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Live Visual Survillance System for Early Drowning Detection at Pool Environments

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ABSTRACT

Drowning accidents occur in Swimming pool, boathouse and beaches staffed with professional lifeguards. It is very hard for normal people to identify the people drowning. We introduce an automatic airbag system, helping evacuate swimmer who is spending abnormally in under water. The pressure sensor is used to detect the deepness of the swimming water. If the time exceeds a predefined maximum threshold level that information is sent to the motor connected to the airbag to trigger it and evacuate the swimmer. Heartbeat sensor which provides digital data connected the swimmer to monitor the swimmer's heart rate, if it exceeds the predefined level the corresponding signal is given to the airbag to trigger it and evacuate the swimmer. The GPS is tracking the swimmer's location and its send to the control room.

Keywords: Heartbeat sensor, Pressure Sensor, Wireless Transceiver, GPS,

1. INTRODUCTION

Drowning is one of the top most case of accidents among children under the age of 12 in the United States. Few wearable sensors are used in the system. These systems are used to detect the deepness of the water. If the time exceeds, to trigger in to the alarm. Heartbeat sensor which provides digital data connected the swimmer to monitor the swimmer's heart rate, if it exceeds the predefined level the corresponding signal is given to the airbag to trigger it and evacuate the swimmer. The GPS is tracking the swimmer's location and its send to the control room. The another one method is video based drowning detection system for the drowning people. but it is difficult to apply the system for the sea. In this analysis our aim is to create a system to help and evacuate the swimmer at an early drowning stage based on wearable pressure sensors which are attached at the swimmer's head level. We do not get Actual measurements of the critical drowning stage. The video-based surveillance system is used for real-time human behavior analysis and it provides an efficient way for detecting the occurrence of any abnormal events occur in our surroundings. In this paper an outdoor surveillance problem, which involves human behavior monitoring within the hostile aquatic environment, is considered. On top of some new insights into problems faced for common outdoor environments, problems unique to human detection within a dynamic aquatic environment are also explained. These system is very useful for lifeguard professionals and to enhance the safety of the swimming pool. The reliance of underwater cameras in these systems inherits weaknesses: expensive installation costs and drowning detection being constrained to victims who have sunk to the bottom of the pool. To circumvent these drawbacks, the proposed system is based on the highly mounted cameras. This allows for the detection of early drowning stage from the onset of water crisis situation.

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1.1. A near drowning detection system based on swimmer's Physiological information analysis

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To identify a human at drowning accident remains it is very hard for Professional lifeguards. In recent advancement of electronics and material science the wearable sensors are emerging. The two wearable drowning detection systems are Introduced first one is a wristband system which triggers an alarm, when the swimmer is unmoved for predefined time, second one is head band based system which sends alarms, if the swimmer expends a long time under water. However, these systems are not considered at early drowning situation. The another alternative idea is a video based drowning detection system, but it mainly suffers from human disturbance when the pool is full up.

1.2. An automatic drowning detection surveillance system for challenging outdoor pool environments

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In this paper our ultimate goal is visual surveillance system. We examine the challenges faced by automated surveillance system operating in hostile conditions and demonstrate the developed algorithms via a system that detects on highly dynamic pool environments. An powerfull segmentation algorithm based on robust block-based background modeling and threshold-with-hysteresis methodology enables swimmers to be reliably detected on amid reflections, ripple splashes and rapid lighting changes. Visual indicators are identified by professional knowledge of underwater detection. it is based on a set of swimmer descriptors has been defined. Through seamlessly fusing that the extracted swimmer descriptors based on a novel functional link network, the system achieve efficient results for water crises detect

2. PROPOSED METHODOLOGY

In these systems it is very difficult for a person who cannot swim to call for help while he/she face a drowning incident. This make from drowning accident are very dangerous as it can occur silently. In this

TRANSMITTER

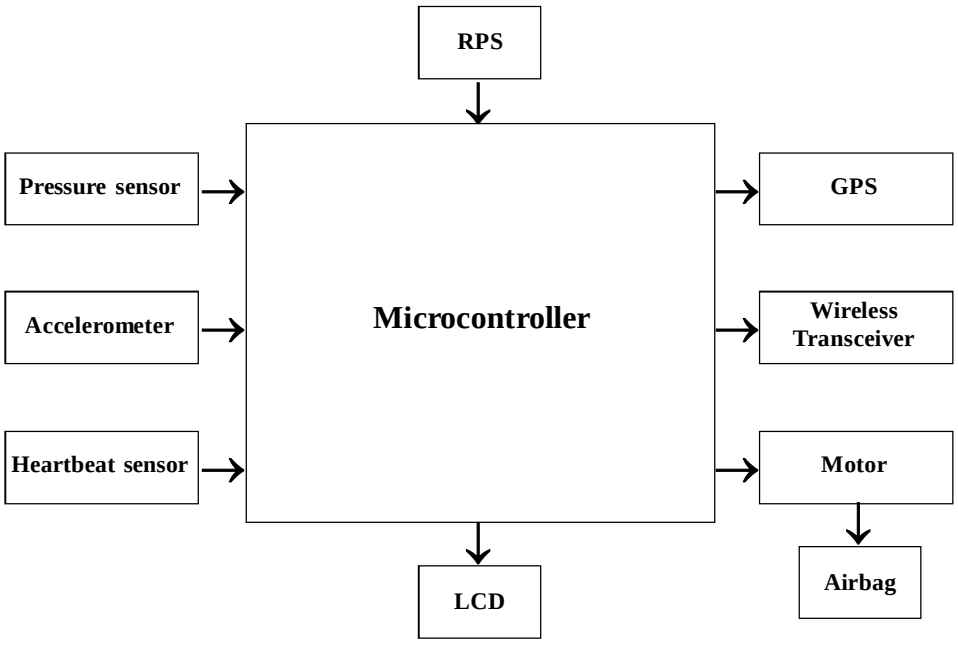

Figure 1: Proposed System Transmitters

RECEIVER

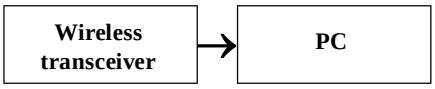

Figure 2: Proposed System Receiver

paper, we consider the wearable sensors it is used to identify victims at the early drowning stage. For this we attached a pressure sensor unit at the swimmer's head level. The pressure sensor is used to detect the deepness of the swimming water. If the time exceeds a predefined level that information is given to the motor connected to the airbag to trigger it and evacuate the swimmer. The heartbeat sensors are attached at swimmer chest level. Heartbeat sensor which provides digital data connected the swimmer to monitor the swimmer's heart rate, if it exceeds the predefined level the corresponding signal is given to the airbag to trigger it and evacuate the swimmer. Accelerometer is used to detect the swimmers motion. The GPS is used track the location of the swimmer and to send the real time data's to the control room.

3. RESULTS AND DISCUSSIONS

3.1. Pressure sensor

The pressure sensor is used to sense the depth of water level, if the swimmer goes to deep the underwater then the threshold values become the change. The airbag gets released and the real time data will be sent to the control room.

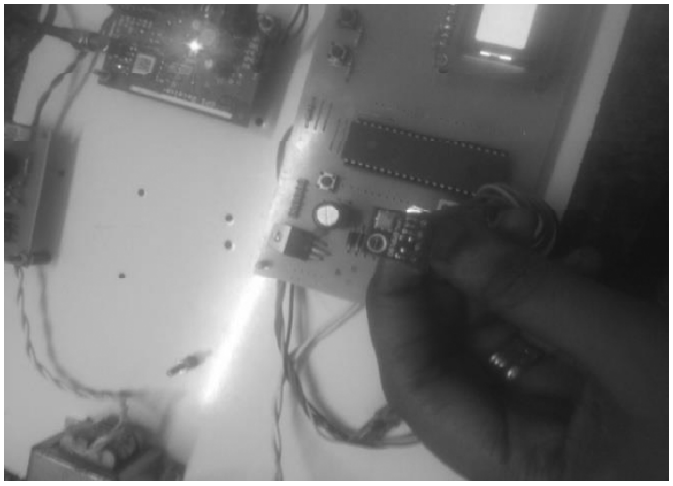

Figure 3: Pressure sensor

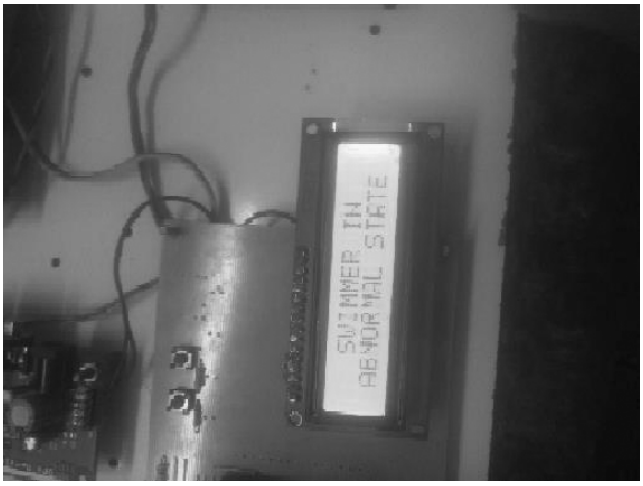

Figure 4: Abnormal state

Figure 5: Airbag activated

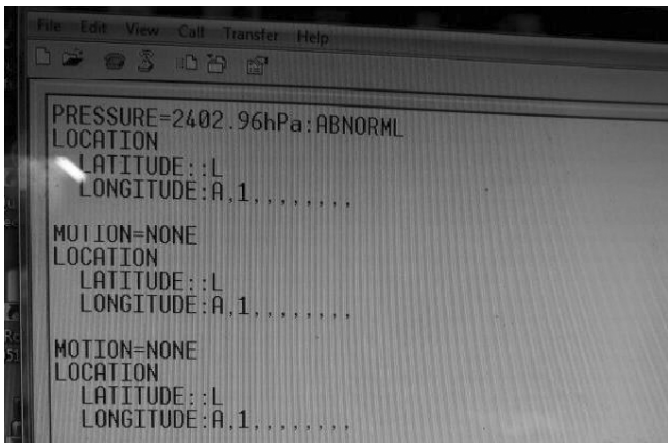

Figure 6: Data telecasting

3.2. Heartbeat Sensor

A Heartbeat sensor monitors the swimmer's heart rate. The normal heart rate is 70 to 95 if the heart beat gets maximum or minimum then the airbag releases and the real time data is also telecast to the control room.

3.3. Location Tracking

If the swimmer goes to the abnormal condition then the GPS is used to track the swimmer's location

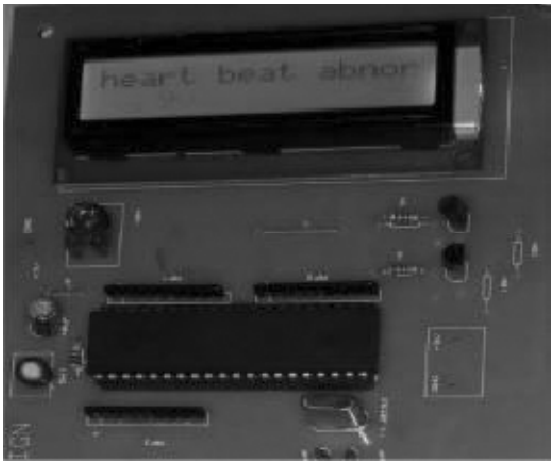

Figure 7: heartbeat abnormal

Figure 8: Airbag Activated

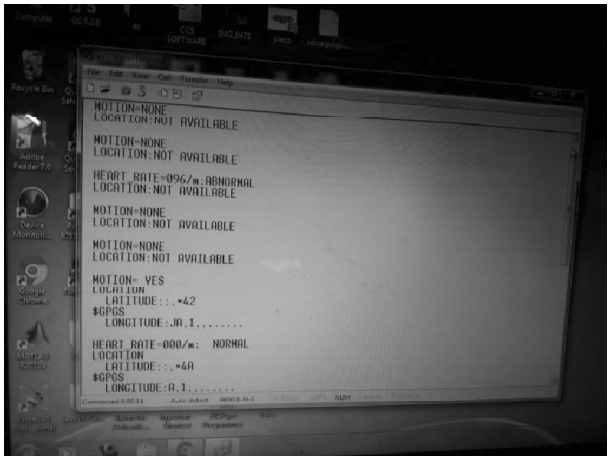

Figure 9: data telecasting

Figure 10: Location tracking

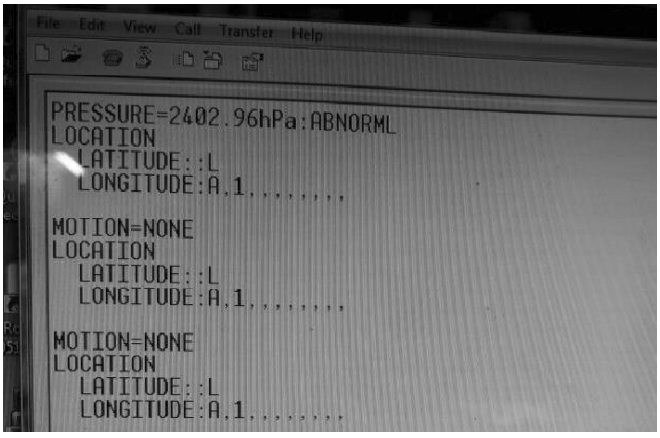

Figure 11: Data telecasting

Figure 12: Experimental Setup

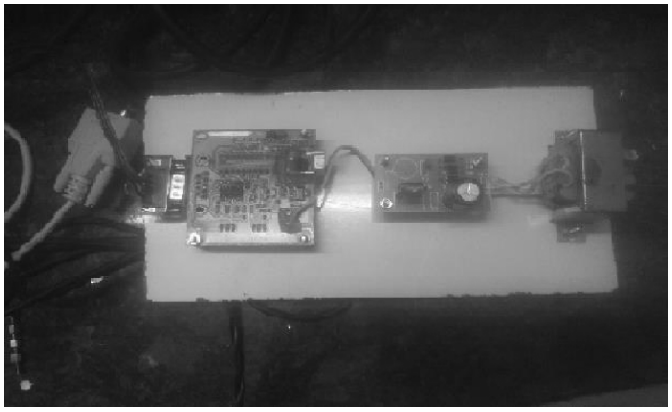

Figure 13: Experimental Setup

4. HARDWARE IMPLEMENTATION

Figure 12 and 13 shows the experimental setup of this proposed work. In which there is a PIC16f877a, GPS module, Pressure sensor, Heartbeat sensor, Power supply unit, LCD Display, Wireless Transceiver

5. CONCLUSION

In this project to create the simulation results for the inertial sensors using the embedded device accelerometer. The efficiency of the pressure sensor is to detect the swimmer's head position, whether it is outside or inside water. And then to show the heart rate of the drowning people, so if the both sensors are going to the abnormal condition then the air bag is released. Another one important part is to track the swimmer's location and the real time data's are sent to the control room.

Our future work is to take a real time condition of the swimmer in underwater. To reduce the drowning accidents and to develop the safety precautions for any pool environments.

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