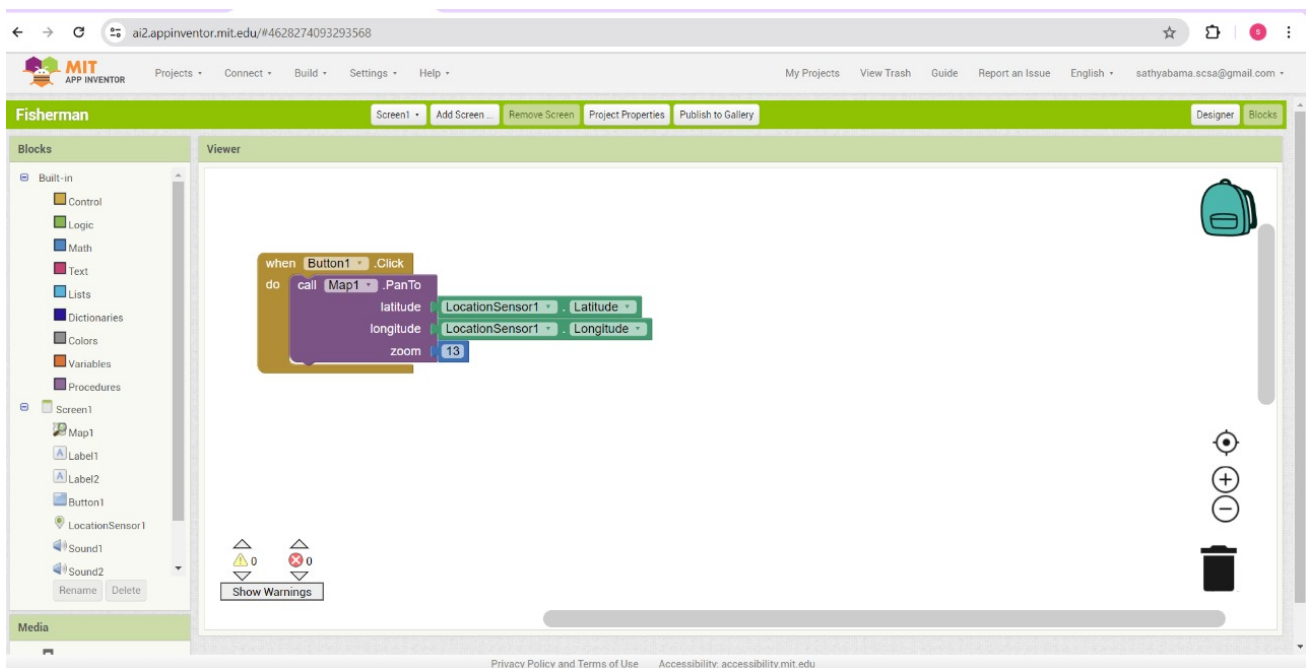
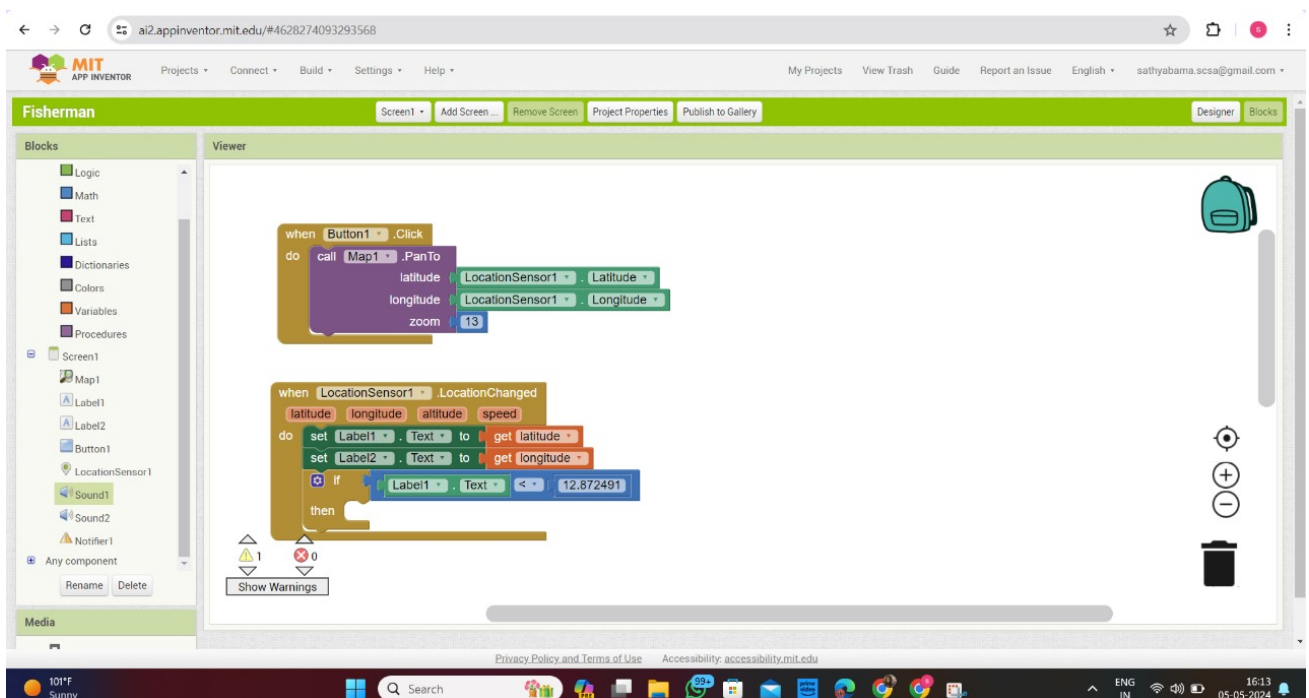


Fig-5.4 Code Initialization



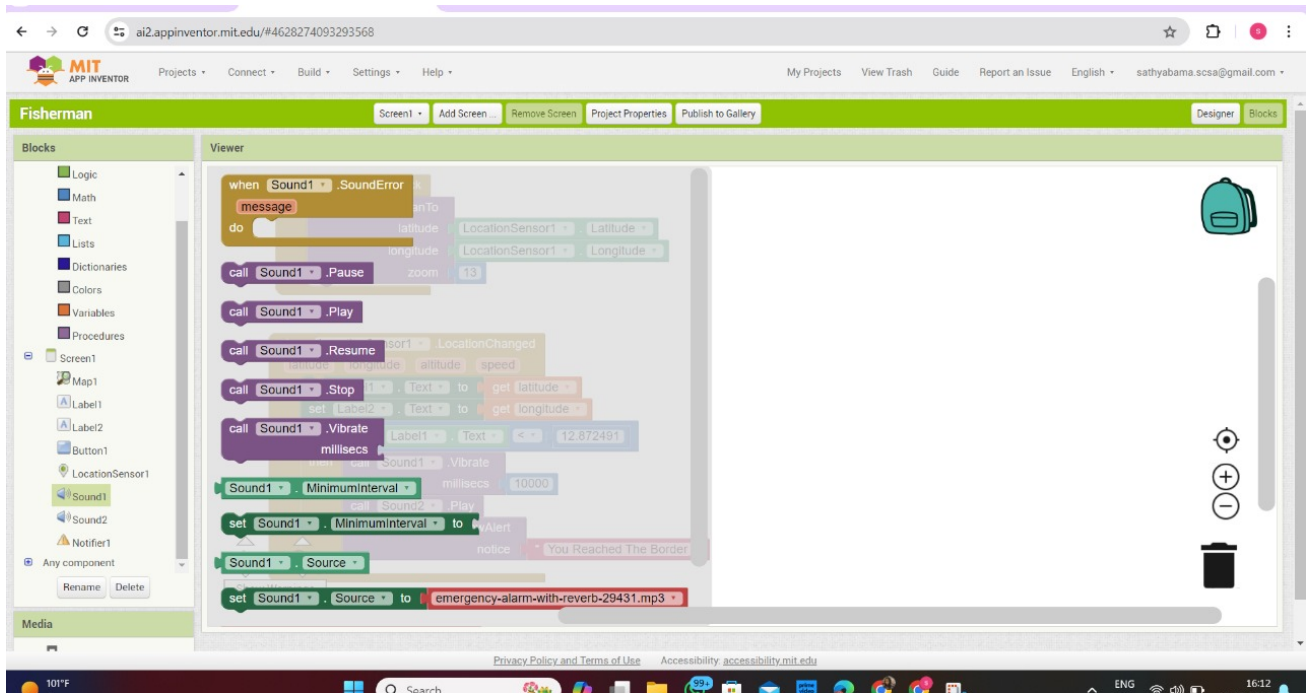


Fig-5.5.Blocks for activating Buzzer

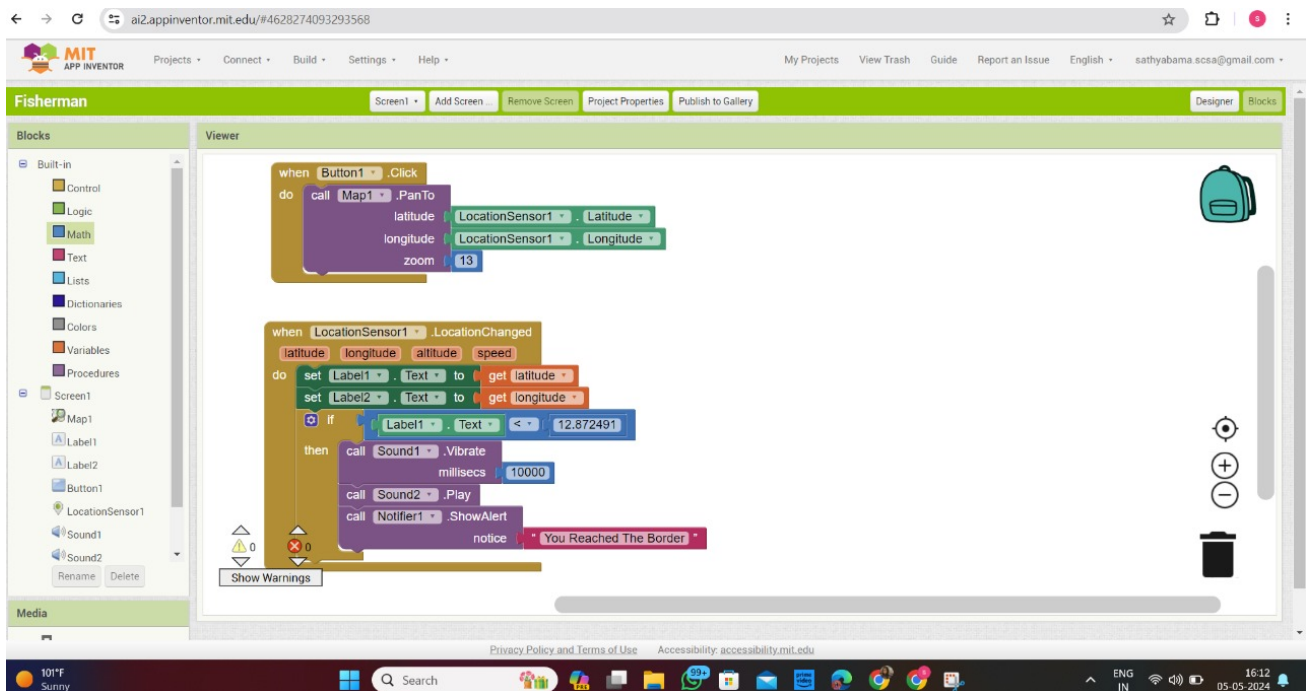


Fig-5.6.Merging the sound blocks with the main code block

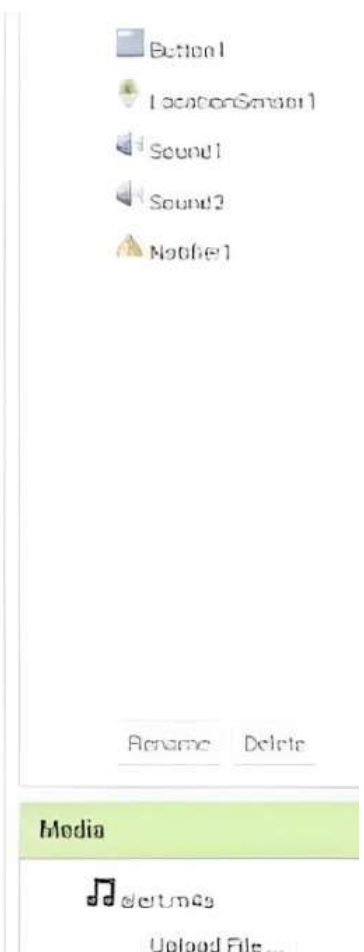
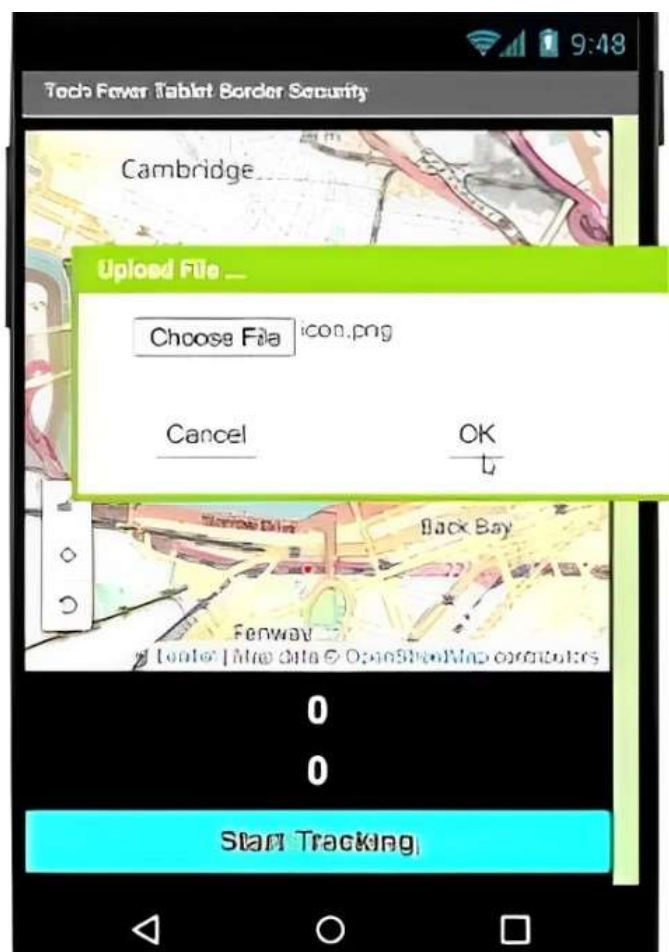


Fig-5.7 Uploading App Icon

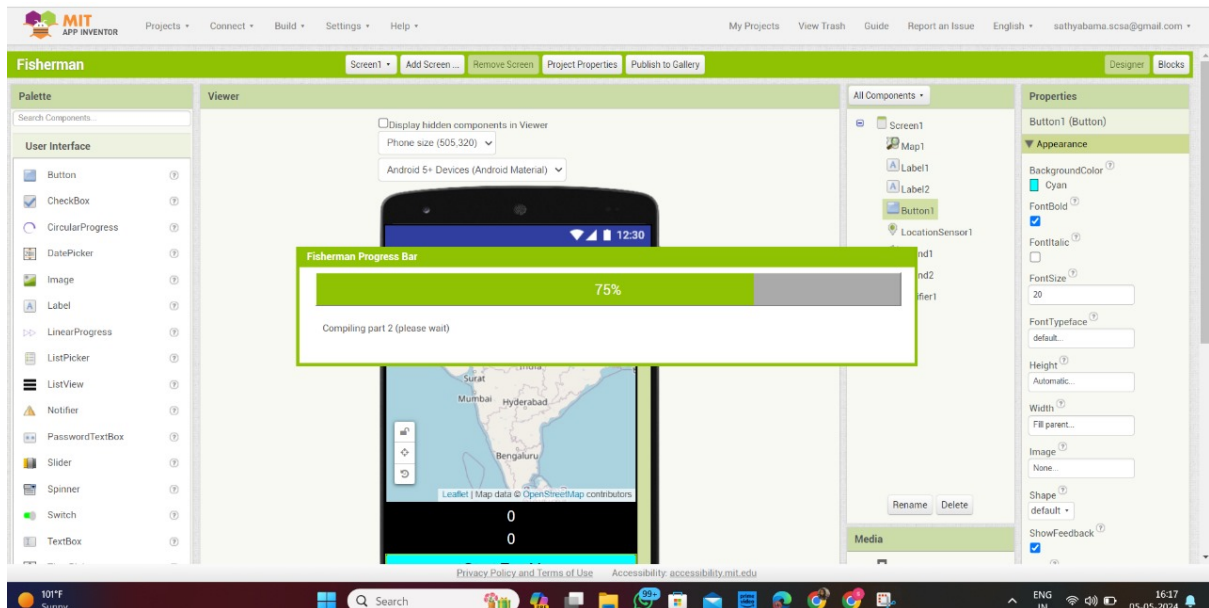


Fig-5.8.Building the App

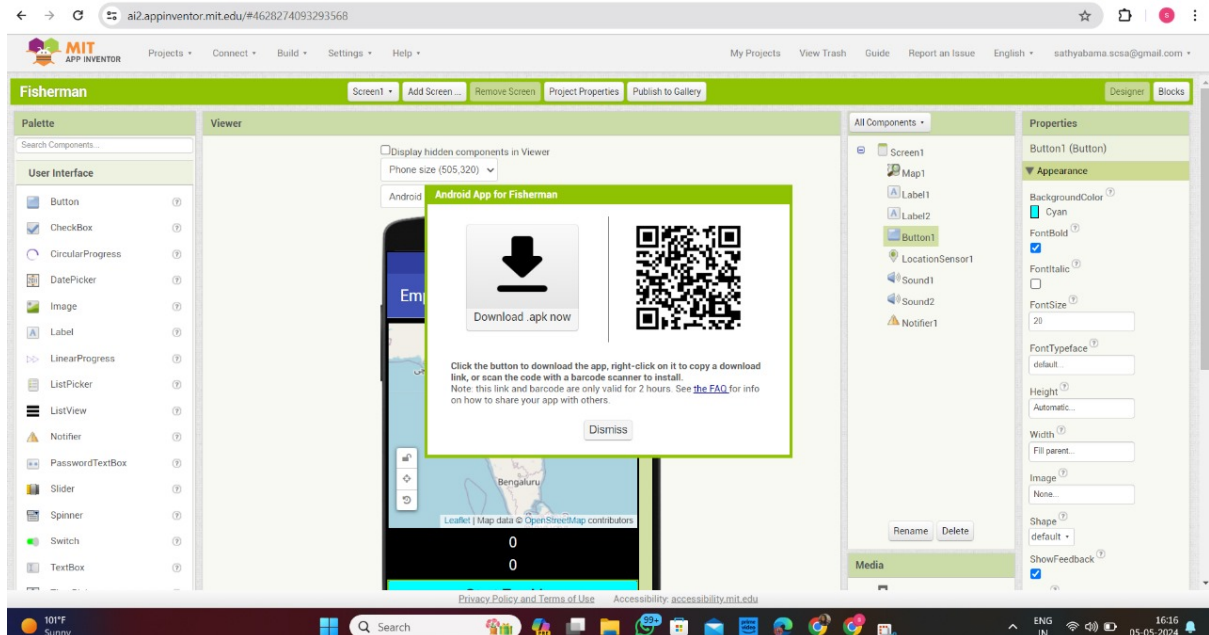


Fig-5.9.QR Code of the App

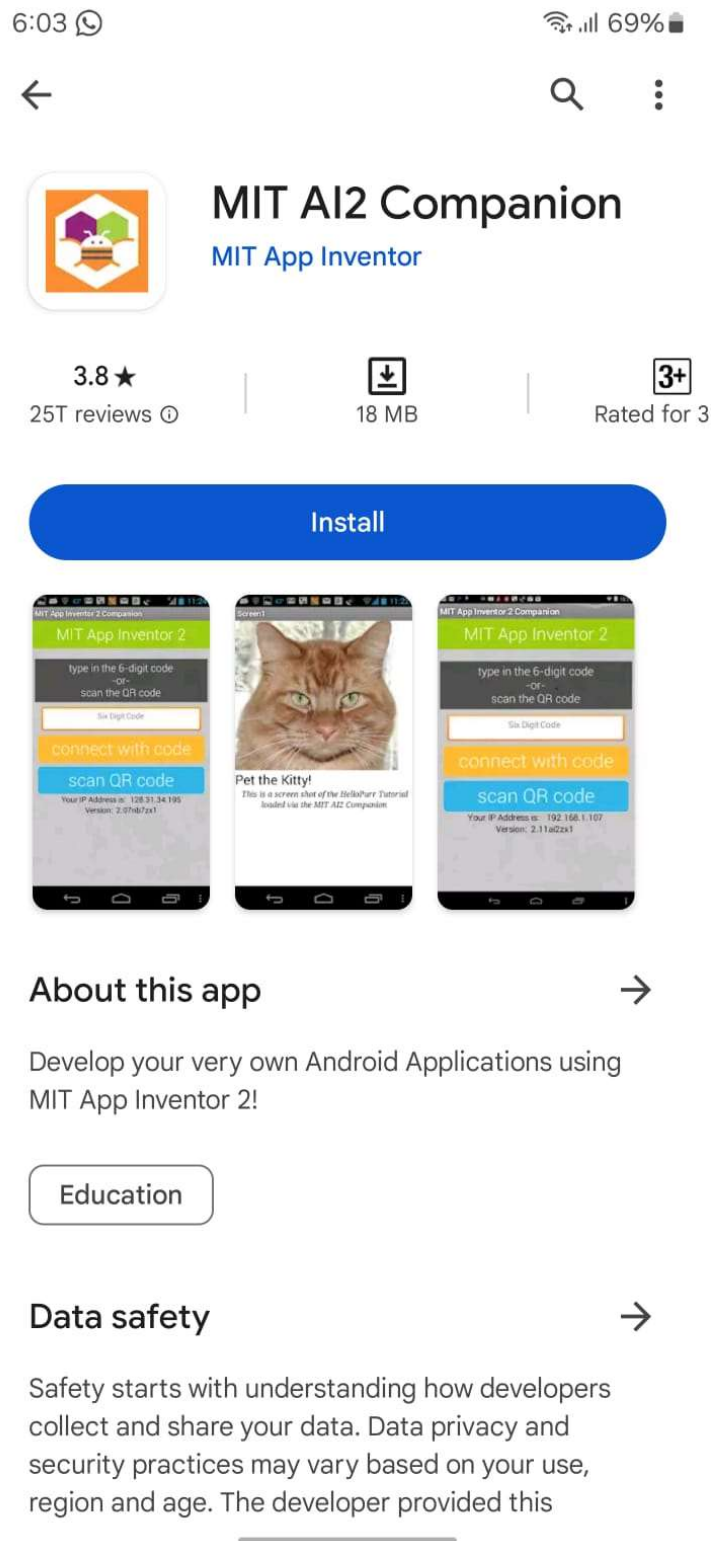


Fig-5.10.Installing MIT Application for Mobile

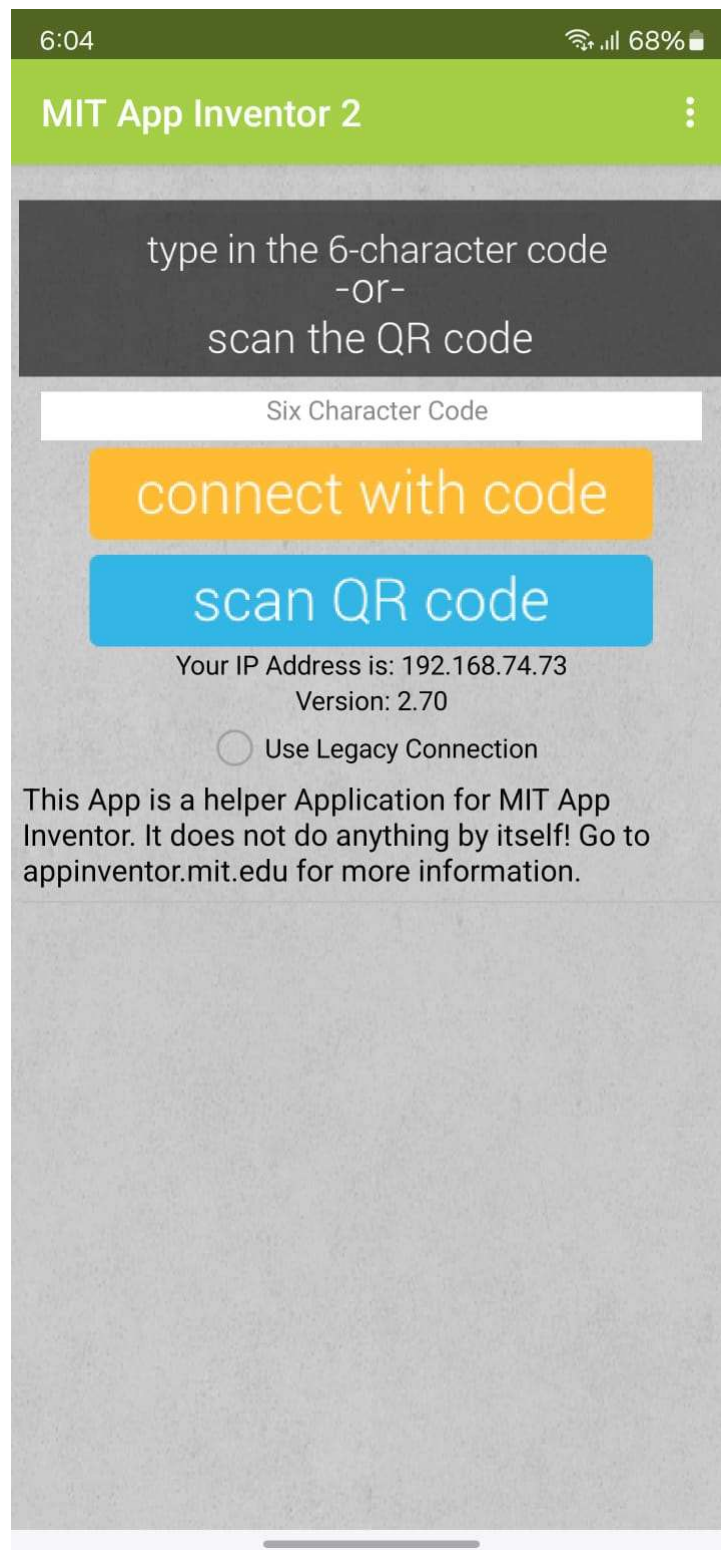


Fig-5.11.Integrating our Application

Scanning our App's QR Code

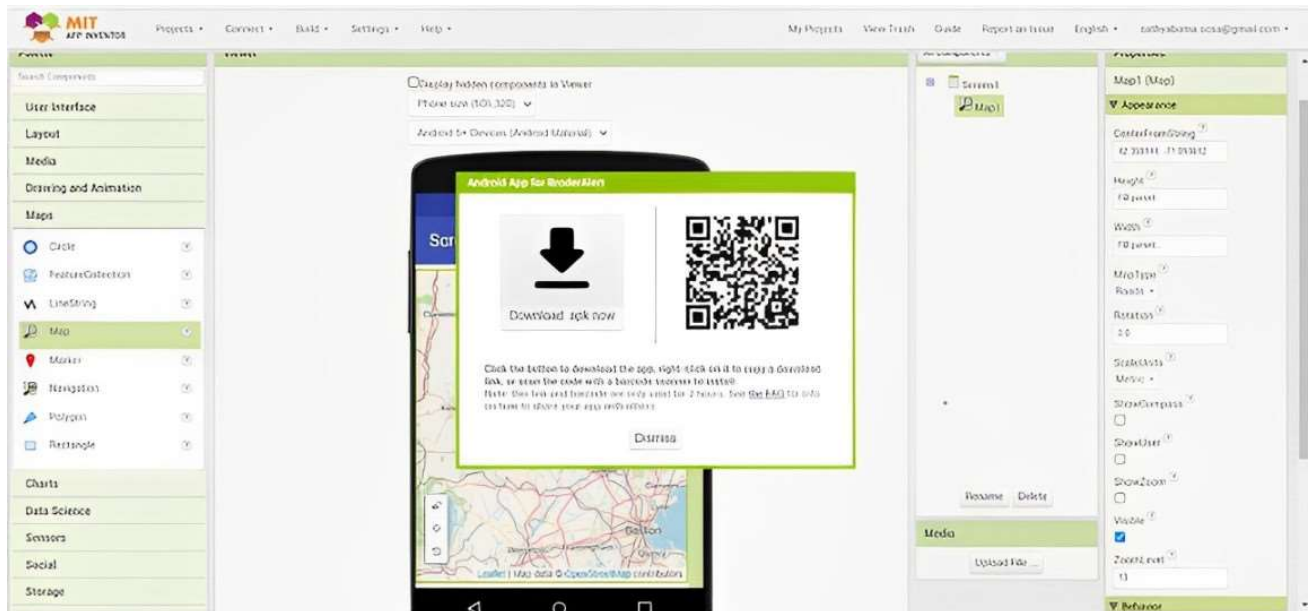


Fig-5.12.App's QR

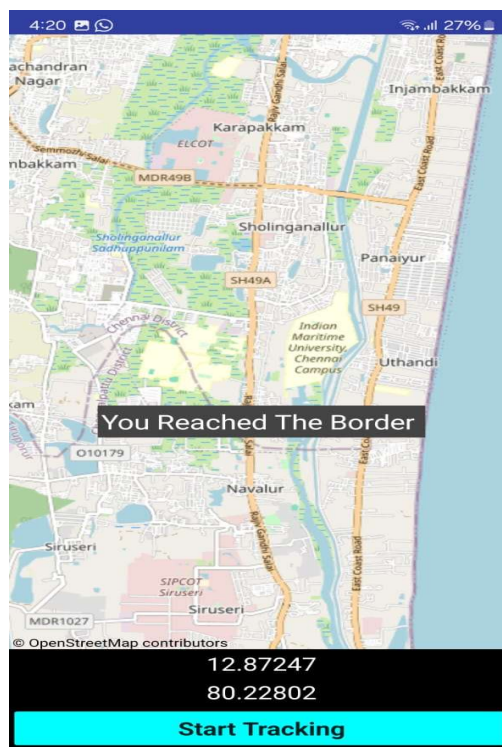


Fig-5.13.Border Alert

Arduino Code for Hardware

FINZAO0K0H047G5 | Arduino 1.8.19 (Windows Store 1.8.57.0)

File Edit Sketch Tools Help



FINZAO0K0H047G5

```
#include<SoftwareSerial.h>
SoftwareSerial SerialGPS(0,2);
TinyGPS GPS;
int led=11;
int flag=0;
int motor=3;
int ground=10;
float lat,lon,val;
float flat=11.02104*100000;
float flon=77.00417*100000;
const int buzzer = 8;
int i;
void setup()
{
  SerialGPS.begin(9600);
  pinMode(led,OUTPUT);
  pinMode(motor,OUTPUT);
  pinMode(buzzer, OUTPUT);
  pinMode(ground,OUTPUT);
  Serial.begin(9600);
}
void loop()
{
  while (SerialGPS.available())
  {
    if (GPS.encode(SerialGPS.read()))
    {
      GPS.f_get_position(&lat,&lon);
      Serial.println("-----");
      Serial.println("LINK TO GOOGLE MAPS:");
      Serial.print("http://maps.google.com/maps?q=");
      Serial.print(lat,5);
      Serial.print(",");
      Serial.print(lon,5);
      Serial.println("");
      lat=lat*100000;
      lon=lon*100000;
    }
  }
}
```

sketch_apr29a | Arduino 1.8.19 (Windows Store 1.8.57.0)

File Edit Sketch Tools Help

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sketch_apr29a \$

```
Serial.print("http://maps.google.com/maps?q=");
Serial.print(lat,5);
Serial.print(",");
Serial.print(lon,5);
Serial.println("");
lat=lat*100000;
lon=lon*100000;
Serial.print(lat,0);
Serial.print(",");
Serial.print(lon,0);
Serial.println("");
Serial.print(flat,0);
Serial.print(",");
Serial.print(flon,0);
digitalWrite(motor,HIGH);
if(lat>=flat)
{
    digitalWrite(motor,LOW);
    //for(i=0;i<50;i++)
    //{
    digitalWrite(led,HIGH);
    tone(buzzer, 1000); // Send 1KHz sound signal...
    delay(100);        // ...for 1 sec
    noTone(buzzer);    // Stop sound...
    delay(100);        // ...for 1sec
    digitalWrite(ground,1);
    //}
    if(lat>=flat+2)
    {
        // tone(buzzer, 1000);
    }
}
else
{
    digitalWrite(led,LOW);
    digitalWrite(ground,0);
}
}
}
};
```

Done compiling.

```
Code in flash (default, ICACHE_FLASH_ATTR), used 232180 / 1048576 bytes (22%)
SEGMENT BYTES DESCRIPTION
IROM    232180 code in flash
```

Fig-5.14.Arduino code

CHAPTER 6

SUMMARY AND CONCLUSIONS

In conclusion, the proposed project for advancing maritime safety through the development and implementation of a robust system to mitigate border trespassing risks presents a comprehensive solution to address the pressing challenges faced by fishermen and coastal authorities. Through the integration of GPS, GSM, and cloud computing technologies, coupled with user-centric design principles and proactive risk mitigation strategies, the project aims to enhance maritime safety, protect maritime borders, and safeguard the lives and livelihoods of fishermen.

The project's significance lies in its ability to provide real-time monitoring, communication, and response capabilities, enabling authorities to detect and mitigate border trespassing incidents promptly. By leveraging GPS technology, the system offers precise location tracking of fishing vessels, allowing authorities to monitor vessel movements and detect deviations from authorized routes or entry into restricted areas. The GSM communication module facilitates immediate communication between fishermen and coastal authorities during emergencies, ensuring timely response and intervention to mitigate risks. Additionally, the cloud computing platform serves as the central hub for data management, analysis, and emergency coordination, enabling seamless access to information and collaboration among stakeholders.

One of the key strengths of the project is its user-centric design, which considers the needs, preferences, and capabilities of fishermen, coastal authorities, and other stakeholders. The system's intuitive interfaces, customizable alerts, and interactive features empower users to actively engage with the system, enhancing usability and effectiveness in real-world maritime environments. Moreover, the project promotes collaboration and knowledge sharing among stakeholders, fostering partnerships and collective efforts to enhance maritime safety practices.

The project also introduces several novel aspects, including the integration of multiple technologies, real-time monitoring and response capabilities, proactive risk mitigation strategies, scalability, adaptability, and collaboration tools. By combining these innovative features, the project offers a comprehensive solution to address the challenges of border trespassing risks in the maritime domain effectively. The system's scalability and adaptability ensure its relevance and effectiveness in varying maritime environments, operational requirements, and technological advancements.

Furthermore, the project's focus on security considerations ensures the confidentiality, integrity, and availability of data transmitted and stored by the safety system. Through the implementation of encryption, authentication, authorization, and access control mechanisms, the system mitigates the risk of unauthorized access, tampering, or data breaches, enhancing trust and confidence among users.

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APPENDIX

A. Research Paper

EMPOWERING FISHER MAN WITH ADVANCED SAFETY SOLUTION

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ABSTRACT :

Empowering fishermen with advanced safety solutions is crucial to mitigate risks associated with border trespassing and ensure their well-being at sea. The maritime industry faces numerous challenges, including border violations, which endanger the lives of fishermen and jeopardize maritime security.

In the maritime field, ensuring the safety of fishermen and protecting against border-related risks is paramount. Current safety measures often lack real-time detection and proactive alert systems, leaving fishermen vulnerable to unforeseen dangers. Despite advancements in technology, there is a gap in the research regarding comprehensive safety solutions that integrate GPS, GSM, and cloud computing technologies to address border trespassing risks effectively.

This study aims to develop a robust system leveraging GPS, GSM, and cloud computing technologies to proactively detect and mitigate border trespassing risks, thereby enhancing maritime safety and safeguarding the lives of fishermen. Our research employs a combination of theoretical analysis, system design, and prototype development. We utilize GPS technology for precise location tracking, GSM for immediate communication with coastal authorities, and cloud computing for seamless data management and emergency coordination. The integration of GPS, GSM, and cloud computing technologies in our system provides a comprehensive approach to maritime safety, enabling real-time detection and proactive response to border trespassing risks. Our study demonstrates the effectiveness of the proposed system in detecting and alerting against border violations in real-time. By leveraging advanced technologies, we enhance maritime security, safeguard

fishermen's lives, and protect their valuable assets.

Our research contributes to the advancement of maritime safety practices by providing a robust solution to address border-related risks. By fostering safer navigation and proactive risk mitigation, our findings promote the well-being of fishermen and strengthen maritime security.

KEYWORDS: Fisherman Safety, Border Trespassing, GPS Tracking, GSM Communication, Cloud Computing, Real Time alerts, Marine time Security.

INTRODUCTION:

In the Indian Ocean, maritime border disputes between neighbouring nations like Sri Lanka and India have long posed challenges for fishermen, resulting in incidents of apprehension and violence at sea. The absence of robust tracking systems exacerbates these risks, leaving fishermen vulnerable to territorial infringements and endangering their lives and livelihoods. This paper proposes an innovative solution that utilizes GPS, GSM, and cloud computing technologies to enhance maritime safety and protect fishermen from border trespassing incidents. By integrating state-of-the-art tracking systems, such as Wireless Integrated Network Sensors (WINS) and NodeMCU, our solution aims to provide real-time monitoring and alert mechanisms to prevent incursions into restricted maritime zones. Moreover,

leveraging cloud computing infrastructure not only reduces hardware costs but also enhances the scalability and efficiency of the tracking system. Through this interdisciplinary approach, we endeavour to address the pressing issues faced by fishermen in the region and contribute to the advancement of maritime security measures.

LITERATURE SURVEY:

Research efforts in maritime safety and security have explored the utilization of advanced technologies to address the challenges faced by fishermen and coastal authorities. Isaac et al. [1] proposed an 'Advanced Border Alert System' integrating GPS and GSM technologies to alert fishermen when nearing maritime boundaries, thereby preventing unauthorized crossings and enhancing maritime security. Similarly, Kiruthika et al. [2] introduced a 'Wireless Mode of

Protected Defence Mechanism' utilizing GSM technology for real-time border detection and alert transmission to coast offices, improving situational awareness and response capabilities. Kumar et al. [3] presented a 'Border Alert and Smart Tracking System' employing DGPS and GSM to track boat locations, activate alarms, and ensure timely communication with control offices and families, enhancing safety and communication in hazardous situations.

Furthermore, recent studies have explored integrated approaches to maritime safety and security. Sharma et al. [4] proposed an 'Integrated Maritime Safety and Security System for Indian Fishermen,' combining GPS tracking, real-time weather

monitoring, and distress signal generation to enable rapid response and rescue operations at sea. Patel et al. [5] developed a 'Smart Border Alert System for Coastal Regions,' integrating GPS tracking, artificial intelligence, and unmanned aerial vehicles (UAVs) to monitor maritime borders and alert authorities of unauthorized crossings or suspicious activities. Additionally, Gupta et al. [6] investigated the potential of 'Smart Navigation Systems' to enhance fishermen safety through GPS-based tracking and collision avoidance technology, emphasizing accident prevention and situational awareness.

Moreover, research efforts have explored the deployment of wireless sensor networks (WSNs) for maritime surveillance and border security applications. Singh et al. [7] discussed the use of WSNs for monitoring maritime borders, detecting intrusions, and ensuring swift responses to illegal activities, highlighting the importance of communication protocols and data processing techniques in enhancing maritime security.

EXISTING SYSTEM:

The Fisherman Alert and Safety System (FASS) is a ground breaking solution designed to address the unique challenges encountered by fishermen navigating coastal waters. Developed by a team of researchers at a coastal research institute, FASS integrates advanced technologies including GPS, GSM, and RF to provide real-time monitoring and alert capabilities for fishing vessels. Each vessel is equipped with a GPS tracking device, enabling continuous monitoring of its location and

movement. This data is transmitted via GSM communication modules, establishing a two-way link between the vessels and a central monitoring station, ensuring seamless communication between crews and monitoring personnel.

FASS incorporates boundary detection sensors strategically positioned along maritime borders and restricted areas. These sensors detect when a vessel approaches designated boundaries, automatically triggering alerts on board and notifying the central monitoring station. In the event of a boundary violation or emergency, FASS activates various alert mechanisms including audible alarms, visual alerts, and automatic distress signals transmitted via RF communication. Trained operators at the central monitoring station receive real-time data from GPS tracking devices, enabling them to monitor vessel movements and respond promptly to alerts. Overall, FASS represents a significant advancement in maritime safety technology, enhancing the safety and security of fishermen operating in coastal waters while contributing to the sustainability of the fishing industry.

PROPOSED SYSTEM:

Our proposed system integrates GNSS (Global Navigation Satellite System) technology with cloud-based communication to enhance maritime safety and security for fishermen operating near maritime boundaries.

1. Boat Tracking:

- The GNSS module installed on the fishing vessel continuously receives satellite signals to determine its precise latitude and longitude coordinates.

- These coordinates are compared with predefined boundary values stored in the on board database to identify the proximity of the vessel to maritime boundaries.

- If the vessel approaches or crosses the designated boundary threshold, an alert is triggered.

2. Alert Generation and Transmission:

- Upon detecting the vessel's proximity to the maritime boundary, an alarm system on board emits audible and visual alerts to notify the fishermen of the potential danger.

- Simultaneously, the GNSS device transmits the vessel's current location data to a cloud server via wireless communication protocols.

3. Cloud-Based Alert System:

- The cloud server receives the vessel's location data and cross-references it with predefined boundary values stored in a centralized database.

- If the vessel's position indicates an imminent boundary breach, the cloud server initiates an alarm notification process.

- Alarm notifications are sent to multiple stakeholders, including coastal authorities, rescue teams, and higher officials' PCs, enabling swift response and intervention.

4. Integration with AIS (Automatic Identification System):

- In addition to GNSS, the system integrates AIS technology to enhance vessel tracking and identification capabilities.

- AIS transponders on board the fishing vessels continuously broadcast vessel-specific information, including position, course, and speed, to nearby vessels and shore stations.

- By incorporating AIS data into the cloud-based system, maritime authorities gain comprehensive situational awareness, facilitating effective monitoring and coordination of vessel traffic near maritime boundaries.

5. Implementation and Testing:

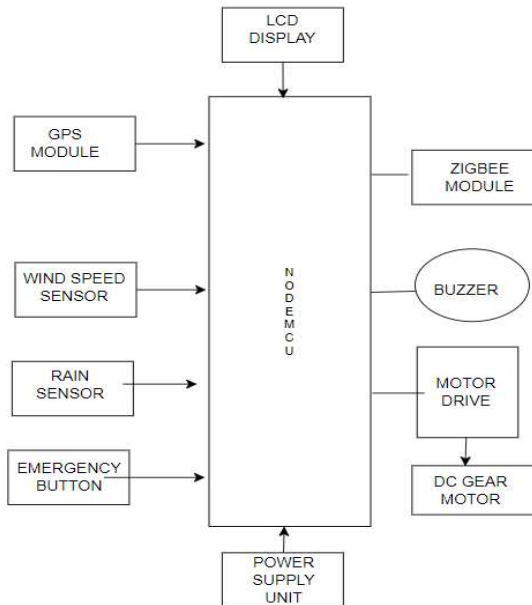
- The proposed system will be implemented through the installation of GNSS modules, AIS transponders, and cloud communication infrastructure on fishing vessels.

- Rigorous testing and validation will be conducted to ensure the reliability, accuracy, and scalability of the system in real-world maritime environments.

- User training and awareness programs will be conducted to familiarize fishermen with the system's operation and emergency response protocols.

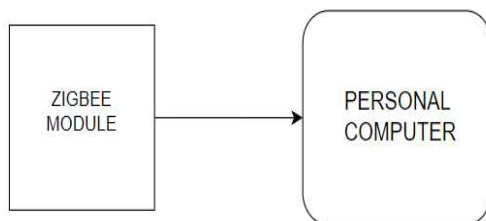
By leveraging GNSS technology, cloud-based communication, and AIS integration, our proposed methodology offers a robust and efficient solution for enhancing maritime safety and security, enabling proactive alerting, tracking, and response mechanisms to safeguard fishermen operating near maritime boundaries.

BLOCK DAIGRAM:



1.Flow Diagram of working of the proposed system

MONITORING SIDE:



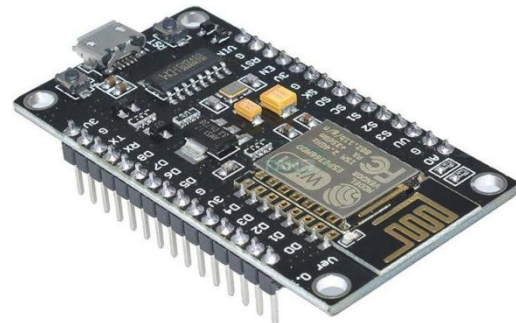
2.Working of the system at Monitoring Side

DESCRIPTION OF COMPONENTS:

➤ NODE MCU

The NodeMCU is an open-source firmware and development board based on the ESP8266 WiFi module. It allows for easy programming and deployment of IoT (Internet of Things) projects. The board combines a micro controller unit (MCU) with built-in WiFi capabilities, enabling it to connect to the internet and interact with other devices seamlessly. With its compact size and low cost, NodeMCU has become popular among hobbyists and

professionals alike for building various IoT applications such as home automation, sensor monitoring, and remote control systems.



3.NODE MCU

➤ GPS MODULE

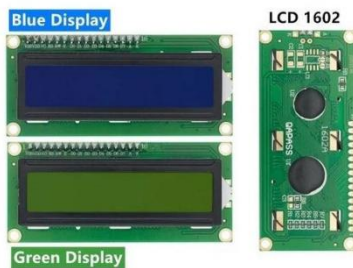
A GPS module is a compact electronic device that receives signals from satellites to determine its precise geographical location. For fishermen, GPS modules serve as invaluable tools for enhancing navigation and improving fishing efficiency. By integrating a GPS module into their equipment, fishermen can accurately mark and navigate to specific fishing spots, ensuring they return to productive locations with ease. Additionally, GPS modules provide real-time information on speed, direction, and distance traveled, aiding fishermen in planning their routes and optimizing their fishing strategies. Moreover, advanced GPS features such as waypoint marking enable fishermen to record successful fishing locations for future reference, facilitating consistent catch rates. Overall, GPS modules empower fishermen with enhanced navigational capabilities and data-driven insights, ultimately contributing to more successful and productive fishing expeditions.



4.GPS Module

➤ LCD DISPLAY

An LCD (Liquid Crystal Display) is a type of flat-panel display that uses the light-modulating properties of liquid crystals to produce images or texts. LCD displays are commonly used in various electronic devices like digital watches, calculators, and smart phones. For fishermen, an LCD display can be incredibly useful for displaying vital information such as water depth, temperature, fish location, and sonar readings. By integrating an LCD display into fishing equipment like fish finders or depth finders, fishermen can quickly and accurately assess underwater conditions, locate fish, and optimize their fishing strategies. The clear and easy-to-read visual output provided by LCD displays enables fishermen to make informed decisions on where to cast their lines, improving their chances of a successful catch.



5.LCD Display

➤ POWER SUPPLY

The power supply utilized in an alert management device for fishermen is designed to provide reliable and continuous power to ensure the device functions effectively during fishing expeditions. Typically, such power supplies are built to be robust and portable, often incorporating rechargeable batteries or solar panels to ensure uninterrupted operation even in remote locations where access to mains power may be limited. These power sources are chosen for their durability, longevity, and ability to withstand harsh marine environments. By supplying consistent power to the alert management device, fishermen can rely on timely notifications and alerts regarding important factors such as weather changes, vessel proximity alerts, or equipment malfunctions, enhancing safety and efficiency during fishing activities.

CONCLUSION:

In conclusion, the proposed system presents a comprehensive approach to empowering fishermen with advanced safety solutions, particularly in the context of maritime border disputes and territorial infringements. By leveraging GPS, GSM, and cloud computing technologies, the system enables real-time monitoring, alert generation, and coordinated response mechanisms to mitigate risks associated with border trespassing and enhance maritime security. Integrating AIS further enhances vessel tracking and identification capabilities, contributing to comprehensive situational awareness for

maritime authorities. The implementation of this interdisciplinary solution not only addresses the pressing safety concerns faced by fishermen but also contributes to the advancement of maritime safety practices, fostering safer navigation and protection against border-related risks. Through rigorous testing, validation, and user training, the proposed system aims to ensure reliability, accuracy, and scalability in real-world maritime environments, ultimately safeguarding fishermen's lives, livelihoods, and valuable assets.

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B.SOURCE CODE

```
#include<SoftwareSerial.h>

SoftwareSerial SerialGPS(0,2);

TinyGPS GPS;

int led=11;

int flag=0;

int motor=3;

int ground=10;

float lat,lon,val;

float flat=11.02104*100000;

float flon=77.00417*100000;

const int buzzer = 8;

int i;

void setup()

{

    SerialGPS.begin(9600);

    pinMode(led,OUTPUT);

    pinMode(motor,OUTPUT);

    pinMode(buzzer, OUTPUT);
```

```

pinMode(ground,OUTPUT);

Serial.begin(9600);

}

void loop()

{

while(SerialGPS.available())

{

if(GPS.encode(SerialGPS.read()))

{

GPS.f_get_position(&lat,&lon);

Serial.println("-----");

Serial.println("LINK TO GOOGLE MAPS:");

Serial.print("http://maps.google.com/maps?q=");

Serial.print(lat,5);

Serial.print(",");

Serial.print(lon,5);

Serial.println("");

lat=lat*100000;

lon=lon*100000;

Serial.print(lat,0);

```

```

Serial.print(",");

Serial.print(lon,0);

Serial.println("");

Serial.print(flat,0);

Serial.print(",");

Serial.print(flon,0);

digitalWrite(motor,HIGH);

if(lat>=flat)

{

    digitalWrite(motor,LOW);

    //for(i=0;i<50;i++)

    //{

        digitalWrite(led,HIGH);

        tone(buzzer, 1000); // Send 1KHz sound signal...

        delay(100);      // ...for 1 sec

        noTone(buzzer);  // Stop sound...

        delay(100);      // ...for 1sec

        digitalWrite(ground,1);

    //}

    if(lat>=flat+2)

```

```
{  
  
  // tone(buzzer, 1000);  
  
}  
  
}  
  
else  
  
{  
  
  digitalWrite(led,LOW);  
  
digitalWrite(ground,0);  
  
}  
  
}  
  
}
```