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An Advanced Safety Enhancement and Real Time Tracking System for Boats

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ABSTRACT: In the present scenario water transportation has been developed a lot but there is no advanced development in the safety measures. As a result disasters are increasing day by day. As a solution for these disasters we are aimed at the implementation of 'An Advanced Safety Enhancement and Real Time Tracking System' for boats which utilizes the latest tracking and safety features.The whole system will be implemented on the microchip 16 series 8-bit controller. The features incorporated in the system are a real time emergency messaging system, a boat tilt identification system. The data received from all these sensors will be stored internally. At definite intervals of time this information will be messaged to the boat traffic control station, so that the information will be intact, even if some mishap occurs to the boat and internal storage system. If the number of passengers exceeds the limit, from the counter information the microcontroller could immobilize the engine. And an air bag is implemented in both sides of the boat to maintain the balance, i.e. in case of tilting of the boat the air bag will inflate and maintain the balance.

I. INTRODUCTION

The waterways play a significant role in transportation system of many developing countries because of their lower cost and higher accessibility compared to other alternatives, creating a great demand for transportation of goods and passengers. However, this mode of transportation has become vulnerable due to limitations of reservoirs, lack of care, and the absence of technology to maintain and monitor the waterways and the water-based vehicles. The scenario is pretty much same for most of the developing countries.Due to the availability of information and ease of access to relevant information, we choose Thekkady and Thattekad boat accident as a case study. The accident occurred in Thekkady was due to, when a number of passengers rushed to one side of the boat and due to sudden movement caused the boat to capsize and all of the passengers were thrown into the water. Similar sort of incident was occurred in Thattekad, the boat was over loaded and due to the movement of passengers to one side of the boat caused the mishap.

In this paper, a system for water transportation safety based on ATMEGA 32 has been developed. The system mainly focuses on the provision for tilting of boat, water leakage due to bad condition of boat, climate condition, and location of boat. In case of tilting of boat, an air bag type system is implemented, and the tilting is identified by accelerometer. The angle of inclination is taken as 30 degree from the earth axis, when the angle of inclination exceeds 30 degree the air bag helps to regains the normal position of the boat. The compressed air to the air bag is controlled by the solenoid valve.A water leakage sensor is provided and in case of any leakage the water is pumped out of the boat. GPS module is implemented to locate the boat and GSM module to send the location to the rescue team at a particular interval of time. This system is mainly developed for tourism. By this system boat safety can be enhanced.

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II. BLOCK DIAGRAM AND DESCRIPTION

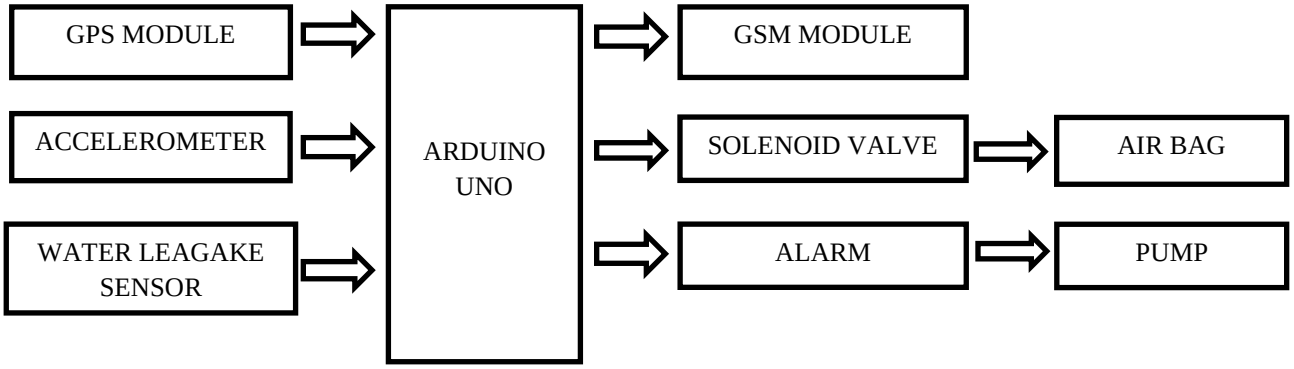

Fig 1: Block Diagram

The block diagram of boat safety enhancement system using microcontroller is shown in fig.1. This project consists of a microcontroller which acts as a central controller which controls the whole system. Here we are using ARDUINO-UNO (ATmega 32).

The accelerometer used is ADXL335, which is a 3 axis accelerometer which checks the tilting of the boat, when the tilting angle goes beyond the set value the air bag get activated. The solenoid valve blows the air from a high pressure container, keep the vessel afloat and prevent from sinking. The air bagsystem keeps boats above the waterline and prevents loss of property while protecting the passengers abroad.

The GPS module provided in the system helps to locate the boatand the location is send to the rescue team at a particular interval of time and at emergency, which helps the rescue team to reach the location in case of any accidents. The information is send via the GSM module, which accepts a SIM card and operates over a subscription to a mobile operator. When a GSM modem is connected to a computer, this allows to use the GSM modem to communicate over the mobile network. Here we are using SIM900a model.

A water leakage sensor is also provide, when water leakage is detected, the alarm gets activated which alerts the passengers to use the safety equipmentsand the water is pumped out of the boat and the rescue team is alerted.

III. PROPOSED SYSTEM DESIGN

The fig.2. shows an animated model of the project. The floating foils are implemented as shown in the figure, when a tilting occurs the air foils will be ejected out and the boat regains its normal position, and immediately a message will be passed to the rescue team about the location and fault condition.

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Fig 2: Model of Proposed system

IV. FLOWCHART AND WORKING

The flowchart of the hardware unit is shown in fig.3. Firstly we have to count the number of passengers, the value is set according to the capacity of boat. If it is over limit, the alarm gets activated and if it is under limit the system will go to the next step. After checking number of passengers, the system will check tilting angle of the boat, here the angle set is 30 degree from the earth axis. If the angle of inclination is beyond the set value, the solenoid valve will open and eject the air bag and thus the boat attains its normal position. At the same time message is passed to the rescue team. At the same time water leakage is also checked. In case of leakage alarm starts and the water is pumped out of the boat, and message is passed to the rescue team. Both check for tilt and water leakage is a continuous cycle.

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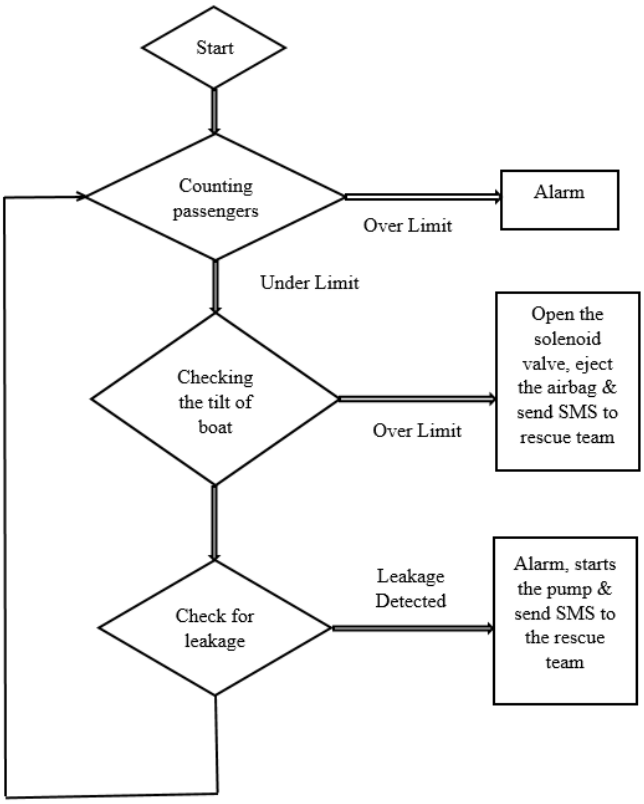

Fig 3: Flow Chart

V. RESULT AND DISCUSSION

The primary focus of this project is to be able to detect any emergency situation of vehicles in waterways and send alerts to the monitoring authorities for initiating an action to stop any mishaps and the ARDUINO-UNO based safety system for boats was successfully developed. Several parameters like tilting of boat, passenger counting, water leakage, location of boat was checked and each stage was successful.

The whole system is fully automated and due to remote indication, the system is efficient and fast. The system is cost efficient. When using a GSM module there must be an issue of network which is one of the disadvantages of this system.

VI. CONCLUSION AND FUTURE SCOPE

This paper facilitates an efficient solution for accidents in water transportation especially in tourism field. The system is provided with an air bag system to avoid tilting, water leakage sensor, over load sensor, GPS and GSM modules for locating the boat. By the use of GPS and GSM system the rescue team will be able to reach the destination with in time in

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case of emergency, which will save lives and make the transport system safe and reliable.This system can be implemented in large water vessels which are used for fishing purposes, by providing satellite communication system instead of GSM, as there is an issue of network.

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