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LoRa Based Ship Man Overboard Rescue System IntegratedLong Distance Wireless Communication

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Abstract:** Man overboard is an exclamationgiven onboard when a crew member or apassenger falls off the ship into the water and needs immediate rescue. Man overboard is a situation wherein a ship's crew member falls into the sea from the ship, no matter where the ship issailing, on open seas or in still waters in port. A seafarer has to be very careful while performing their duties on board a vessel as it can never be taken for granted that a person cannot fall offthe ship due to bad weather, swell in the sea,accidents, and negligence. A man overboard is anemergency situation, and it is essential to locate and recover the man overboard person as soon aspossible as due to bad weather or rough sea, the crew member can drown or else due to temperature of the cold water, the person can get hypothermia. Man overboard is an emergency situation, and the person overboard should berescued as soon as possible. It might become difficult to locate him in case of strong waves or bad weather. He could also drown or die of hypothermia if action is delayed. Therefore, the proposed system develops a system that will automatically trace the location of ship man. Thisproject utilizes long distance RF communication modules such as LoRa module which provide long distance communication in terms ofkilometres. The hardware component includes micro-controller, GPS, LoRa modules, etc. The LoRa modules can be fixed in the ships for tracking of the ship manwho will wear the wearable with lora transmitter and the rescueteam will be having the mobile app to track the person. As the ship man overboard, the location of the ship man is been transmitted to a LoRa receiver which is then transmitted to the mobile app developed for rescue team independently for tracking the ship man. The live location is sharedvia google map to the rescue team. Thus, thisproject will help us in tracking the ship man overboard in an easy and effective manner.

Keywords:** Rescue project, LORA-Based,Long distance RF Communication, Education

I. INTRODUCTION

"Man overboard!" is an exclamation given aboard a vessel to indicate that a member of the crew or a passenger has fallen off of the ship into the water and is in need of immediate rescue. Whoever sees the person's fall is to shout, "Man overboard!" and the call is then to be reported once by every crewman within earshot, even if they have not seen the victim fall, until everyone on deckhas heard and given the same call. This ensures that all other crewmen have been alerted to the situation and notifies the officers of the need to act immediately to save the victim. Pointing continuously at the victim may aid the helmsman in approaching the victim.

A person may fall overboard for any number of reasons: they might have been struck by one of the ship's booms, they may have lost their footing on a slippery deck or while climbing the ship's ratlines, they may have deliberately jumped overboard in a suicide attempt, or any number of other reasons.Falling overboard is one of the most dangerous and life-threatening things that can happen at sea. This isespecially so if falling from a large vessel that is slow to maneuver, or from a short-handed (i.e., undermanned, lacking sufficient crew) smaller boat. When single-handed and using self-steering gear, or when taking place at night or in stormy conditions, the situation is usually fatal. If the individual who falls overboard is wearing a personal flotation device (life jacket), the chances of their survival are significantly improved. Since 2000, 284 people have gone overboard orfallen off cruise ships and a further 41 have fallenoff large ferries. In any given month, approximately two people go overboard and between 17 percent and 25 percent are rescued. If the vessel has a functioning engine it should be started as soon as possible (after checking for trailing ropes). Once the sails are under control recovery should proceed as for a powerboat. There have been various sailing manoeuvresrecommended and taught to handle man-overboard situations. Three common ones follow. Whoever sees the accident is to shout, "Man overboard!" loudly and clearly to alert the rest of the crew. At least one person should do nothing other than stand and point at the casualty maintaining continuous visual contact. Whatever marker and flotation equipment is to hand should be thrown as near the casualty as possible by other crewmembers. This may include a horseshoe buoy or lifebuoy, a danbuoy or man overboard pole, and even a floating smoke signal. If the equipment exists, man overboard alerts are to be triggered on whatever electronic gear is available including GPS receivers and DSC radio transmitters.

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The most direct action is to stop the boat immediately, very near to the casualty. This can be done by immediately tacking the bow of the boat through the wind without handling the jib sheets, so that the boat is effectively hove to. In some circumstances, this may be enough, and the casualtycan be recovered as the boat drifts back down onto them. In many cases, however, the manoeuvre will have left the boat too far away for that. In this case, the mainsail is sheeted in hard and the turncontinued until the boat circles, the wind is jibed across the stern and the boat is sailed downwind,past the casualty again and finally brought to rest byturning upwind again. It is recommended not to adjust the sails for efficient downwind sailing, so that too much speed is not built up when approaching the casualty. The main advantages of this method are its simplicity (making it ideal for short-handed crews), and the fact that the boat does not need to be maneuvered far away of the casualty (which reduces the likelihood that the crew may losevisual contact).

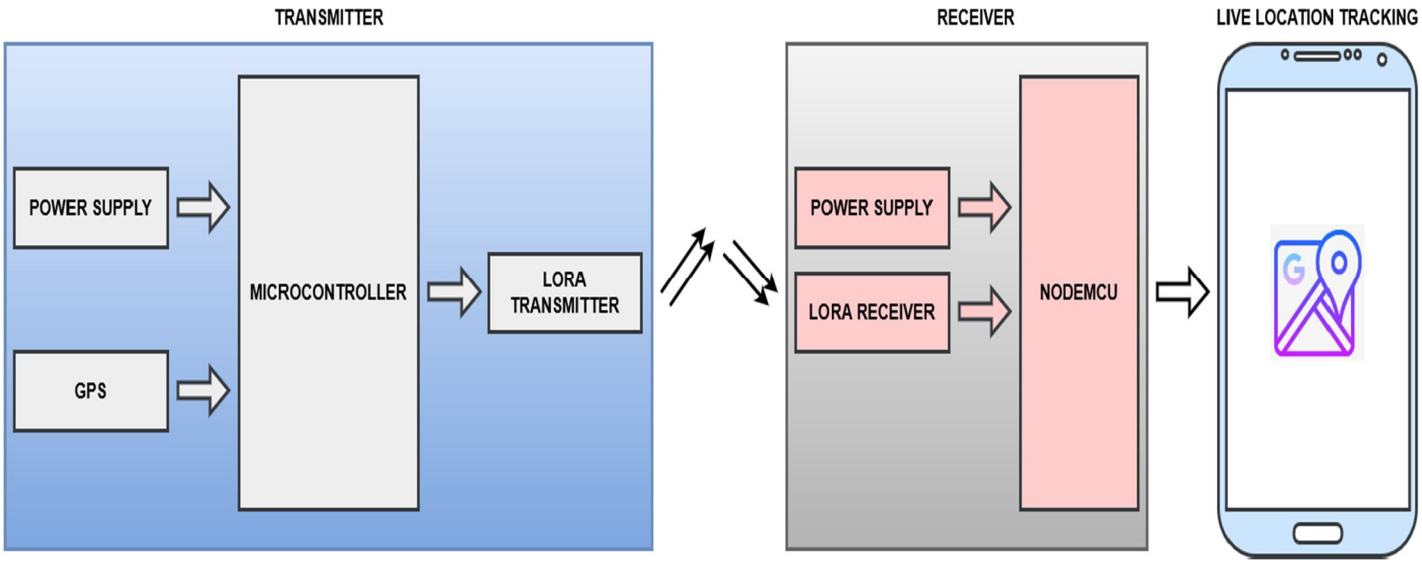
II. EXISTING SYSTEM

New communication technologies are being developed for the Internet of Things (IoT), such as wireless long-distance andlow-power networks (LPWAN). The LoRa (Long Range) protocol, a wireless communication technology for long-range applications, is a type of LPWAN that has been recently widely used. The 3D localization and tracking of objects using LPWANis a hotspot in IoT applications. In spite of many methods for improving the accuracy of 3D localization using traditional wirelesscommunication such as Wi-Fi, ZigBee and Bluetooth, a few of them are available for long-range applications. In this way, this paper presents an improved 3D localization system based on LoRa communication and altimeter for indoor applications. The method uses the traditional trilateration technique with the signal strength indicator (RSSI) together with an experimental update of parameters for improving localization accuracy. Experimental tests done in two indoor scenarios showed a significant improvement of upto 80%, with a maximum confident interval (95%) of 0.121m, in the 3D localization accuracy, in addition to better results than related papers in the literature.

III. PROPOSED SYSTEM

The proposed system develops a system that will automatically trace the location of ship man. This project utilizes long distance RF communication modules such as LoRa module which provide long distance communication in terms of kilometres. The hardware component includes micro-controller, GPS, LoRa modules, etc. The LoRa modules can be fixed in the ships for tracking of the ship man who will wear the wearablewith lora transmitter and the rescue team will be having the mobile app to track the person. As the ship man overboard, the location of the ship man is been transmitted to a LoRa receiver which is then transmitted to the mobile app developed for rescue team independently for tracking the ship man. The live location is shared via google map to the rescue team. Thus, this project will help us in tracking the ship man overboard in an easy and effective manner.

Block Diagram



IV. METHODOLOGY

In this project, we have decided to develop a system that will automatically trace the location of ship man. This project makes use of long-distance radio frequency (RF) communication modules like the LoRa module, which are able to provide communication over long distances measured in kilometres. The microcontroller, GPS, and LoRa modules, amongst other things, make up the hardware component. The LoRa modules can be installed in the ships in order to facilitate the tracking of the ship's crew members. The crew members will wear wearables equipped with Lora transmitters, and the rescue team will have a mobile app with which to track the individuals. As soon as the shipman goes overboard, the location of the shipman is sent to a LoRa receiver, and from there it is sent to the mobile app that was developed for the rescue team specifically for the purpose of tracking the shipman. The live location has been communicated to the rescue team through Google Maps. As a result, this project will assist us in locating the ship's missing crew member in an efficient and straightforward manner.

V. CONCLUSION

The project has been successfully implemented to provide a solution for the shipman overboard and it has automatically traced the location of ship man. This project utilizes long distance RF communication modules such as LoRa module which provide long distance communication in terms of kilometres. A mobile application is developed for rescue team independently for tracking the ship man. Also, the live location is shared via google map to the rescue team. Moreover, this system can be utilized for monitoring and live tracking of the shipman via mobile application and is also very promising for real-time application because of the fast- processing time.

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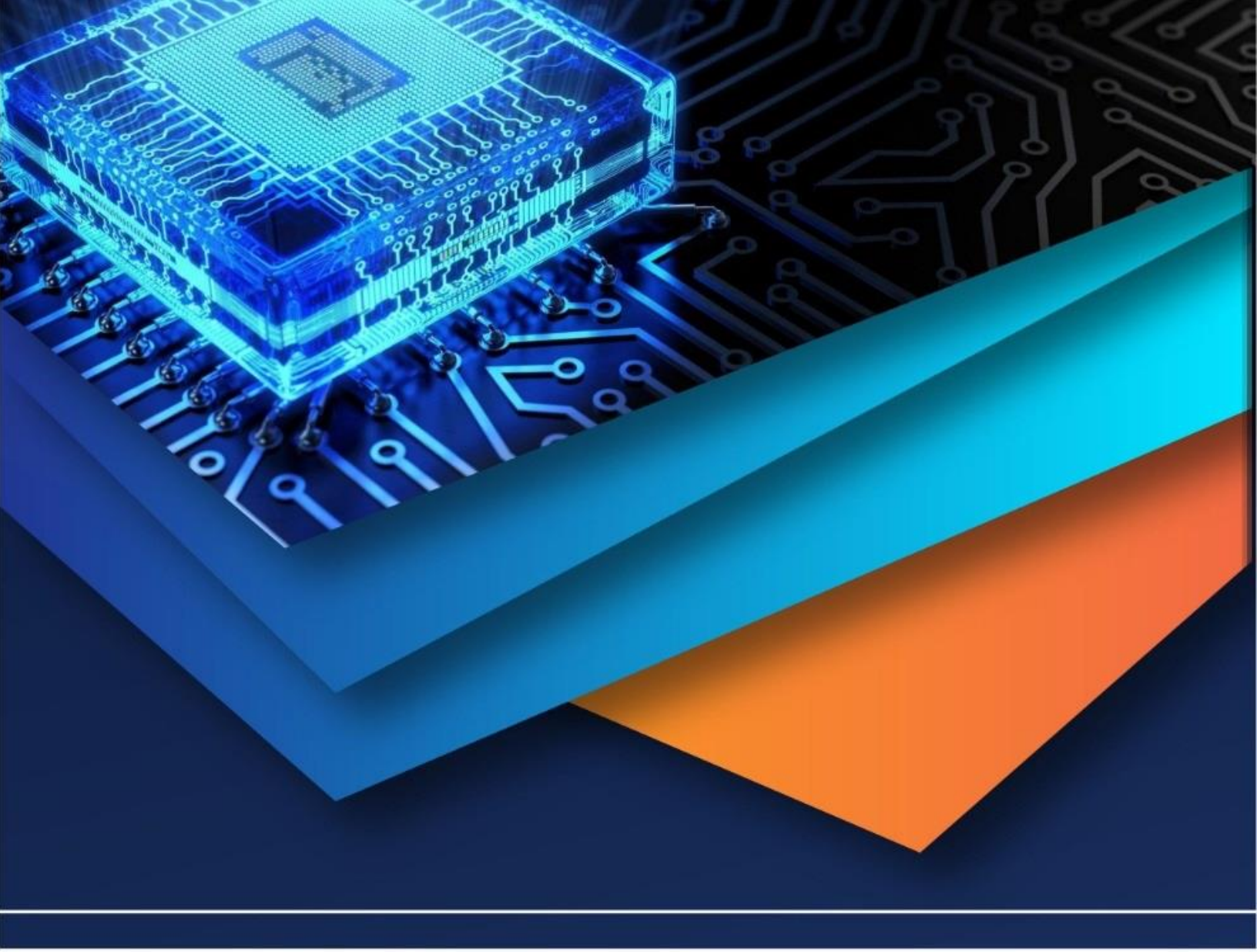
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