

Border Alert and Life Protection System for Fisher-men

Chairma Lakshmi K. R*, Gnanasekaran T

Department of Electronics and Instrumentation Engineering, R.M.K. Engineering College, Chennai-601206, India

*Corresponding author email: chermalakshmi@gmail.com, Tel.: +918056944256

ABSTRACT

Investigating the border control and ensuring security in the borders is a life-threatening problem faced by many peninsular countries. The International Maritime Boundary Line between the countries is difficult to identify, which is the foremost motive for the cross-border cruelty for fishermen. Due to some unavoidable circumstances such as weather condition, fishermen's abnormal body condition leads to a tough journey for them to work. The present invention generally relates to security and protection system for fishermen. More specifically, a system to prevent the fisherman from border crossing issue and to monitor the health status of the fisherman for ensuring safety and security using IoT devices.

Keywords - International Maritime Boundary Line (IMBL), IoT, Life-threatening problem of Fisherman, Weather status.

1. INTRODUCTION

Fishing has been a salient source of income across all the inhabitants of the world in the coastal regions. Fishermen from our country are being abducted for crossing the border which is unintentional most of the times. In most cases, due to crossing of maritime frontiers the fishermen are arrested along with seizing the fishing trawlers and the fishing boat and shot by the Sri Lankan navy which has become more frequent in the past decade. Moreover, the fishermen are proscribed from fishing where frequent firings are predominant. Though it may be political anxiety, it is the charge of the government and the ignorance of focusing in this issue that has created enormous issues [1-4]. In 2015, a recent survey by the government sources revealed that until October 2015, 650 fishermen were arrested. Most of the times the boat on which the fisherman has invested for his profession have been impounded by the Maritime Security Agency (MSA) of the neighboring countries. The major causes incorporate the unawareness of the international maritime border line which leads of major problems like arresting and impoundments would be a great loss to the fisherman family. Also, sudden weather changes in sea also affected fishermen's health [5-9].

The border alert and life protection system continuously monitor the health conditions of fishermen. This system utilizes a controller unit with a GPS system and an IoT module. Whenever the fishermen approach the border line, there will be an alarm that is generated by the controller and intimates

them. Furthermore, if they proceed towards the borderline, the controlling unit will control the motor boat. It turns the motor in counter direction to avoid the border crossing issue. The boatman's precise location is monitored continuously with the help of GPS in terms of Latitude and Longitude and also the weather condition; fishermen's body condition such as body temperature, heart rate is also monitored continuously. Weather monitoring unit is used to detect the sudden changes in weather condition and save the fishermen from weather changes. If an emergency or abnormality occurs then alerts are sent as notifications to the coastal guard control room and the boatman's family members with the help of IoT module.

2. PROPOSED METHODOLOGY

The objective of the present invention is to prevent the fisherman from border crossing issue and to monitor his health status for ensuring his safety and security. Fig. 1 displays the block diagram of proposed Methodology.

In proposed product, GPS device is used to receive the topographic location of the boat in the sea and alarm circuit is used to indicate the border of the country. Topographic location of country's border and the position of the boat in latitude and longitude manner can be compared by controller. If the location of the boat is nearby the Maritime Border Line or restricted zone, the controller triggers an alarm in the boat to alert the fishermen. If the location of the boat is equal or beyond the predefined location or restricted zone, it can be confirmed that the fishermen crossed the border and

then the controller will drive the motor in reverse mode to avoid crossing of the border and in addition to that the latitude and longitudinal values of the boat will be informed to the coastal guards or navy control room and the family members of fishermen. In this system, camera is placed inside the boat. If abnormal or emergency conditions are experienced or alert is sent to navy control room from boat then the camera in ship is switched on by sending control signal from navy control room, live data or situation can be monitored by coastal guards from control station. In one of the embodiments of the present invention, the sensors mounted in life jacket, fishermen's health conditions like body temperature and heart beat rate are monitored continuously and any emergency or abnormal condition if happens to the fisherman health conditions then information about fisherman's body temperature, heart beat rate and GPS location such as longitude, latitude will be informed to coastal guards or navy control room through IoT as well as family members of fishermen. If any abnormal environment changes like cyclone or earthquake occur near fishermen's current location, it can be intimated or informed to fishermen's boat from control station through IoT. Similarly, information related to fishing location and fish's availability is also informed to fishermen's boat through IoT.

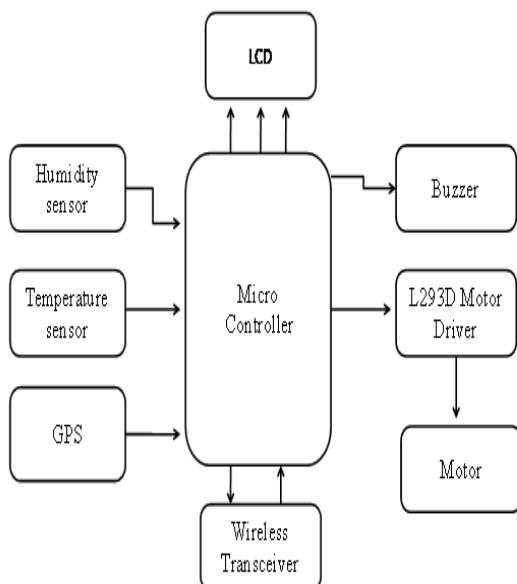


Fig. 1 Functional block diagram of proposed methodology

Fig. 2 shows the flowchart of the proposed model, where the boat unit flow and fisherman unit flow are explained with conditions. In this system Microcontrollers are interfaced. The input from the Boat unit and Fishermen unit is taken and these values

are used to identify abnormal condition by comparing the values of input to the predefined values. If the information reaches to abnormal stage then the appropriate intimations are provided.

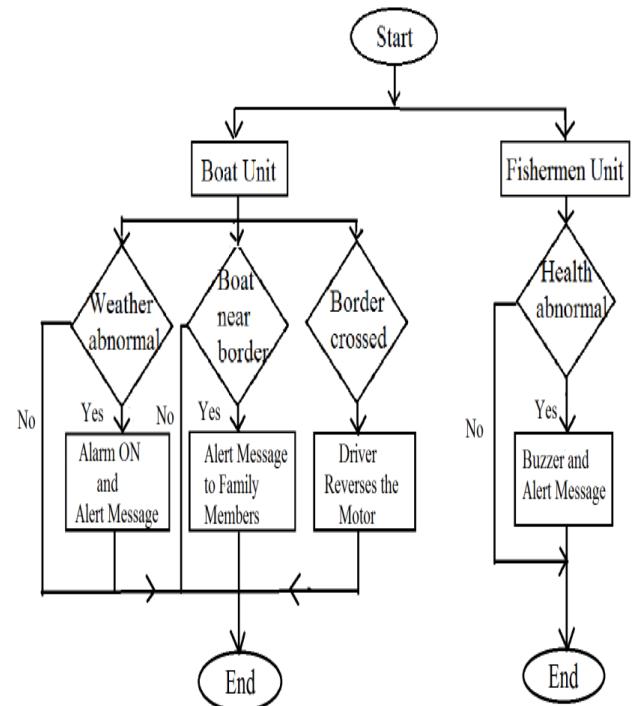


Fig. 2 Flow chart of proposed methodology

2.1 Normal Condition (Fishermen is in own Country and Health is in normal mode)

The sensor values are compared with the normal values and the GPS tracker value is compared with the predefined value and transmit the information to the control room of Coastal Guard about the description of health and weather status of fishermen and the action is terminated.

2.2 Health problem occurred to Fishermen (Fishermen is in own country and the Health is in abnormal mode)

The sensors detect abnormal health conditions such as temperature, heart beat and it displays the abnormal status in the boat, indicates to coastal guards by the change of color in the server and it also intimates the family members through message.

2.3 Boat crossed the Border (Weather condition and Health condition are normal)

If the boat nears the border alarm triggers along with the alert message displayed in the LCD placed on the boat. Even the normal health condition of fishermen are

observed and continuously updated in IoT. The GPS tracker will continuously monitor the latitude and longitude values of the position of boat. These values are compared with the preloaded latitude and longitude values of the border. Once the boat reaches the border line, the driver stops the motor and reverses its direction along with the alert message sent to the family members of the fishermen and the coastal guards.

2.4 Border Crossed and Health condition abnormal (Weather is normal)

Once the boat reaches the border line, the driver stops the motor and reverses its direction along with the alert message sent to the family members of the fishermen and the coastal guards. If the sensors detect abnormal health conditions, LCD displays abnormal status in the boat, indicates to coastal guards by the change of color in the server and it also intimates the family members through message.

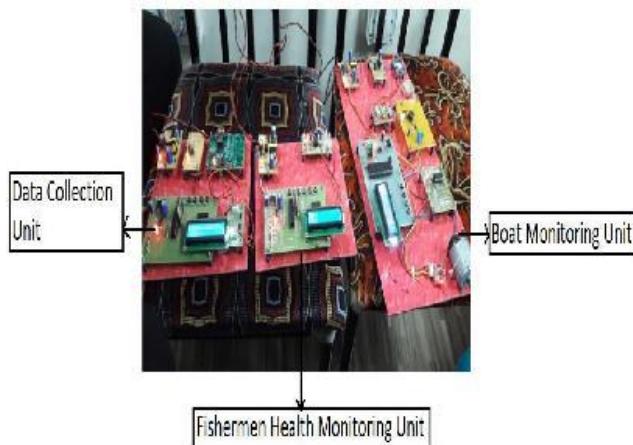


Fig. 3 Photographic view of proposed methodology

Fig. 3 shows the proposed prototype model for Border alert and life Protection system for Fishermen which has three units in it. They are Boat monitoring unit, Health monitoring unit and Data collection unit.

3. EXPERIMENTAL TESTS, OBSERVATIONS AND DISCUSSIONS

3.1 Normal Condition (Fishermen is inside our own country and Health Condition is normal)

Fisherman has not crossed the border and health condition is normal (i.e.) Temperature is below 40 and Heart Beat count is below 100. Fig. 4 shows the server update of normal health condition (Heart Beat and Temperature) of the fisherman for the coastal guards. Here the fisherman Temperature is 36 which are below

40 and the status updated as normal, the Heart Beat is 90 which are below 100 and the status updated as normal. Fig. 5 shows server page of the border status as normal depicting that they are inside our own country. Fig. 6 LCD display shows the Fisherman unit of normal health conditions of the fisherman. Here the display shows the Temperature below 40 and Heart Beat is below 100.

Sho	Data Received On	Temperature	Heart Beat	Temperature status	Heart Beat Status
226	31-03-2018 13:47:24	036	090	Normal	Normal

Fig. 4 Photographic views of server page of health status

Data Received On	Border Status
31-03-2018 02:34:42	Normal

Fig. 5 Screenshot of server page of border status



Fig. 6 LCD display of health status

3.2 Health problem occurred to Fishermen (Fishermen is in own country and the Health is in abnormal mode)

The fisherman has Health problem but the boat has not crossed the border. The abnormalities in the health may occur in three ways.

3.2.1 Both Heart Beat and Temperature in abnormal condition

Fig. 7 shows the server page of health status which illustrates that the temperature and Heart Beat of the fisherman is Abnormal (Temp-Above 40, Heart Beat-Above 100). Fig. 8 shows the LCD display as abnormal condition of both Temperature and Heart Beat of the fisherman. This display is fitted in the fisherman unit itself. This abnormal condition gives us the alert in the IoT server along with the message sent to family members and coastal guards. Fig. 9 shows the Message Alert of both health condition which is given to the family and coastal guards. In this message both the abnormality status is indicated.

Sno	Data Received On	Temperature	Heart Beat	Temperature status	Heart Beat Status
229	05-04-2018 18:07:07	041	102	Abnormal	Abnormal

Fig. 7 Server page of health status

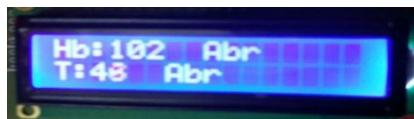


Fig. 8 LCD display of health status

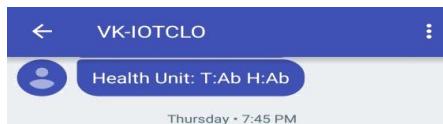


Fig. 9 Message alert of health status

3.2.2 Only Heartbeat is in abnormal Condition (Above 100)

Fig. 10 shows the server page of health status which illustrates that the Heart Beat of the fisherman is Abnormal (Heart Beat-Above 100). This will in turn give message alert for family members and coastal guards. Fig. 11 shows the LCD display as abnormal Heart Beat of fisherman and Temperature as normal condition. This display is fitted in the fisherman unit itself. This abnormal condition gives us the alert in the IoT server along with the message sent to family members and coastal guards. Fig. 12 shows the message alert for abnormal Heart Beat that is given to family members and coastal guards, which is very useful for us to save the fisherman.

Sno	Data Received On	Temperature	Heart Beat	Temperature status	Heart Beat Status
227	05-04-2018 18:07:47	037	102	Normal	Abnormal

Fig. 10 Screenshot of server page of heart beat abnormal status



Fig. 11 Screenshot of LCD display of abnormal heart beat status



Fig. 12 Screenshot of message alert of health status

3.2.3 Only Temperature is in abnormal condition (Above 40)

Fig. 13 shows the server page of abnormal Temperature status of the fisherman (Temp-Above 40). This abnormal condition gives us the alert in the IoT server along with the message sent to family members and the coastal guards. Fig. 14 shows the LCD display as abnormal Temperature value of the fishermen. This display is fitted in the fisherman unit itself. This abnormal condition gives us the alert in the IoT server along with the message sent to family members and coastal guards. Fig. 15 shows the message alert for abnormal Temperature status that is given to family members and coastal guards, which is very useful for us to save the fisherman.

Sno	Data Received On	Temperature	Heart Beat	Temperature status	Heart Beat Status
231	05-04-2018 13:45:05	041	060	Abnormal	Normal

Fig. 13 Server page of abnormal temperature status



Fig. 14 LCD display of abnormal temperature status



Fig. 15 Message alert of abnormal temperature status

3.3 Boat crossed the Border (Weather condition and Health condition are normal)

The boat of the fisherman will not completely cross the border, incase the fisherman nears the border it updates in the IoT server along with the message alert given to the family members and the coastal guards. Now the weather condition and the health status are in normal condition only. Fig. 16 shows the server updates for nearing the border. When the boat nears the border it gives message alert to the family of the fisherman and the coastal guards. Inspite of the alert if the boat reaches the border then the DC motor reverses its direction and moves the boat away from the border. Fig. 17 shows the LCD display that indicates the status of the boat which is nearing the border. This display is fitted in the Boat unit. This abnormal condition give us the alert in the IoT server along with the message sent to family members and coastal guards. Fig. 18 shows the message

alert for nearing the border that is given to family members and coastal guards, which is very useful for us to alert the fisherman.

Data Received On	Border Status
31-03-2018 02:21:34	Near_to_border

Fig. 16 Server page of border status



Fig. 17 LCD Display of boat nearing the border

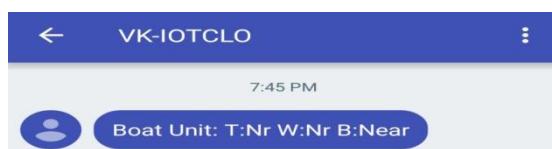


Fig. 18 Message alert of boat nearing border

3.4 Border Crossed and Health condition abnormal (Weather is normal)

The boat of the fisherman will not completely cross the border, in case the fisherman nears the border the DC motor reverses its direction, health status of the fisherman is Abnormal (Temp-Above 40, Heart Beat-Above 100). It updates in the IoT server along with the message alert given to the family members and the coastal guards. Fig. 19 shows the server updates for nearing the border and the health status of the fisherman. When the boat nears the border and the health of the fisherman goes abnormal it gives message alert to the family of the fisherman and the coastal guards. Inspired of the alert if the boat reaches the border then the DC motor reverses its direction and moves the boat away from the border.

Data Received On		Border Status			
Sno	Data Received On	Temperature	Heart Beat	Temperature status	Heart Beat Status
228	05-04-2018 13:07:07	041	102	Abnormal	Abnormal

Fig. 19 Server page of border and health status

4. CONCLUSION

Countries with the International Maritime Boundary Line (IMBL) frequently suffer from security issues and

constant danger for those fishermen. The people of shoreline regions have the main labor of fishing, due to inattentiveness or without knowing their boundary limit of their country they cross the borders. In such kind of situation, the survival of fishermen continues to be difficult. In India there will be around 4 million Fishermen are there and it comprises in 875,365 families. Thus, our product provide a unique system to identify the Border Line for all Fishermen to eliminate the Border crossing issues and avoid fisherman missing or boat missing problems occur due to Natural Disasters. Using IoT technology, Unexpected parameters of fishermen body conditions, weather condition of sea like about any natural disaster like cyclones can be updated in IoT server present in Coastal Guards as well as it can be informed to fisherman well advance to safe guard them. The future enhancement includes integrating Fish Locator technology which aids the fisherman for locating the fishes and therefore they can easily capture the fish. Also, the better communication for transferring the information can be made through VSAT technology.

REFERENCE

- [1] D. Ramya, V. C. Mahavishnu, Y. Rajkumar , K. Sujatha, S. Mohana Gowri and R. Vidya, IoT based frontier security and tracking system for indian fishermen using a threshold based algorithm, *International Journal of Pure and Applied Mathematics*, 22, 2017, 271-274.
- [2] K. Karuppasamy, K. Jagadheesh, K. Nehru, K. Sindhu Meena and S. Vignesh, Providing a border alert system for fishermen by using GPS & GSM technology in wireless sensor networks, *International Research Journal of Engineering and Technology*, 4, 2017, 1904-1907.
- [3] S. Ranjith, Shreyas, K. Pradeep Kumar and R. Karthik, Automatic border alert system for fishermen using GPS and GSM techniques, *Indonesian Journal of Electrical Engineering and Computer Science*, 17(1), 2017, 84-89.
- [4] R. Raja Nandhini, S. Malarvizhi, A. Praveen, C. Mohanraj and R. Srinivasan, Intelligent navigation system for fishing boats using GPS, *International Research Journal of Engineering and Technology*, 3, 2016, 1169-1172.
- [5] B. Kamalakannan, K. Naresh and P. Sakthivel, Protecting fishermen's by detecting and warning them while crossing sea borders using GSM and

RFID technologies, *Proc. International Conference on Green Engineering and Technologies*, India, 2016.

- [6] G. Sivagnanam, A.J. Midhun, N. Krishna and G. Maria Samuel Reuben, A. Anguraj, Coast guard alert and rescue system for international maritime line crossing of fisherman, *International Journal of Innovative Research in Advanced Engineering*, 2(2), 2015, 82-86.
- [7] D. Jim Isaac and H. Eugene Kingsley, Advanced border alert system using GPS and with intelligent engine control unit, *International Journal of Electrical and Computing Engineering*, 1(4), 2015, 11-14.
- [8] J. Shibu, D. Gowthami, A real-time border alert system for boats using wins, *International Journal of Software & Hardware Research in Engineering*, 2, 2014, 6-9.
- [9] Abid Khan and Ravi Mishra : GPS – GSM based tracking system, *International Journal of Engineering Trends and Technology*, 3, 2012, 161-164.