Nautical Boundary Recognition and Forewarn System using Arduino

B. Ahilaa[1], A.Maheswari[2], C. Pon Saraswathi[3] & V.R.Vinoj[4]

[1-4]Department of Electronics and Communication Engineering,
Stella Mary's College of Engineering, Aruthenganvilai, Kanyakumari District, Tamil Nadu.

ABSTRACT

The locale's environment organization is turning into a significant piece of anglers because of helpless climate and decreased development in recuperation, intensifying the contention between our anglers over the reality. They are dealing with a few issues in view of absence of information about India-Sri Lanka line. In this undertaking, we give total answer for the issues which was looking by the anglers. In this project, we used GPS for the revelation of the Sri Lankan borders. We can check the current degree and longitude by using the GPS and send the information to the Arduino UNO microcontroller. The control at that point thinks about the current scope and longitude esteems with the preset qualities to decide the current area. In light of the correlation results, the framework confirms that the anglers have nearly arrived at the ocean line. On the off chance that the anglers arrived at the boundary, it gives an alarm with ringer sound and show 'Warning! Don't Cross' message in the LCD show. Furthermore, it stops the engine motor of the boat consequently. Also, we can know the climatic conditions by using the DHT-11 sensor that is a central ultra negligible exertion mechanized temperature and clamminess sensor. It is really simple to use, yet requires mindful wanting to grab data. The data from the sensor ship off the Arduino UNO microcontroller and give the alarm to the anglers utilizing ringer and LCD show.

Keywords: Arduino UNO microcontroller, GPS, DHT-11 sensor, Longitude, Ringer sound.

1. Introduction

As the market for marine assets develops, anglers in Tamil Nadu should face challenges. This activity improves the versatility and convenience of GPS gadgets a drift [1]. We realize that relations among India and Sri Lanka make this issue hard for Tamil Nadu anglers. The continued shelling of a Tamil Nadu anglers on the Sri Lankan line outraged all residents. In Tamil Nadu, around 18,000 kinds of boats fish off the coast among India and Sri Lanka. Fishing has been a worry since the savagery in Sri Lanka 20 years prior. Sri Lankan navy caught and kill the fishermen while they cross the border [2].

From the spot of the point of view on fishermen, the erroneous guide rose up out of an absolute absence of the sea course. From Tamil Nadu around 18,000 boats of first-class sorts lead fishing exercises nearby the India-Sri Lanka ocean line at any rate by using unintentionally going too far with the exception of data, they are punished by using the Sri Lankan Navy. The sea line between the worldwide territories isn't without inconvenience unmistakable, which is the huge legitimization this offense. Besides, in instances of approaching home grown calamities, disappointment or stretch in informing concerned faculty to clear the territory, brings about deficiency of presence and impacts the financial wages for a monstrous scope [3][4].

Throughout the long term, Global Positioning System (GPS) Technology has developed to be a fundamental capacity in individuals' lives. With the accessibility of such an element in the possession of individuals, it has empowered them to run over themselves on a worldwide scale and get a thought about the nearby environmental factors. Prior, in basic inserted area following designs two parts had been conspicuous GPS and GSM module [5]. Yet, there is a trouble to send message through GSM on the grounds that in the useful use it very well may be support just 35 kilometers distance range. The livelihoods of individuals living in the waterfront locales of this nation rely entirely upon fishing in the ocean. Intersection the line is a genuine

physical issue [6]. Since the limits are obscure, anglers utilize unpleasant sea limits. In such a circumstance, the existence of anglers keeps on being troublesome. To keep away from this issue, we need to know the India-Sri Lanka line however this is hard to track down by the anglers [7]. This task manages the total arrangement of the issue looking by the anglers. Here, we use GPS module for recognizing the line. Global Positioning System (GPS) is being utilized increasingly more for a wide change of utilizations. This is a solid position, route for end-clients of some place on the planet or round the globe, on any climate, day or night. The synchronization advantage gives that GPS has three portions: space, oversea and customer. GPS has become into an extensively gear over the world and flip into a helpful instrument for the planning, outlines, business, consistent usages, checking and redirection has gone [8].

As in any of the contemporary GPS constructions of geographic and diversion, the security prerequisites of non-military personnel route in the ocean are met on the grounds that the ocean line can't be stamped. This work focuses on the adaptability and utility of a GPS in the sea. The statute inspiration at the rear of the work is to assist fishermen with investigating past the constraints of particular countries. In the competition that a fisher goes past the restrictions of the country, at that factor a word arises, showing that the fishermen have crossed the edge [9]. DHT-11sensor for tracking down the climatic conditions. Moreover, the engine motor of the boat stops prior to intersection the boundary consequently.

2. Literature Survey

IoT based Fisherman Border Alert and Weather Alert Security System was firstly developed in 2020 [10]. The line distinguishing proof is done the utilization of GPS and a caution machine is given to alarm the Fishermen. In this endeavor, we'll monitor the condition of the estimating zone, and if the fisherman crosses the border, the sensors like temperature, wind speed sensor, and rain sensor will determinedly resource the fisherman calculating location and transmit data to the anglers using ZigBee module reliably whenever they have any help infers there's an emergency button, if they are in an emergency they can press the emergency button, then the alert was shipped off and information from GPS module is furthermore transmit [11]. If the environmental condition isn't normal, therefore the buzzer will start to ring to alert within the vessel. If the fishermen cross the edge, the ringer is started to ring. In common climatic conditions, the data from the sensors that we use and the GPS space of the barge is continually invigorated in the essential worker and appeared in an LCD.

Shalini et al. developed a "Border Detection System for Fisherman using GPS and Arduino" 2019 [12]. The GPS will perseveringly find the extension and longitude of the location and shows the piece of information to the fishermen. By then, it offers the yield which gets examined and appeared in LCD. By laying out valid Arduino code, the GPS module finds data about the position and transmits the bearings from GPS to the Arduino board. The bearings of every place on the planet are constantly tested, and when a line appears at the extension, pink delicate sparkles, a chime is rung, and information is displayed on the LCD.

Fisherman Navigation and Safety System was developed in 2019 [13]. Basically, the GPS space of their insightful telephones will track the locations up to 10-15 miles, nearly duplicating the range. This technique is

sensible and reasonable considering the copious usage of sharp telephones with GPS-based location organizations engaged in them. With our system, we can easily count the number of people entering the sea and returning to the beach [14]. With the date and time record of entering and exiting the port, it is difficult to detect lost neighborhood workers or illegal activity. The whole prosperity is essentially developed on User's Private Pin which is novel to each customer, when approved it creates an individual QR code on the laborer that shuts the trip exactly if checked using the utility with the enrolled handset.

3. Existing System

Region-based alert organizations are essential parts for anglers, in light of horrendous climate conditions and loosen of advancement in rescue reinforce our fishermen's going up against a lifetime issue with neighbor countries. In the current framework, a negligible exertion and basic environment ready system for fisherman's is used to follow their relatives, colleagues, and different fishermen. If some fishermen facing any problems like startling weather changes or crisis, this structure will uphold the fisherman. It screens the weather of the figuring zone and when the angler crosses the edge, at that point these sensors consistently assets the computing zone and by utilizing ZigBee, it sends information to the laborer dependably at whatever point they need any assistance gathers, crisis button is there where the alarm was transported off the specific standard specialist where they get the opportunity to preserve and GPS area is transmitted. Just in case, the weather isn't commendably arranged will be transmitted regularly and the chime will start to ring to alert the fishermen [15][16]. If the weather condition is too poor, the information which is taken from the sensors and GPS space of the boat is constantly strengthened and showed up in an LCD. The structure is arranged by the utilization of GPS and GSM.
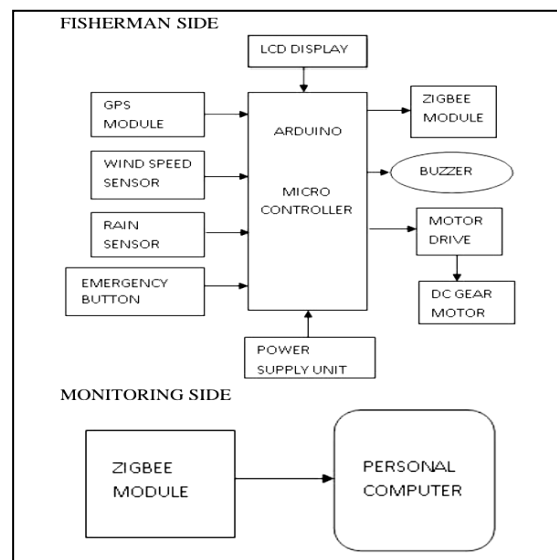
Fig.1. Block diagram of Existing System

GPS provides customers with unexpected organization arrangements, titles, and schedules. Prior to this, GPS has always limited the location of the ocean. Looking at the previous position of the ocean limit and force location, the result is the extent and longitudinal level of the shipping area. When the ship approaches the docking area, an alarm will be triggered and the sound will continue to accelerate the engine [17]. The speed

becomes slower when changing the width. There are two ways to develop the power signal used to set the heartbeat width. These signs are restricted by their location and current location. Below the repeat scale, the warning will continue to decrease. The position of the ship is displayed on the LCD screen [18]. If the boat goes too far, an alarm will be issued to the angler and the boatman's behavior in the marine engine will be informed. The transmitter sends information about ships at sea to the base station through ZigBee [19][20].

Drawbacks:

- Less exactness.

- Slow according.

- Unable send the message utilizing ZigBee to the significant distance.

- Difficult to stop the engine motor of the boat due to panic.

- High costly

4. Proposed System

The Fisherman from Tamil Nadu, mostly crossing the border by unknowingly. They are being taken and their boats are being caught. Once in a while, it achieves the deficiency of lives as well. Major issues are minor assessment genuinely and correspondence with the maritime power. This enterprise is to keep away from such failures and alert human beings in delivery approximately limits. In this project, we proposed that each and every Fisherman can find the border between the India and Sri Lanka easily and the Fisherman from Tamil Nadu under risky circumstance can save their life and improve the security. In our proposed framework, line ID is finished utilizing Global positioning system (GPS). Likewise, identifying the climate conditions utilizing DHT-11 sensor, it will serve to the know the current temperature and furthermore, the worth is show in LCD show. Likewise, we suggested that the engine motor stops consequently prior to intersection the boundary by utilizing the GPS and Arduino UNO microcontroller. This venture is easy to use and minimal effort when contrasted with the current framework.
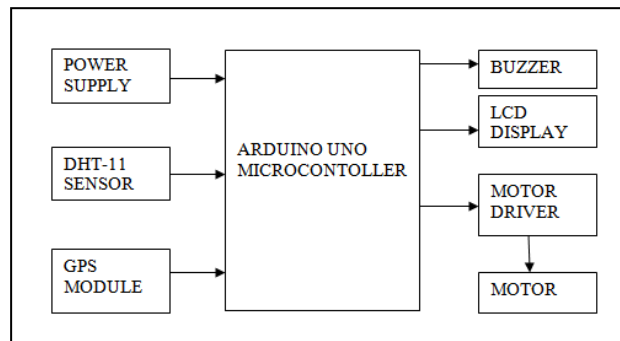
Fig.2. Block diagram of proposed system

Merits:

- *High precision*

- *High effectiveness*

- *Relief from panic to stop the engine motor of the boat*

- *Low cost when contrasted with existing framework*

5. Hardware Requirements

1. Arduino UNO:

An Arduino [21] is in reality a microcontroller primarily based on total percent that may be both applied straightforwardly with the aid of using shopping for from the service provider or may be made at domestic using the segments, resulting from its open-supply gadget highlight. Basically, it is applied in interchanges and operating several gadgets.

Arduino is a low-cost, open-source electronics platform with simple hardware and software. Arduino boards can read inputs, such as light from a sensor, a finger on a button, or a Twitter post, and convert them to outputs, such as turning on an LED, triggering a motor, or publishing something online.
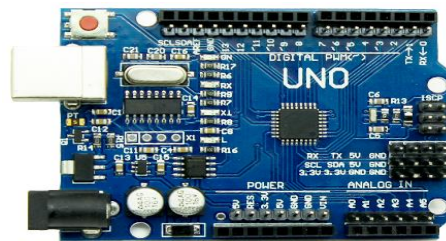
Fig.3. Arduino UNO Microcontroller

2. Global Positioning System (GPS):

GPS gives scope and longitude data, which is the satellite based route framework. The unit has 10-20 m exactness. The GPS beneficiary is an electronic gadget which gets the sign from 3 to 4 satellites. It tends to be store current situation of the gadget by utilizing the distance estimation from different satellites. This module depends on the NEO 6M GPS. This unit utilizes the furthest down the line innovation to give the most ideal situating data and remembers a dynamic GPS receiving wire with a UART TTL attachment. A battery is additionally included with the goal that you can get a GPS lock quicker.


Fig.4. GPS Module

This is an invigorated GPS module that may be used with Ardupilot mega v2. This GPS module offers the quality function information, thinking about higher execution together along with your Ardupilot or different Multirotor control stage. The GPS module has a successive TTL yield, it has 4 pins: TX, RX, VCC, and GND. It is super programming.

3. LCD:

Liquid Crystal Display is a sort of level board show which uses liquid valuable stones in its fundamental kind of action. LEDs have a colossal and fluctuating game plan of use cases for clients and associations, as they can be consistently found in cells, TVs, PC screens, and instrument sheets. LCDs were a significant bounce to the extent that the advancement they replaced, which consolidate light-delivering diode (LED) and gas-plasma shows.
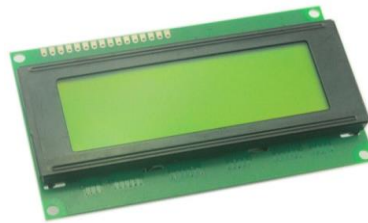

Fig.5. LCD Display

LCDs allowed features to be much thinner than cathode pillar tube (CRT) development. LCDs eat up fundamentally less power than LED and gas-show shows since they work on the rule of hindering light as opposed to releasing it. Where a LED transmits light, the liquid pearls in an LCD make an image using scenery enlightenment.

4. DHT-11 Sensor:

The DHT11 is a generally applied temperature and humidity sensor. The sensor allocated NTC to quantify temperature and an 8-digit microcontroller to find the temperature and humidity as sequential information. The sensor is moreover manufacturing the line adjusted and easy to interface with different microcontrollers. The DHT11 sensor can both be bought as a sensor or as a module. Regardless, the show of the sensor is something similar. The sensor will come as 4-pins out of which simplest 3 pins can be used at the same time as the module will go together with 3 pins as exhibited beforehand. The solitary differentiation among the sensor and module is that the module may have an isolating capacitor and pull-up resistor inbuilt, and for the sensor, you want to use them distantly at something factor required.
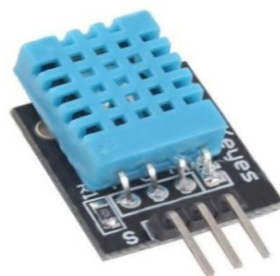
Fig.6. DHT-11 Sensor

5. Motor Driver:

L293D Motor Driver Shield for Arduino is presumably perhaps the most flexible available and highlights 2 servo and 4 engine connectors for DC or stepper engines. That makes it an incredible safeguard for any

mechanical venture. This Arduino viable engine Driver safeguard is a full-included item that it very well may be utilized to drive 4 DC engine or two 4-wire steppers and two 5v servos. It drives the DC engine and stepper with the L293D, and it drives the servo with Arduino pin9 and pin10.

Fig.7. Motor Driver

The safeguard contains two L293D engine drivers and one 74HC595 move register. The move register grows 3 pins of the Arduino to 8 pins to control the bearing of the engine drivers. The yield empowers the L293D is straight forwardly associated with PWM yields of the Arduino.

6. DC Motor:

A DC motor is used to convert the direct flow of electrical energy into mechanical energy which is electrical motors. The most notable sports depend upon the forces conveyed by appealing fields. Since they could be powered by existing direct-current lighting power transport systems, DC motors were the most common type of motor used. DC motors use electromagnetic induction to convert electricity into motion, while AC motors do the opposite. A permanent magnet and an armature (a spinning coil of wire) are used in the motor.


Fig.8. DC Motor

6. Software Requirements

Arduino IDE:

To write the computer code and upload it to the physical board, the Arduino IDE (Integrated Development Environment) is used. The Arduino IDE is extremely simple, which is likely one of the reasons Arduino has become so famous. Compatible with the Arduino IDE is undoubtedly one of the most important criteria for a new microcontroller board.


Fig.9. Logo of Arduino IDE
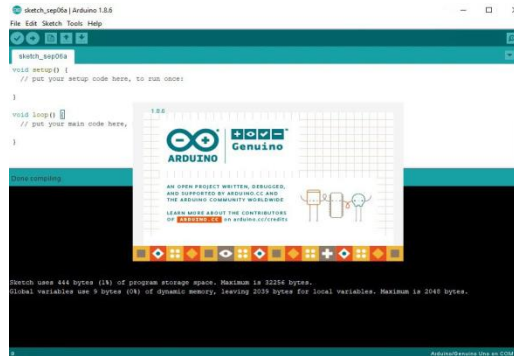
Fig.10. Coding page

7. Results and Discussions

The framework was effectively designed and tried with success with a given circled organizes. The venture is low financial plan as contrasted and the current framework and it will help the poor anglers by and large. This framework gives adequate data to the anglers. This task gives total answer for the issue looked by the anglers. Anglers can think about the climatic conditions which are shown in LCD show and they can stop the engine motor with no frenzy. At the point when the temperature is typical and prior to arriving at the boundary, the message "HAPPY JOURNEY" showed in the LCD show. On the off chance that the anglers comes to approach the line, the message "WARNING ! DON'T CROSS" is shown in the LCD show and furthermore the engine motor stops consequently. This gives the alarm sound utilizing signal when any issue happens. The framework is exceptionally modest and can be generally used to save the helpless angler from getting detainment because of absence of mindfulness.
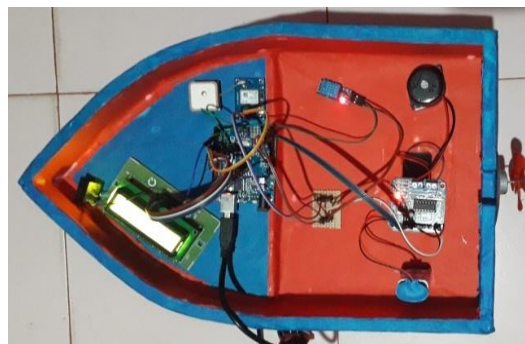
Fig.11. Prototype of Proposed System
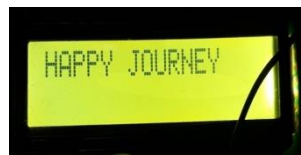
Fig.12. Output of GPS when border is not detected

Fig.13. Output of DHT-11 Sensor

Fig.14. Output of GPS when the border is detected

8. Conclusion

Territory based caution organizations are principal fragments for fisherman's, due to dreadful climate conditions and loosen of advancement in rescue support our fisherman's going up against a real presence time problems with neighboring countries. On thinking about the problem we proposed a simplicity and simple surroundings geared up gadget for fishermen which is used to comply with their relatives, companions and different fishermen. For any fishermen who face difficulties, such as unforeseen climatic changes or crises, this device will assist them. If the environmental conditions aren't suitable, the ringer will begin to ring to warn the person on board.

References

1. Mythily D, Helan Renila R, Keerthana T, Hamaravathi S, Preethi P. "IOT based Fisherman Border Alert and Weather Alert Security System". International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181. ECLECTIC -2020 Conference Proceeding.

2. Kumar, T. A., & Janaki, S. S. (2012). Design of axi bus for 32-bit processor using bluespec. ISSN: 2778 International Journal of Advanced Research in Engineering and Technology, 1(3).

3. Mukesh Krishnan M B, Saveetha D, Arokiaraj A, Rajasekar P. "Fisherman Navigation and Safety System". International Journal of Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-12, October2019.

4. A Kavitha, N Ashok Kumar, M Revathy. "Automatic Identification of Maritime Boundary Alert System using GPS". International Journal of Engineering & Technology, 7 (3.1) (2018) 20-22.

5. Ruturaj H. Parkhande, Suhas B. Pawar, Shubham U. Nalawade, Prof. Sandeep N. Yadav. "Marine Boundary Alert System for Fishermen". Volume 3, Issue 2, February – 2018 International Journal of Innovative Science and Research Technology. ISSN No:-2456 –2165.

6. S.Aakash, N.Gowtham Raj , M.Parama Sivam, T.Paul Ebinesar, R.Rasu, Gokul Prasath.Y. "GPS Border Alert System for Fishermen" IEEE-2013.

7. Arunvijay D, Yuvaraj E. "Design of Border Alert System For Fisherman Using GPS". International Journal of Student Research in Technology & Management . Vol 2(02), March –April 2014, ISSN 2321-2543.

8. S. A. Selvi, T. A. kumar, R. S. Rajesh and M. A. T. Ajisha, "An Efficient Communication Scheme for Wi-Li-Fi Network Framework," 2019 Third International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), 2019, pp. 697-701, doi: 10.1109/I-SMAC47947.2019.9032650.

9. Asif Iqbal Mulla, Sushanth K J, Prashanth Kumar H R, Abubakar Shameez. "Border Alert System for Fishermen Using GPS system". World Journal of Research and Review (WJRR) ISSN:2455-3956, Volume-2, Issue-5, May 2016 Pages 01-04.

10. Vinoth Kumar R, Suriya Prakash M, Andril P, Thamizhlni M,Vivek Kumar N. "Tracking and Warning System for Fisherman Using IOT". International Journal of Pure and Applied Mathematics. Volume 118 No.20 2018,2045-2049. ISSN: 1311-8080 (printed vision); ISSN: 1314-3395 (on line vision).

11. Sivaramaganesh M, Ramya M, Gowtham T, Bharathi T, Jeevitha G. "Implementation of Maritime Border alert System". International Journal of Innovative Research in Electrical,Electronics, Instrumentation and Control Engineering. Vol. 2,Issue 3,Mach 2014.

12. Shalini, S., Saravanan, M., & Kumar, T. A. (2018). Design of fault tolerant sequential circuits using selective triple modular redundancy algorithm. International Journal of Pure and Applied Mathematics, 119(14), 1045-1050.

13. Kumar, T. Ananth, R. Rajesh, and P. Sivanainthaperumal. "Performance analysis of noc routing algorithms for 5×5 mesh based soc."

14. R. Keerthana, T. A. Kumar, P. Manjubala and M. Pavithra, "An Interactive Voice Assistant System for Guiding the Tourists in Historical places," 2020 International Conference on System, Computation, Automation and Networking (ICSCAN), 2020, pp. 1-5, doi: 10.1109/ICSCAN49426.2020.9262347.

15. Balaji, S. and Balamurugan, B. and Kumar, T. Ananth and Rajmohan, R. and Kumar, P. Praveen, A Brief Survey on AI Based Face Mask Detection System for Public Places (March 28, 2021). Irish Interdisciplinary Journal of Science & Research (IIJSR) 2021, Available at SSRN: https://ssrn.com/abstract=3814341

16. L. Renuka Devi, N. Arumugam, et al., J. Nano- Electron. Phys. 13 No 2, 02026 (2021). DOI: https://doi.org/10.21272/jnep.13(2).02026

17. Rajakumar, G., T. Ananth Kumar, T. A. Samuel, and E. Muthu Kumaran. "Iot based milk monitoring system for detection of milk adulteration." International Journal of Pure and App. Math. 118, 9 (2018): 21-32.

18. Sundaramoorthy, Revathy, Yamuna Ilango, and Ananth Kumar Tamilarasan. "Smart bus passengers information and safety management system." International Journal of Pure and Applied Mathematics 119, no. 14 (2018): 795-800.

19. Kumar, T. Ananth, and R. S. Rajesh. "Towards power efficient wireless NoC router for SOC." In 2014 International Conference on Communication and Network Technologies, pp. 254-259. IEEE, 2014.

20. Balasubramanian, S., S. Pratheep, R. Rajmohan, T. Ananth Kumar, and M. Pavithra. "SVM Block Based Neural Learning Technique for Identification of Fraudulent Web Pages." Global Journal on Innovation, Opportunities and Challenges in Applied Artificial Intelligence and Machine Learning [ISSN: 2581-5156 (online)] 4, no. 2 (2020).

21. https://www.arduino.cc/ accesed on 06th May 2021.