

Monitoring with Self-Helping System for Fishermen

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Abstract: The issues of fishermen stray in each territorial water has come as a potential irritant in the bilateral relations between the neighboring states and countries. International Marine Time Boundary line (IMTL) between countries will always have security problem. Due to carelessness the fishermen may accidentally cross the country border. In such situation they may face attack from the opposite navy. To avoid such situation a device using embedded system has been designed to protect the fishermen. GPS receiver is used to find the current location of the fishermen. The heart beat sensor continuously monitors Heartbeat of the fishermen. GSM is used to transfer the data to the cloud storage using IoT. If fishermen navigate beyond the country border a warning message is sent from the control room.

Keywords: Arduino, GPS, GSM, Safety.

1. Introduction

India, with a fish production of 9.58 million MT per year, is the second largest producer of fish worldwide and constitutes 5.68% of the world total fish production. Marine fisheries accounts for approximately 39% of the production. This sector contributes 0.83% to the national Gross Domestic Product (GDP) and ~4.6% to the agricultural GDP [2], but is a crucial component of the rural coastal economy in 3202 villages across 8,118 km coastline. 0.9 Million fishermen are employed full time, followed by another 3.5 million gaining livelihood in the processing and marketing sector [3].

Fishing has existed as a means of obtaining food from the Mesolithic period. During the time of the Ancient Egyptians, fishermen provided the majority of food for Egyptians. Fishing had become a major means of survival as Fishing has existed as a means of obtaining food from the Mesolithic period, well as a business venture. This project is to safeguard the lives of the fishermen when they are in sea area. Include the pressure gradient, waves, jet streams and other local weather conditions. There are links to be found between wind speed and wind direction, notably with the pressure gradient and surfaces over which the air is found. These wind speeds cause high damage to the boats which can cause harm to the fishermen. Waves are generated by forces that cause disturbances in the body of water. They can result from a wide range of forces such as the

gravitational pull of the sun and the moon, underwater earthquakes and landslides. In the outer atmosphere of the ocean, air molecules push against the water and this leads to a friction between the air and water. This friction between the air, water and tries to push the ridges or ripples up, on the ocean surface. As a result of this the pressure on the sea increases, which eventually grows into waves that may reach many meters in height.

2. Problem Statement

In our day-to-day life we hear the news about fishermen once out on the sea the fishermen are subjected to various oceanographic and climatic conditions. Tamilnadu has involved in conducting fishing along the India - Sri Lanka maritime border. Due to the lag of communication many fishermen are struggling a lot. On the basis of census 2018, there are 3,288 marine fishing villages in Tamil Nadu. The total Marine fisher folk population was about 4 million comprising in 864,550 families in Tamilnadu. 85% of them having full time engagement in fishing activities. About 25,000 boats from since then the fishing activity is not being done peacefully. Tamil Nadu fishermen are arrested, or shot, by the Sri Lankan Navy and they are died due to storm and cyclone. They are not able to communicate properly this leads to loss in the both humans as well as their economic.

3. Block Diagram and Background

In this system embedded based model is developed to save the fishermen life and to avoid the problem between two countries. Each fisherman who is sailing in the boat has this device. This device consists of GPS receiver which continuously receives the GPS location of the fishermen. Heart beat sensor is fixed in the device which is used to monitor the heart rate of the fishermen. The GPS location and the Heartbeat rate is stored in a cloud storage which is monitored by the control room. The particular layer land that is border level is predefined and it is stored in the microcontroller memory. If the current value is compared with the predefined value and if these

values are same or greater than the predefined value, a warning message is sent to the fishermen and coastal guard.

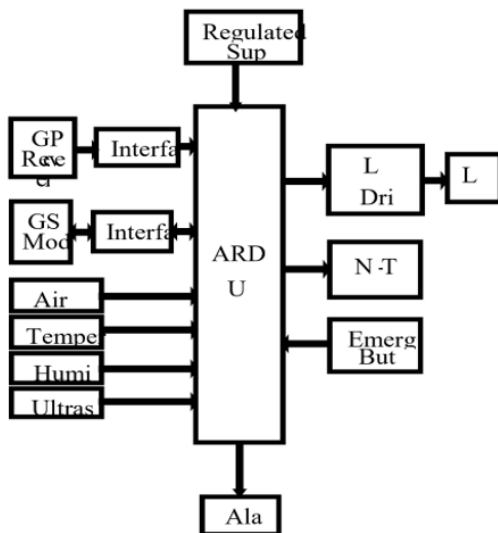


Fig. 1. Block diagram

A. Power supply

A constant regulated supply of 9V from rechargeable battery used for power supply. It provides the necessary voltage to the microcontroller unit.

B. Arduino (Microcontroller) (ATmega328)

Arduino UNO is microcontroller based on the ATmega328. It has 14 digital input/output pins, 6 analog, 916MHZ digital oscillator, a USB connection, a power jack, an ICSP header and a reset button. The UNO differs from all proceeding boards in that it does not use the FTDI USB to serial driver chip. Instead, it features the ATmega328 programmed as a USB to serial converter.



Fig. 2. Arduino Uno (Microcontroller)

C. Global Positioning System (NEO-6M)

GPS is a satellite based navigation system consists of a network of 24 Satellites located into orbit. GPS provides latitude and longitude information. The units have about 10-20 m accuracy. The GPS receiver is an electronic device that receive signal from three or four satellites. Using the distance measurement from multiple satellites, the GPS receiver can store the current position of the device.



Fig. 3. Global Positioning System (GPS)

D. Global System for Mobile communication (SIM900)

GSM network operate in a number of different carrier frequency and its frequency upto 900MHZ or 1800MHZ. It is based on both TDMA and CDMA mechanism where a spectrum is divided into small slices. GSM module is used for transmission and reception of message and it also serve other purpose. GSM satellite roaming has also extended service access to areas where territorial coverage is not available. It requires 5v power supply and operates at a speed up to 6KBPS. The operating voltage is from 3.2V to 4.8V.



Fig. 4. Global System for mobile communication

E. LCD

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a back light or reflector to produce images in colour or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as pre-set words, digits, and seven-segment displays, as in a digital clock.



Fig. 5. LCD

F. Ultra Sonic Sensor (HC-SR04)

The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. It comes complete with ultrasonic transmitter and receiver modules.

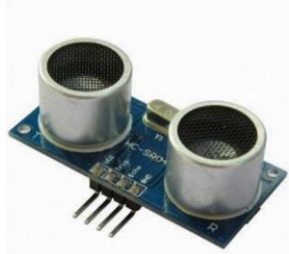


Fig. 6. Ultras Sonic Sensor

G. Temperature and Humidity Sensor(DHT11)

DHT11 Temperature and Humidity Sensor features a temperature and humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature and humidity sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, excellent quality, fast response, anti-interference ability and cost-effectiveness. Each DHT11 element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The calibration coefficients are stored as programmes in the OTP memory, which are used by the sensor’s internal signal detecting process. The single-wire serial interface makes system integration quick and easy. Its small size, low power consumption and upto-20-meter signal transmission making it the best choice for various applications, including those most demanding ones. The component is 4-pin single row pin package. It is convenient to connect and special packages can be provided according to users’ request.

H. Air Flow sensor

Wind speed, or wind velocity, is a fundamental atmospheric rate. Wind speed is caused by air moving from high pressure to low pressure. Many aspects can be affected by wind speed such as weather forecasting, aircraft, mines, navigation and agriculture, so the observation of wind speed is necessary. An anemometer or wind meter is a device used for measuring wind speed, and is a common weather station instrument.

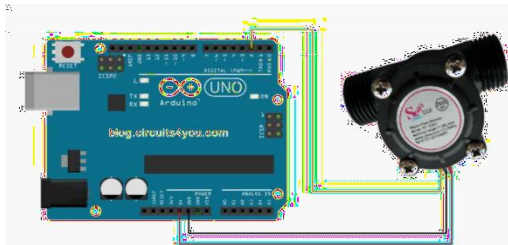


Fig. 7. Airflow sensor

I. NRFTx-Rx

nRF24L01 is a single chip radio transceiver for the world wide 2.4 - 2.5 GHz ISM band. The transceiver consists of a fully integrated frequency synthesizer, a power amplifier, a crystal oscillator, a demodulator, modulator and Enhanced Shock Burst

protocol engine. Output power, frequency channels, and protocol setup are easily programmable through a SPI interface. Current consumption is very low, only 9.0mA at an output power of -6dBm and 12.3mA in RX mode. Built-in power down and Standby modes makes power saving easily realizable.



Fig. 8. NRFTx-Rx

J. Embedded C

Embedded C is most popular programming language in software field for developing electronic gadgets. Each processor used in electronic system is associated with embedded software.

Embedded C Programming is the soul of the processor functioning inside each and every embedded system we come across in our daily life, such as mobile phone, washing machine, and digital camera. Each processor is associated with an embedded software.

The first and foremost thing is the embedded software that decides functioning of the embedded system. Embedded C language is most frequently used to program the microcontroller.

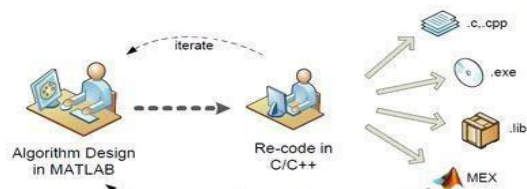


Fig. 9. Embedded C

K. Arduino IDE

The Arduino Integrated Development Environment (IDE) is a cross-platform application that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU tool chain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code

into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware. By default, avrdude is used as the uploading tool to flash the user code onto official Arduino boards.

In October 2019 the Arduino organization began providing early access to a new Arduino Pro IDE with debugging and other advanced features.

4. Applications and Advantages

A. Applications

- The hijack of the ship by the pirates can be eradicated.
- The lost ship wrecks due to natural calamities can be identified.
- By keeping the kits in the entire boats and by knowing the locations of all the boats we can use our kit to assist the traffic.
- In case of any accident on the sea. it can be detected by the system and the accident location of the boat is sent to the rescue team.
- Based on the location of the boat, the embedded system sends signal to Alarm. This are nearby the border.
- Monitoring weather (sensing the temperature, humidity, air blow).
- Avoidance from Predators using shock treatment.
- animal, thereby making it suitable for different areas of our country.

B. Advantages

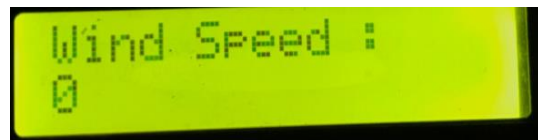
- Save lives of fishermen and the boat.
- Communication becomes very easy.
- Location of any lost boat could be found.
- Accurate determination of location.
- Maintenance cost is low.
- Easy to implement.
- Cost effective.

5. Results

The result of the topic is show below.



Fig. 10. Project model



- The system in the main ship is connected to the server at the Coast Guard side through Wi-Fi. The system sends the boat name, the location (magnitude and longitude) and the status (emergency/non-emergency) at a predefined time interval. The map on the Coast Guard side is updated accordingly.
- Monitoring the health of the ship.
- Traffic monitoring.
- Climatic conditions can easily access.

6. Conclusion

In previous days' fishermen cannot easily find out the border and proper information about climatic condition. With the help of this paper, we can easily identify the border and continuous monitoring of climatic condition using LoRa wireless technology and wind speed sensor. And also we can track the boat location. Thus the fishermen can easily identify the national sea borders and therefore prevents them from entering their area. Thus saving their lives and providing good relationship with the neighboring countries. Also, the piracy of ship can be easily brought.

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