Automated Safety Monitoring System for Passenger Boats using Arduino

Dr. M.Venkatesan[1], B. Manasa[2], K. Supriya[3], B. Dwaraka[4], A. Raja Mohan[5],

[1] Professor, Dept: of ECE, PBR VITS , Kavali, Andhra Pradesh-524201

[2,3,4,5] UG Students Dept. of ECE, VEC , Kavali, Andhra Pradesh-524201 India

Abstract : It was observed that many automobiles using sensors are operating more efficiently. The vast majority of motorbikes and cars with sensors are effective in preventing collisions. Due to this, there are hardly any street accidents. If we can implement the concept of using sensors in the boats, we can reduce boat accidents given the preceding situation where the number of accidents occurring is very low. This is the main idea driving our task. The Internet of Things was used to complete the mission. Using the Arduino and several sensors, a task can be completed..

Index Terms - Arduino, RF Tx, RF Rx, LCD, GSM, DHT11, Relay, Water sensor.

I.INTRODUCTION:

An Embedded system is a special-purpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few predefined tasks, usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Personal digital assistants (PDAs) or handheld computers are generally considered embedded devices because of the nature of their hardware design, even though they are more expandable in software terms. With the introduction of the OQO Model 2 with the Windows XP operating system and ports such as a USB port both features usually belong to "general purpose computers". Physically, embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. In terms of complexity embedded systems can range from very simple with a single microcontroller chip ,to very complex with multiple units, peripherals and networks mounted inside a large chassis or enclosure Avionics, such as inertial guidance systems, flight control hardware/software and other integrated systems in aircraft and missiles.

- •Cellular telephones and telephone switches.
- •Engine controllers and anti lock brake controllers for automobiles
- •Handheld computers
- •Personal digital assistant
- •Video game consoles
- •Computer peripherals such as routers and printers.
- •Industrial controllers for remote machine operation.

II.EXISTING SYSTEM:

There are many progressed boats with various features like fast, remote-controlled boats, power boats, and so on. All these boats were developed only keeping in view of speed and quality. So, there is no development of boats to evade the boat mishaps using sensors.

Drawbacks of Existing Method

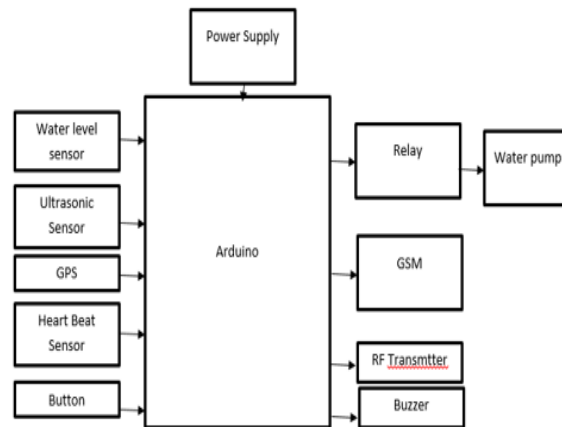- Accidents may occur

- Huge loss of property and life's

Fig 2.1: Examples of Existing system
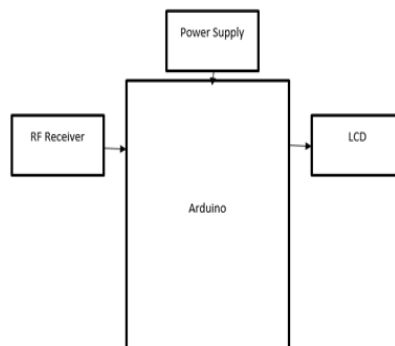
III.PROPOSED METHOD:

With the help of the designed smart boat, we can spare the lives of the individuals. The individuals in the boat can get quick assistance from the control room even before the risk occurs or as soon as it occurs. We can likewise check the water existence inside the boat with the assistance of certain water sensors. Ensuring effective utilization of life jackets spares the individual from risks. With this proposed smart boat, we can spare the lives of lots of individuals.

3.1:BLOCK DIAGRAM:

Boat-TX:

```
                    ┌──────────────┐
                    │ Power Supply │
                    └──────┬───────┘
                           │
┌──────────────┐           │
│ Water level  │───▶┌──────┴──────┐       ┌───────┐      ┌────────────┐
│ sensor       │    │             │──────▶│ Relay │─────▶│ Water pump │
└──────────────┘    │             │       └───────┘      └────────────┘
┌──────────────┐    │             │
│ Ultrasonic   │───▶│             │
│ Sensor       │    │             │       ┌───────┐
└──────────────┘    │   Arduino   │──────▶│  GSM  │
┌──────────────┐    │             │       └───────┘
│     GPS      │───▶│             │
└──────────────┘    │             │       ┌───────────────┐
┌──────────────┐    │             │──────▶│ RF Transmtter │
│ Heart Beat   │───▶│             │       └───────────────┘
│ Sensor       │    │             │       ┌───────────────┐
└──────────────┘    │             │──────▶│     Buzzer    │
┌──────────────┐    │             │       └───────────────┘
│    Button    │───▶│             │
└──────────────┘    └─────────────┘
```

RX:

```
                 ┌──────────────┐
                 │ Power Supply │
                 └──────┬───────┘
                        │
┌─────────────┐  ┌──────┴──────┐       ┌─────┐
│ RF Receiver │─▶│             │──────▶│ LCD │
└─────────────┘  │             │       └─────┘
                 │             │
                 │   Arduino   │
                 │             │
                 └─────────────┘
```

3.2: APPLICATIONS

1. Military and aerospace embedded software applications
2. Communication Applications
3. Industrial automation and process control software
4. Mastering the complexity of applications.
5. Reduction of product design time.
6. Real time processing of ever increasing amounts of data.
7. Intelligent, autonomous sensors.

IV. COMPONENTS DESCRIPTION:

4.1: HARDWARE COMPONENTS REQUIRED:

4.1.1: ARDUINO UNO:

The **ATmega328** is one kind of single-chip microcontroller formed with Atmel within the **megaAVR family**. The architecture of this Arduino Uno is a customized Harvard architecture with 8 bit **RISC processor** core. **Uno** include Arduino Pro Mini, Arduino Nano, Arduino Due, Arduino Mega, and Arduino Leonardo.
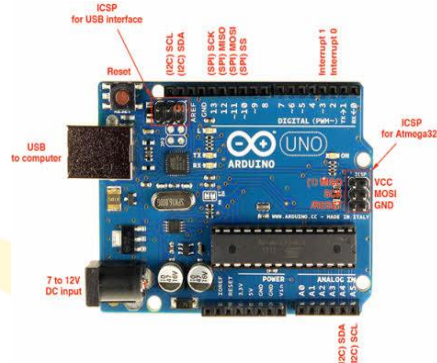

Fig 4.1.1: Arduino Uno

4.1.2: GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION):

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection.A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging.
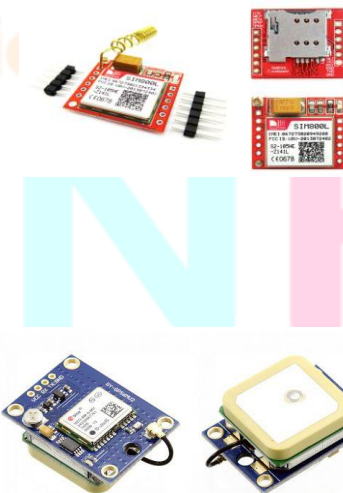

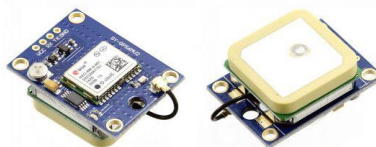**Fig 4.1.2: GSM**
4.1.3: GPS MODULE:

Fig 4.1.3: GPS

The u-blox NEO-6M GPS engine on these modules is quite a good one, and it also has high sensitivity for indoor applications. Furthermore, there's one MS621FE-compatible rechargeable battery for backup and EEPROM for storing configuration settings. The module works well with a DC input in the 3.3- to 5-V range (thanks to its built-in voltage regulator).

4.1.4: ULTRASONIC SENSOR:

The ultrasonic sensor (or transducer) works on the same principles as a radar system. An ultrasonic sensor can convert electrical energy into acoustic waves and vice versa. The acoustic wave signal is an ultrasonic wave traveling at a frequency above 18kHz. The famous HC SR04 ultrasonic sensor generates ultrasonic waves at 40kHz frequency.

Fig 4.1.4: Ultrasonic Sensor

4.1.5: BUZZER:

A **buzzer** or **beeper** is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of **buzzers** and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

Fig: 4.1.5: Buzzer

4.1.6: WATER PUMP:

Fig 4.1.6: Water Pump

A submersible pump, also called an electric submersible pump, is a pump that can be fully submerged in water. The motor is hermetically sealed and close-coupled to the body of the pump. A submersible pump pushes water to the surface by converting rotary energy into kinetic energy into pressure energy.

4.1.7: 5v RELAY:
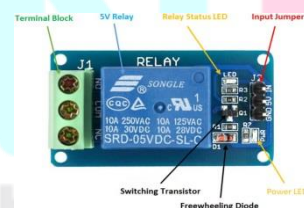
Fig:4.1.7: 5V Relay

4.1.8: WATER LEVEL SENSOR:

The sensor has a series of ten exposed copper traces, five of which are power traces and five are sense traces.These traces are interlaced so that there is one sense trace between every two power traces.Usually these traces are not connected but are bridged by water when submerged.

4.2: SOFTWARE REQUIRED:

4.2.1: ARDUINO IDE SOFTWARE:

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It originated from the IDE for the languages *Processing* and *Wiring*. It includes a code editor with features such as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, and syntax highlighting, and provides simple *one-click* mechanisms to compile and upload programs to an Arduino board. It also contains a message area, a text console, a toolbar with buttons for common functions and a hierarchy of operation menus. The source code for the IDE is released under the GNU General Public License, version.

4.2.2: EMBEDDED C:

EMBEDDED C Programming is the sole of the processor functioning inside each and every embedded system we come across in our daily life , such as mobile phone , washing machine and digital camera. Each processor is associated with embedded software. The first and foremost thing is the embedded software that decides the functioning of the embedded system.
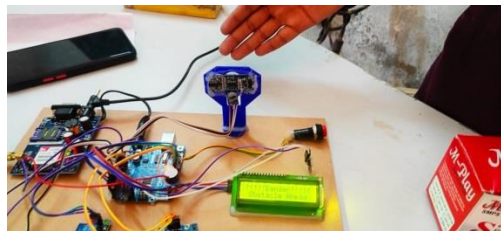
RESULT AND DISCUSSION:

FIG 5.1:Abstacle Detected

fig 5.2: GPS Shows the location

FIG 5.3 Pump the water to out side

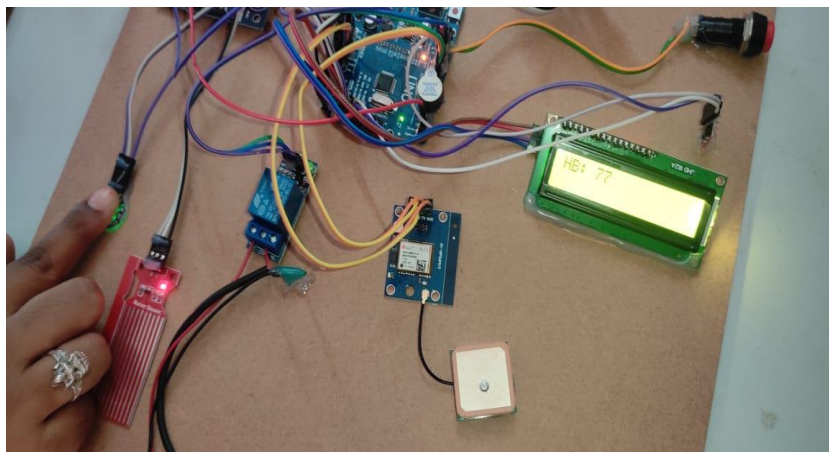**FIG 5.4 Emergency button pressed**

FIG 5.5. To measure the heart rate

CONCLUSION:

This project is very useful for passenger's safety in boats, as it comes with different sensors to monitor different hazards and passes the information to control room as well as emergency services using RF transmitter-receiver and GSM. GPS is used to fetch the location of boat and always transmits the location to the control room. By using this GPS the boat will be notified whenever it's crossing the border latitude and longitude. It also comes with a heartbeat sensor with which the user can monitor his/her heartbeat. The emergency button is installed on the boat with which anyone can call emergency services at the time of emergency and the boat captain has the special authority to cancel the emergency call any time when button pressed to cancel false alarms. Whenever water detected in the boat, the water pump starts immediately pumping water out and informs to control room and emergency services for help. The ultrasonic sensor is installed in the front side of the boat with which the obstacles in front of boat can be detected from a long distance.

REFERENCES:

[1].Karan Kansara, Vishal Zaveri, Shreyans Shah, SandipDelwadkar and KaushalJani, "Sensor based Automated Irrigation System with IOT", International Journal of Computer Science and Information Technology Vol. 6, Issue 6, 2015.
[2].Joaquin Gutierrez, Juan Francisco Villa-Medina, and Alejandra Nieto-Garibay, Miguel Angel Porta-Gandara, Automated Irrigation System Using a Wireless Sensor Network and GPRS Module", IEEE Transaction on Instrumentation and Measurement,2013.
[3].VandanaDubey, NileshDubey and ShaileshsinghChouchan, "Wireless Sensor Network based Remote Irrigation Control System and Automation using DTMF Code", IEEE Transcation on Communication Systems and Network Technologies, July 2013.
[4].G.Nisha and J.Megala, "Wireless Sensor Network Based Automated Irrigation and Crop Field", Sixth International Conference on Advanced Computing ICoAC, 2014.
[5]. Kavianand G, Nivas V M, Kiruthika R and Lalitha S, "Automated drip Irrigation system", IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development, 2016.