

# IOT Based Nautical Monitoring System

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**Abstract-**In today's world, the problem faced by the Tamil fishermen for the past 10 years is difficulty in identifying our country's border. The boundary between Sri Lanka and India includes arcs of Gulf of Mannar, Bay of Bengal and Palk Strait. The existing system's developed for the maritime boundary identification can assist the fishermen and the coastal guards by means of Global positioning system (GPS), Global system of mobile communication (GSM) and also by Zigbee transmitter and receiver. This system fails to notify the message at the mid of the sea when the satellite communication is amputated. To overcome this disadvantage of missed messages here we have designed a device using embedded system by GPS device and Wi-Fi sensor in addition to this a temperature and humidity sensors are used to know the current weather report in case of endangered situation. The GPS receiver gives the current location of the boat. The microcontroller compares the current location with the predefined values unless until the border is reached. Once, the border is reached, it makes an alarm, display and sends a message to the coastal guards through Wi-Fi sensor using Internet of Things. By means of this, the fishermen will get help in all aspects and the information will be known to both fishermen and the coastal guards, this leads to easy rescue.

**Keywords-** GPS, Wi-Fi sensor, PIC microcontroller, LCD, Internet of Things (IOT).

## I. INTRODUCTION

In the system we are using the wireless technology to send the message from the boat to the coastal guards with the position of the boat in the sea using the IOT technology. The system is used to detect the boundary of the country where the long time dispute between Sri Lanka and India still exists. This mainly happens when fisherman crosses border of neighboring country as they are not aware of the limits in sea. The proposed system uses a GPS receiver which receives signals from the satellite and gives the current position of the boat. The satellite technology used is Low earth orbit, where the connectivity is done without gaps. The microcontroller compares and indicates the fisherman that he has crossed the boundary by a LCD display with a buzzer. It also uses a Wi-Fi sensor to send message to the monitor server for every 40 seconds. This system provides an indication to both fisherman and to the coastal guard. A report for weather can also be obtained through temperature and humidity sensor. The objective is to determine the actual location of the boat and to know the border limit with the weather report.

## II.LITERATURE SURVEY

Suresh et al., [1] designed a system for boats using Zigbee, the system follows the Zigbee transmitter and receiver. The main feature is when someone crosses the border line; the client module shows indication of warning message. If no response from the client, then it controls the boat from the server side module by using system control unit.

Arunvijay et al., [2] designed a border alert system for fishermen using GPS, the fishermen can easily identify the national borders and prevents them from entering neighboring countries. The system moves through GPS and GSM.

Yogesh kumar et al., [3] designed a GPS based tracking of maritime line of control monitoring system, it is a useful device for safer navigation, especially for fishermen. The main advantage of this system is compact and affordable for fishermen.

Aishwarya Dalvi et al., [4] designed a nautical border alert system, the system provides the high accuracy and high precision values of the latitude and longitude. This model proves to challenge the already existing model which just uses a GPS device to track the border and make the boat move backwards. Piracy of the ship can be controlled.

Jaganath et al., [5] designed a paper on GPS based border alert system for fishermen, the fisherman can able to identify the international border and they can be prevented from capturing of Sri Lankan coastal border unit. The system is a low cost efficient method of wireless tracking. It also gives sufficient information to both ship and coast guards of any one crossing the border.

## III.EXISTING SYSTEM

At present there are few existing system, in which the complete system moves through GPS, GSM, Zigbee transmitter and receiver. In these technologies, the location can be identified but the mobile communication will be failed due to weak signal at the middle of the sea.

The satellite technology used is geostationary orbit, where the single satellite covers an area. This holds good for terrestrial purpose, but at the sea surface the ice bergs will block the satellite communication. Separate antennas were used for GPS and GSM. This is the major drawback of the already existed systems.

## IV.PROPOSED SYSTEM

In this proposed system, the main modules are GPS and Wi-Fi sensor in addition with the temperature sensor. The current latitude and longitude is known to both fishermen and coastal guards. The border is identified by comparing the current values with the original values and the message is sent through Wi-Fi sensor using IOT. Single antenna is used. This helps in continuous updating of the information at instantly. The low earth orbit is used to provide the connectivity without gap. This also helps in retrieving the missed messages. By using the electronic map, the navigation path can be identified. Thus it saves the lives of the fisherman and alerts the base station to provide help.

**V. PROPOSED SYSTEM ARCHITECTURE**

The procedure of this system is the GPS gives the current location of the boat to the microcontroller. The microcontroller compares the position values, display in the LCD, sends to the monitor server. This continues until the border is reached. When the border is reached it makes a buzzing alarm and display and also send a message to the coastal guard that the border is reached. This helps us in all the circumstances.

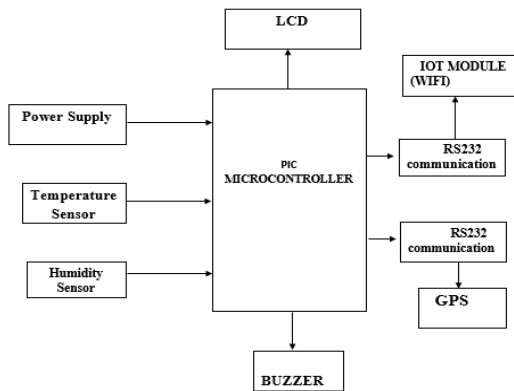


Figure1: Block Diagram

**VI. CIRCUIT DIAGRAM**

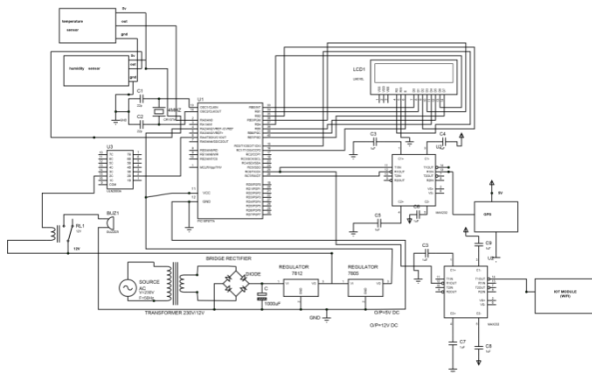


Figure2: Circuit Diagram

**VII. DESCRIPTION**

**1. Microcontroller**

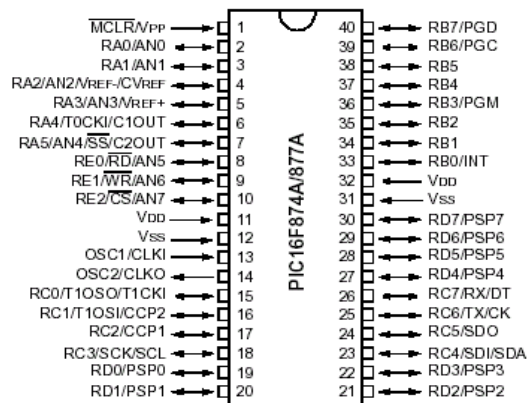


Figure3: PIC

The microcontroller used here is 8 bit Peripheral Interface Controller with CMOS technology. It is a RISC MCU works on low power with high performance. It has only 40 pins. This is used for its efficient and cost effective. The operating voltage is 5v and the current is 25mA.

**2. Global Positioning System:**

The GPS is a space based navigation technology. This is used to get the accurate position such as latitude, longitude and altitude. This uses NMEA 0183 protocol. It is maintained by United States Government and is freely accessible to everyone using GPS receiver. It has three parts such as pace segment, control segment, user segment.



Figure4: GPS Satellite

**3. WI-FI SENSOR:**

Wi-Fi sensor is used to send the location information to the coastal guards' server using IOT. The Internet of Things (IOT) is the network of objects such as physical things embedded with electronics, software, sensors, and connectivity, enabling data exchange. ESP8266 is a low cost Wi-Fi microcontroller chip that has the ability to empower IOT and helps the exchange of information among various connected objects.

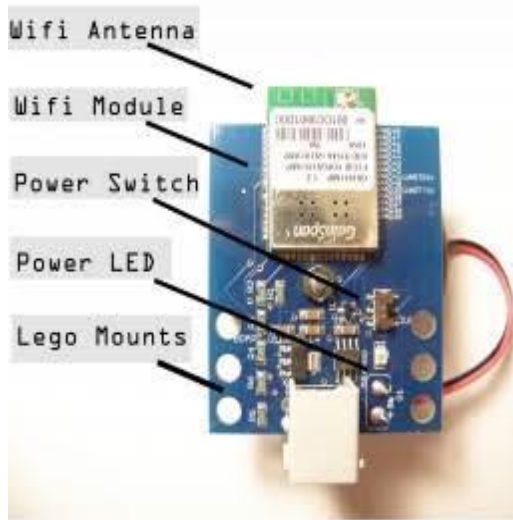


Figure5: ESP8266 Module

#### 4. Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of  $\pm 1/4^{\circ}\text{C}$  at room temperature and  $\pm 3/4^{\circ}\text{C}$  over a full  $-55$  to  $+150^{\circ}\text{C}$  temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

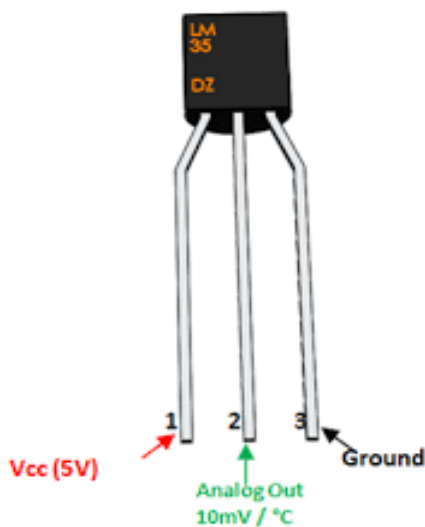


Figure6: Temperature Sensor

#### 5. Humidity Sensor

A humidity sensor senses, measures both moisture and air temperature. The sensor is composed of two metal plates and contains a non-conductive polymer film between them. This film collects moisture from the air, which causes the voltage between the two plates to change. These voltage changes are converted into digital readings showing the level of moisture in the air.

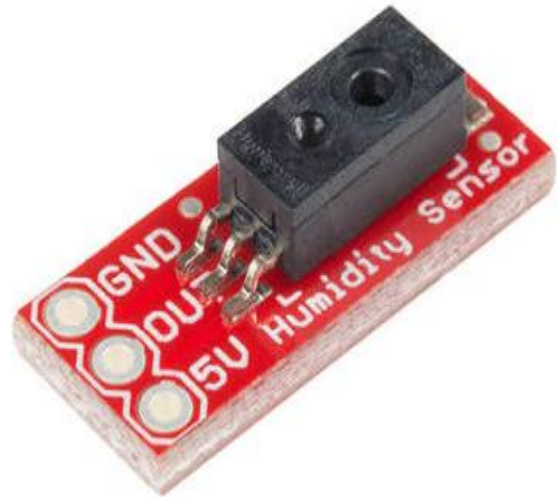


Figure7: Humidity Sensor

#### VIII. ADVANTAGES

- Determination of accurate location.
- Low maintenance cost.
- Connectivity without gap.

#### IX. APPLICATIONS

- The absconding boats due to natural calamities can be identified.
- The hijacked boats by the pirates can be recovered.
- By placing the device in all the boats, the location can be identified and help the fisherman to guide them in their progress.

#### X. RESULT

The present paper is designed for the security purpose of fishermen. In this, PIC16F847A is used for interfacing to various hardware peripherals. The RS232 is used for serial communication between the modem and the controller. This is the simulation output of the IOT module and is carried out using PROTEUS design tool.

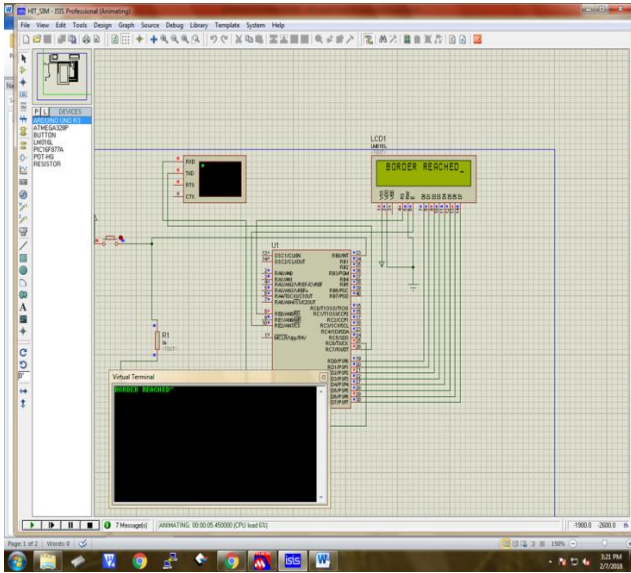


Figure8: IoT Simulation output

The hardware output of the transmitter which is the client module:

After simulation, it was build using actual electronic equipment. This circuit have been build, tested and verified the output obtained. The GPS is tested for the current latitude and longitude and the output is verified.



Figure9: GPS Module

To know the weather report the Temperature and Humidity Sensors values are verified and noted.



Figure10: Sensor Module

Once the border is reached, the LCD displays that the border is reached with a buzzer alarm. The demonstration is done by setting a border line.

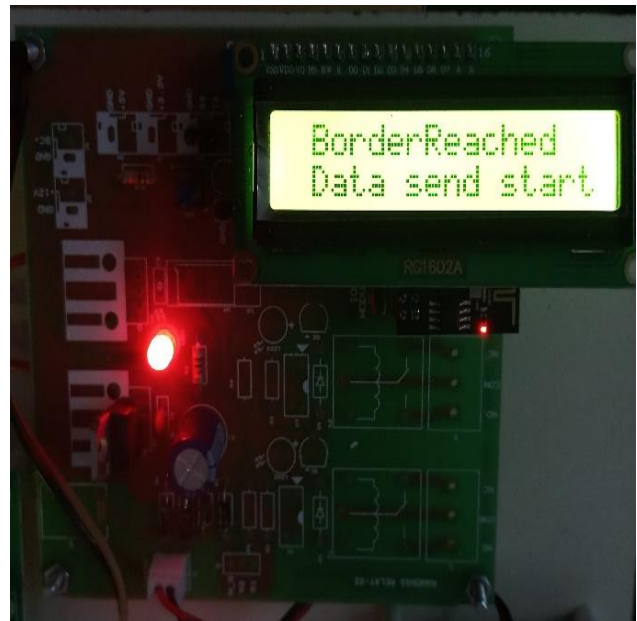


Figure11: LCD Module

The above module results are developed for the sake of fishermen, which is placed in the boat.

To notify the coastal guard, the Wi-Fi sensor is used. Using IoT, the complete information is received with the date and time.

Row#	value	receivedate
337	T:33,H:00,L:A,1055.4517,N,07658.9745,E,0.00	3/20/2018 1:45:39 PM
336	T:33,H:00,L:A,1055.4523,N,07658.9747,E,0.00	3/20/2018 1:45:29 PM
335	T:33,H:00,L:A,1055.4580,N,07658.9750,E,0.80	3/20/2018 1:45:19 PM
334	T:33,H:00,L:A,1055.4580,N,07658.9706,E,0.00	3/20/2018 1:45:09 PM
333	T:33,H:00,L:A,1055.4580,N,07658.9706,E,0.00	3/20/2018 1:44:59 PM
332	T:33,H:00,L:A,1055.4580,N,07658.9706,E,0.00	3/20/2018 1:44:49 PM
331	T:33,H:00,L:A,1055.4580,N,07658.9706,E,0.00	3/20/2018 1:44:39 PM
330	T:33,H:00,L:A,1055.4557,N,07658.9729,E,0.80	3/20/2018 1:43:59 PM
329	T:32,H:00,L:A,1055.4410,N,07658.9758,E,0.00	3/20/2018 1:43:49 PM
328	T:32,H:00,L:A,1055.4410,N,07658.9758,E,0.00	3/20/2018 1:43:39 PM
327	T:32,H:00,L:A,1055.4410,N,07658.9758,E,0.00	3/20/2018 1:43:29 PM
326	T:32,H:00,L:A,1055.4410,N,07658.9758,E,0.00	3/20/2018 1:43:20 PM
325	__IOT_APPLICATIONS_DATA_MONITOR__	3/20/2018 1:43:08 PM
324	BorderReached	3/20/2018 1:42:39 PM

Figure12: IoT Module

Thus, the IoT based nautical monitoring system is developed to help both the fishermen and coastal guard at instant.

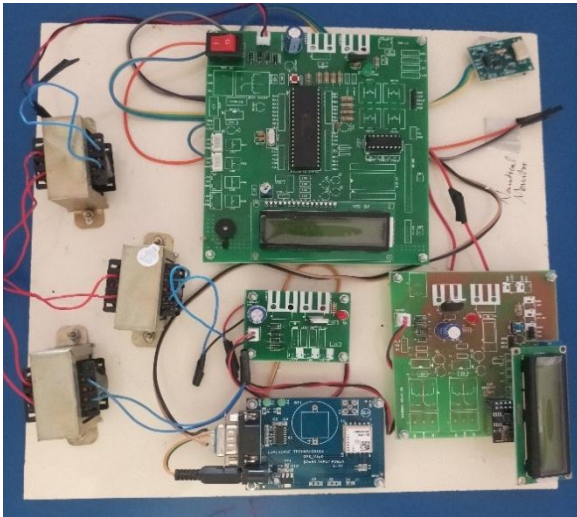


Figure13:Nautical Monitoring System

The result obtained works well for the nautical applications and it provides an information at instant.

## XI. FUTURE SCOPE

- The communication module can be added.
- An EEPROM can be used to store the position values.

## XII. CONCLUSION

Thus from the proposed system, the nautical monitoring system is done by determining the accurate location and weather. This also provides the alerting buzzer sound and display when the border is reached. The information is send to the coastal guards using IOT module. The system holds good for connectivity without gap. Thus, this proposed project is going to emerge in the future generation. Since, the project is based on Internet of Things. The device is simple and low cost. Hence, the project is going to be the efficient.

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