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Ship Tracking Device with Fuel/Fire Accident Notification Provision

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Abstract: This paper presents the development of an electronic system designed to use in sail ship. The main interesting elements are three-axis acceleration, Global Positioning System (GPS), fire and fuel leakage detection. Along with the provision for location tracking, this system also tells us about any fire accident taking place on the ship, fuel leakage accident and also if the ship is tilting in water. In this paper, Wi-Fi is used as a medium of communication between the system and the mobile phone application. These two act as the transmitter and receiver sections of the system. The design intention is on low-cost electronic systems-based technology and demonstrating the validity of these technologies in a scientific application.
Key words: fire, tilting, fuel, low cost, Wi-Fi, GPS, three-axis acceleration.

I. INTRODUCTION

A ship tracking device is used to track the location of the desired ship. These days a lot of accidents are taking place out of which most are due to technical glitches or problems. These include fire accidents, fuel leakage accidents, etc. Hence a system that provides awareness of any such kinds of leakage and fire accidents on the ship are a required now. The control of the ship is provided to the user via an application on the Android mobile phone. This is because since a mobile phone is a portable device, it won't be a problem for the user to carry it with him all the time. The integration between the hardware system and the mobile phone will be using the Wi-Fi module. The facility of moving the ship forward and backward has also been given to the user. This way when any kind of accident takes place on the ship, the user is notified and the necessary actions can be taken to avoid any huge loss. The facility to locate the ship whenever required makes it easy to track the ship in case of any kind of piracy in the middle of sailing. The forward and backward movement of the ship is facilitated using DC motors with fins to work in the water.

II. PREVIOUS WORK

All the papers that we referred to have given us a clear path of all the prerequisites for the project. The research for the concerned project is based on several papers that play in the same fields of electronics. Few of these papers include data acquisition systems that are used to form either a rough path or map of whether any obstacle is expected anytime during the journey because of which rerouting may have to be done and few of them include acquiring weather related data using the data acquisition system.

A. The marine channels have low bandwidth because of the channel limitations of Very High Frequency which result in packet rates below 30 kbps. The power consumption is not a barrier as such systems do not take much power practically. [3]

B. Satellites play a key role in the marine communication system and hence it has to be considered as a major element. Hiring satellites from other countries results in huge expenses and hence, cannot be used in systems which cannot afford such budget. It may also result in delays due to obstacles or weather conditions.[4]

C. The research also highlighted a point which has been causing major trouble in huge water bodies. Tsunami being a tremendously harsh natural disaster, it has destroyed also ships along with islands. At such times, moving a vast object like a ship away from such region becomes an impossible task. Hence, problems have to be faced. The communication system of a nearly destroyed ship cannot be relied upon.[5]

D. A lot of facilities depend on maritime transport for their import and export type businesses. With such increasing demand of maritime transport, trafficking is becoming a huge concern in the waters. Due to such problems, it is difficult to study maritime accident probabilities. These problems result in water accidents. A technology has to be designed which makes the maritime transport much safer, economical and efficient. [6]

E. The marine networks are hugely dependent on weather conditions.[3]

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III. TRANSMITTER SIDE

The system containing the microcontroller, Wi-Fi module, MQ-5 fuel sensor, LM-35 temperature sensor, GPS receiver, tilt detector, DC motors along with the motor driver, etc. are considered to be the transmitting side since they are going to be placed on the ship. The data acquired from this system is what is to be sent to the user on his mobile phone. The fuel leakage accidents will be detected by fuel sensor (MQ-5).

This sensor is sensitive to LPG (Propane). The moment it detects any of it, the sensor is expected to notify it to the system immediately. The fire accidents are detected using LM-35 temperature sensor. This sensor detects the fire using change or increase in temperature form the normal. The moment the temperature increases, the sensor sends the signals to the corresponding system.

The tilt detector is programmed to notify any kind of tilting of ship in the water body. This tilting may be because of the load or some functionality problem of propellers.

This may further lead to sinking of the ship. Hence, a system notifying such imbalance is necessary. The GPS module is used for sending the coordinated location of the ship. This location information may be in the longitude, latitude and degree form but it helps the concerned person to locate his/ her ship as and when requires. The DC motors are connected to the DC motor driver which will be responsible for the forward and backward movement of the ship. The motors will have fin like structures attached to them which makes it possible for them to work in water.

IV. RECEIVER SIDE

The receiver side is the side that receives the signals from the transmitter side which is discussed in the previous section. It is expected to contain an Android mobile phone. This mobile phone will consist of an application simply downloaded from Google play store that will act as the notification and controlling panel for all the information and from the transmitter side.

The phone is a portable and reliable platform for such activity since it is rare for somebody to not carry their phone with them be it indoors or outdoors. This portable device also eliminates the problem of user interface since it is a friendly interface and is not expected to take more than 5-10 minutes to understand the required functioning.

V. DISCUSSION

The research for this project and this review paper led us to the conclusion that just like roads, even water bodies are experiencing trafficking an because of the increase in demand for maritime transport. This maritime transport facility is being widely used for the purpose of import- export business. Hence, this trafficking makes it difficult to calculate the accident possibilities and safety is at stake. Also, another problem that we observed is the weather conditions. These conditions alter the communication between stations and hence, sometimes become a problem. Because of the fact that VHF limits the bandwidth, not a lot of options are left to choose from as a solution.Technical glitches and hence small scale accidents involving fuel/fire as the source of the accidents may sometimes lead to large scale destruction and damage to property as well as life. Such problems may be eliminated by the systems proposed in this project.

VI. CONCLUSION

It demonstrates the ability to track the location of the boat and report any kind of fire taking place on the ship as well as reporting any kind of fuel leakage. The user is notified with the location of the ship as and when required. Any kind of fire accident taking place on the ship or fuel leakage accident is also notified to the user via his/her Smartphone. The movement of the ship in the water can also be controlled using the same.

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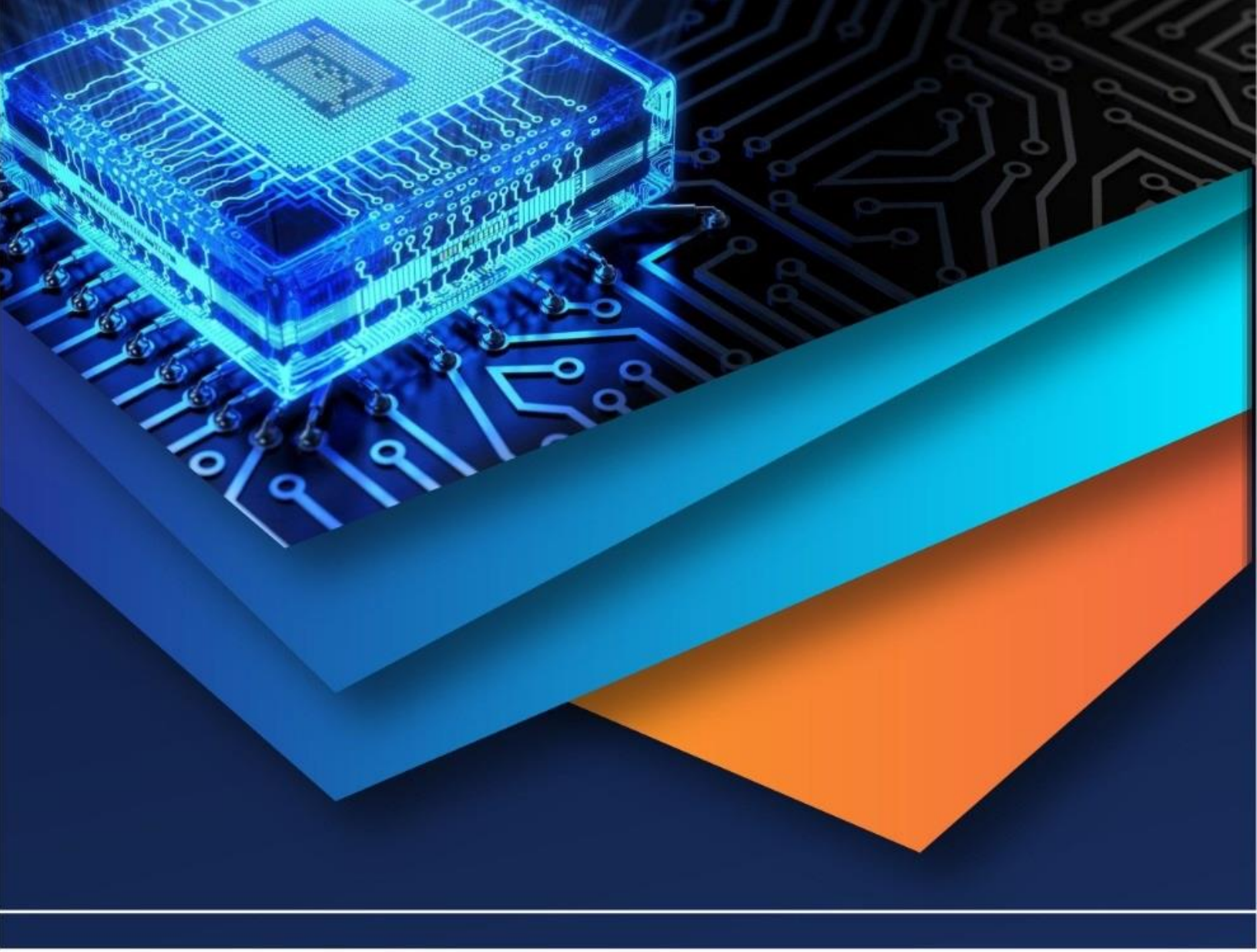
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