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# Automated Drowning Detection and Security in Swimming Pool

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**ABSTRACT:** Swimming pool surveillance systems plays an essential role in safeguarding the premises. The main purpose of this project is to design a safety swimming pool. We present in this paper human movement approach to detection of drowning incidents in swimmingpools at the earliest possible stage. This is done by preventing the children from drowning in the swimming pool by lifting the iron plate. The proposed approach consists of two main parts: The LASER and LDR are the main thing and an iron plate for inclination. Compared with the swimming pool drowning monitoringsystem based on video technology, the demo system based on human movements hasan advantageof convenience, cost saving, and simple algorithm.

**KEYWORDS:** Laser, LDR, Inclination, Iron plate, Monitoring.

## I. INTRODUCTION

Swimming is a favorite exercise, but in the water, beginners often cannot be free to breathe action and cause choking water, then loss of balance and cause a drowning accident. Some special circumstances, such as cramps, collide with each other, disease or mental stress, and so on, may also cause swimmer drowning. Drowning is a leading cause of death and disability for children. Worldwide, drowning produces a higher rate of mortality than any other cause of injury in children less than 15 years of age. Young children under the age of five are at particular risk, suffering the highest drowning mortality rates worldwide. According to the Centers for Disease Control and Prevention, approximately one thousand children die from drowning annually in the world. Young children under the age of five are at particular risk, suffering the highest drowning mortality rates worldwide. In this project to avoid drowning accidents automatically by using the iron plate. The earliest swimming alarm system appears in the 1976, then there are some patent applications, but due to various reasons, these techniques are not popular. In 2001, the French Vision IQ company produced the world's first set of drowning alarm system Poseidon, this is the first commercial promotion system. In 2003, Singapore Nan yang University of Technology design DEWS. Swimming pool drowning monitoring system based on video technology is mostly reported in the literature. There are three kinds drowning monitoring system according to the different position of the camera. One is that the camera is mounted on the underwater swimming pool wall, then monitor underwater swimmer status. A limitation of this equipment is that if too much swimmers, occlusion problem will appear. The other is that the camera is mounted upon the water, and monitors the swimmer posture change. The reaction and refraction of light and water wave interference will affect the image quality, and drowning man feature this method detected is not easy to distinguish swimmers and divers obviously. The third is a combination of the two, underwater camera and aerial camera matched, monitoring the swimmer posture.

## II. PREVIOUS SYSTEM FOR DROWNING

The block diagram of the previous drowning detection in the swimming pool figure [1] is given below. In this technology they are using the wearable device and then the video cameras are used. The device we designed is wear on the wrist and move in large amplitude along with the wrist when human is swimming in the water, and the data acquired from accelerator will dramatic changes. If human is drowning in water, his or her wrist almost motionless, and the data acquired from accelerator will have only small changes due to water movement. Drowning detection method uses threshold.

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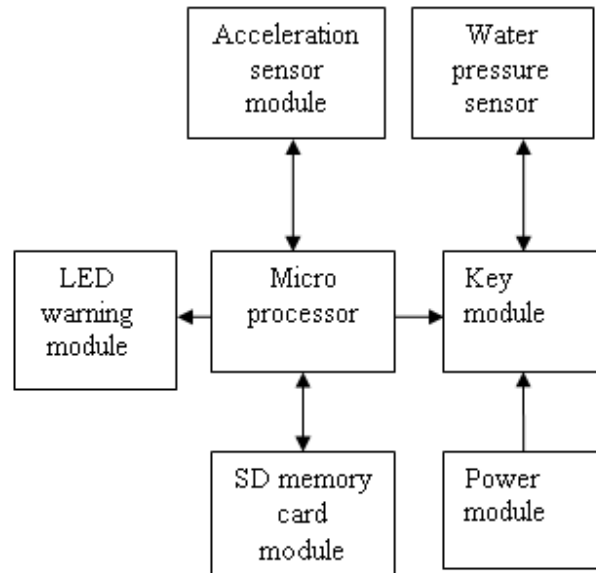


Fig. 1 wrist drowning detection device



Wearable drowning monitor device can detect drowning accident and alarm. The device has seven main modules, including microprocessor, power module, SD memory card module, LED warning module, acceleration sensor module, water pressure sensor module, and keys module. The red LED is used for drowning warning. One blue LED is used to get the work status of the device which will flash every few seconds in order to save the precious energy. Because LED light-emitting angle generally relatively small, 5 red LED lights of upward and around direction is installed to make LED alarm signal clear. Two keys are designed on the demo device. One is the switch for power. First, data from water pressure sensor is used to judge whether the human body in the water, if the body in the water, then start downloading judgment process. Then, analog signal obtained from the three axis acceleration sensor is converted to digital signal and three axis acceleration values are gained. Human motion changes can be obtained through analysis then we can determine the human body is in the independent state of motion or drowning. In the demo system, acceleration data is analyzed every 25 seconds and if human has less than twice elective movement, we can judge that he or she has drowning occurs.

### III. PROPOSED DROWNING DETECTION

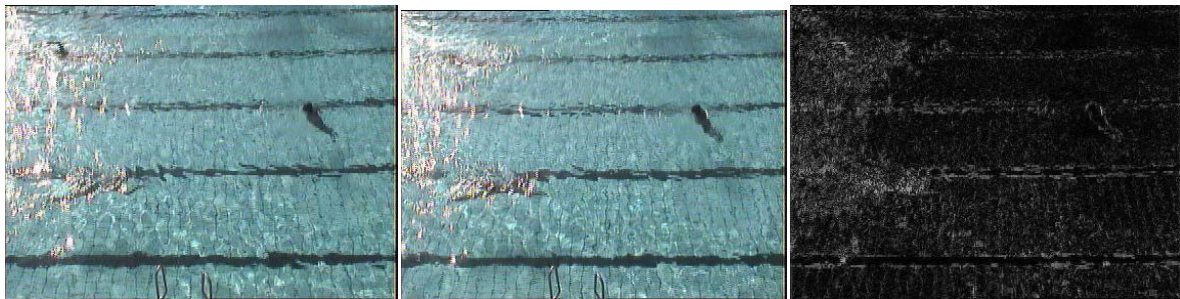
The proposed system block diagram figure[2] shows given below. In this project we are going to design a safety swimming pool by using a light source. In the proposed method the human identification in the swimming pool depends

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on the LDR and laser. First, data from water pressure sensor is used to judge whether the human body is in the water, if the body is in the water, then start downloading judgment process. The iron metal plate is placed in the floor of the swimming pool. The laser and the LDR source will be placed in the side of the wall. Here we are using ATmega81 microcontroller to control the whole process. Embedded C language is used for the coding. Initially the laser source which spreads over the swimming pool and the LDR which sense the laser light and which produces the resistance value. Depends on the resistance value the process has been taken. When the LDR value will be kept constant then the alarm will be activated. The resistance value will be changed with respect to the human movement. The message will be sent to the administration by using the GSM service. After 30 seconds there is no change which means the plate will lift automatically using the motor and motor drive. The human is safe in this technique.



## BLOCK DIAGRAM:

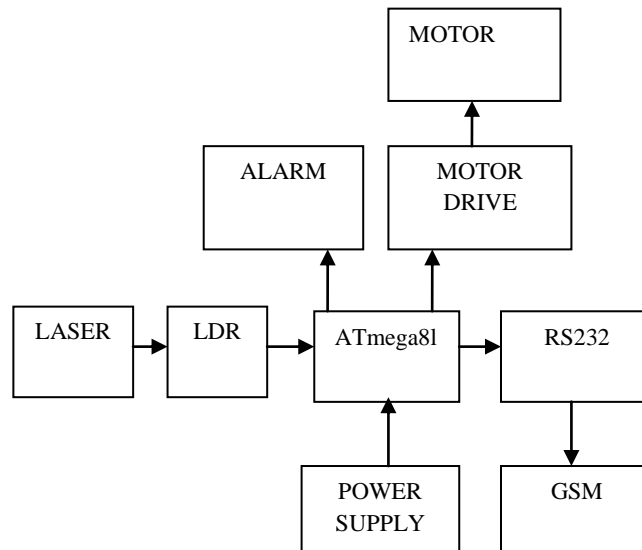


Fig.2 Block diagram for drowning detection system in swimming pool

## BLOCK DIAGRAM DESCRIPTION

The proposed project consists of following modules

- Laser & LDR implantation
- Timer circuit for ATMEGA8
- GSM module
- Buzzer and inclination circuit



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## A. LASER & LDR IMPLANTATION MODULE

1. Laser
2. LDR

### LASER:

By using the laser source we can generate the laser light. The laser light which spreads over the water in the swimming pool. The laser source which is placed in the side wall of swimming pool.

### LDR:

Light depending resistance. The LDR which is used to measuring the resistance value of laser light. The resistance value is not constant the value will be changed depending on the movement of human and then the LDR is fixed side of the wall.

## B. TIMER CIRCUIT FOR ATMEGA8:

ATmega8 is the microcontroller, that controller has peripheral features like inbuilt ADC, required to get the signals from the sensors. Maximum clock frequency is 20MHz and hence faster than 8051. It is based on RISC and Hardware architecture and hence even faster. Embedded C is used for programming the microcontroller. The block diagram the output is passed to the controller pin then 1v output is given to the motor circuit. Here the motor driver converts the 1v to 12v and then the motor runs automatically then the iron plate lifted automatically.

## C. GSM MODULE:

### RS232 INTERFACE:

The serial/Column port of the computer is used for communication with the hardware. The serial port of the computer uses RS232 standard for communication. RS232 standard voltages are not compatible with conventional TTL / CMOS circuits. Hence IC MAX232 is used for voltage conversion between RS232 port and the microcontroller. MAX232 enables full duplex communications, while doing the necessary voltage conversions.

### GSM:

GSM (Global System for Mobile communication) is a digital mobile telephony system. With the help of GSM module interfaced, we can send short text messages to the required authorities as per the application. This technology enables the system a wireless system with no specified range limits. This is a plug and play GSM Modem with a simple to implement RS232 and TTL serial interface. It is used to send SMS, make and receive calls, and do other GSM operations by simple AT commands through a serial interface from microcontrollers and computers. It uses the SIM300 module for all its GSM operations. Thus GSM Module is connected to the controller and transmits the incoming messages to the controller. It also receives the messages from controller. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band.

## D. BUZZER AND INCLINATION CIRCUIT:

The alarm is activated when the LDR value will be not changed depends on the human movement. The LDR resistance value will be increased which means there is any human is presented in the swimming pool. Then the alarm is activated. After the 30 seconds there is no change in the LDR value means the iron plate is lifted automatically.

## IV. CONCLUSION

In future the system can be modified by using the various detection technologies. If the swimmer has a long time rest, the device will give positive judgment. Problems such as device sealed and batteries power supply, and so on, need to be further studied. The new type of laser used in the water has been studied.



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