

STAMPEDE ALERT SYSTEM WITH HEART BEAT SENSOR

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Abstract

The main objective of this paper is to save the life of people in stampede condition. This module can be used in various religious places and the places where the large number of people are expected to gather. At such places there is a chance of occurrence of stampede.

In our module we are using large number of pressure sensors which will indicate the density of human beings in a given area. These sensors are interfaced with arduino board, when a large number of piezoelectric sensor are pressed then the arduino board sense that pressure and will give the acknowledgement to the buzzer to alert the authorities before occurring stampede. This status is also displayed on the LCD which is interfaced with microcontroller Atmega 328. Another module of this project is Heart beat sensor kit. This will be used to measure the heartbeat of the people, if the stampede occurs this will be used to search the victim people by using GPS module and give instant help to that needy one.

Keywords: Heart beat sensor, arduino board, piezoelectric sensor

1. INTRODUCTION

Stampede is a situation when many people are move quickly or in an uncontrolled way, usually in the same direction at the same time, especially because of fear. The examples where the stampede is occurred which is shown below:

- 1883: Victoria Hall Disaster where 183 children died rushing to get treats behind a narrow door at the end of a downward staircase
- 1913: Italian Hall Disaster 73 people died trying to escape from a false fire alarm at a crowded Christmas party Bombing of Chongqing, China, 1000 people were killed in a stampede at the Jiaochangkou tunnel, an access point to an air raid shelter.
- 2 July 1990: Mecca tunnel tragedy: 1426 people killed.
- June 6, 1941: during a Japanese nel tragedy: 1426 people killed
- 31 December 2014: 2014 Shanghai stampede: 36 people killed and 47 injured in Shanghai stampede during New Year's celebrations
- 24 September 2015: 2015 Hajj stampede At least 2,177 people killed and 934 injured at the annual Hajj in Saudi Arabia

From these facts we get an inspiration to make a system for avoiding such a stampede situations. Here we are using two sub - modules, the first sub – module will give an alert before occurrence of stampede. The major advantage of this system is to generate the voltage with the help of piezoelectric sensor and the other system of this module which will be used after occurrence of stampede. This can help us to find out the location of victim people for giving them an emergency help.

2. WORKING

The first module of this paper is stampede monitoring system.

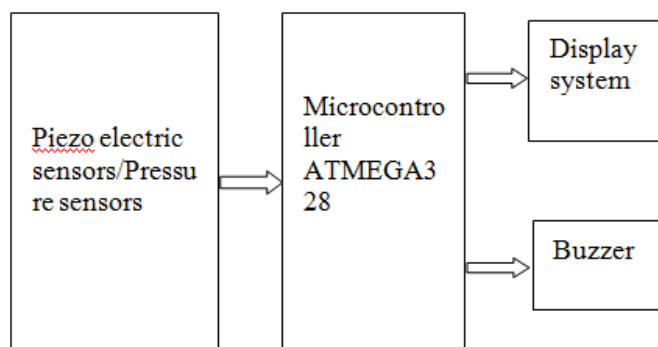


Fig 1: Stampede Alert System

In this system we use the piezoelectric sensors which are mount on the ground surface, at that place where stampede condition can most probably occurs. The piezoelectric sensor is a device that uses the piezoelectric effect and to measure the pressure, temperature, strain or force by converting them to an electric charge, this is the major role of piezoelectric sensor that's why we select these sensor in our system. These sensor which will be measure the pressure, and send these analog data to ATMEGA328 microcontroller. Here we will set the threshold value in the microcontroller. If the output which will coming from piezoelectric sensor exceeds the threshold value then microcontroller gives acknowledgement to the control room through buzzer as well as shown the condition of Stampede occurs on the LCD display.

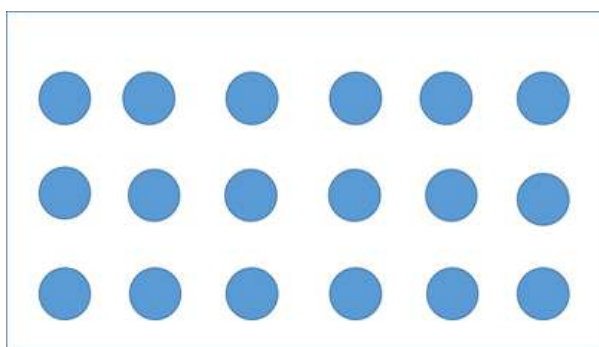


Fig 2: Group of Sensors

In normal state, when the people are moving in steady manner or at a constant speed. In that case the vibration will be generate due to piezo sensor is also steady and at the output side the voltage will be generated which will be pulsating. In that condition the graph of that system is smooth.

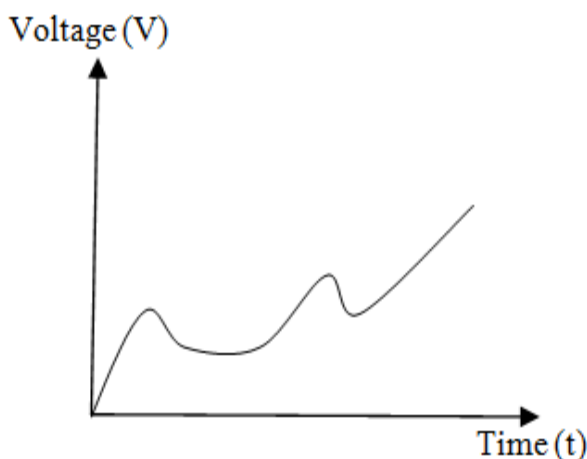


Fig 3. Graph of stampede alert system in steady condition

If panic occurs in that case the people start moving fast, more pressure will be applied on the piezo sensor and stampede condition can take place then the spikes in voltage will be generated and it exceed the voltage $V(t)$ which is shown in fig.4

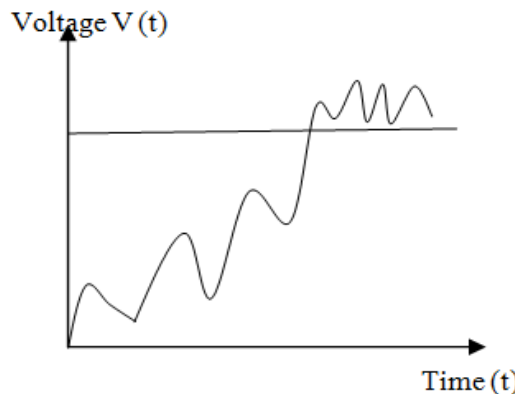


Fig 4. Graph of stampede alert system in stampede condition

The second module of this project is heart beat sensor, which comes in to action when stampede situation has been occurred. In these module we use heart beat sensor, battery, GPS module, x-bee transmitter and x-bee receiver. These all peripherals are connected to the micro-arduino. This kit will provided to each and every person when they enters at that place. The Heart beat sensor consists of an elastic belt which is used to attach the sensor on to the wearer's wrist, the flexible pressure sensor and a module which contains the ASP system and the counter.

This module is used to indicate the heart rate, and power input. When your heart beats is contracts and pushes blood through the arteries to the rest of your body. This pressure creates pressure on the arteries. Blood pressure is recorded as two numbers- the systolic pressure is recorded as two numbers- the systolic pressure (as the heart beats) over the diastolic pressure (as the heart relaxes between beats). This force create pressure on the arteries the unit which measures this is called sphygmomanometer. Finally, this level signal is transmitted in to the counter directly to measure the heart rate. The power input is used to power up the whole system. This module can be used to send the heart bit data (bit/sec) continuously to the control room through x-bee transmitter and it can be receive to the control room with the help of x-bee receiver, which will be placed at the control room. In that control room a person is available who check or monitor that situations.

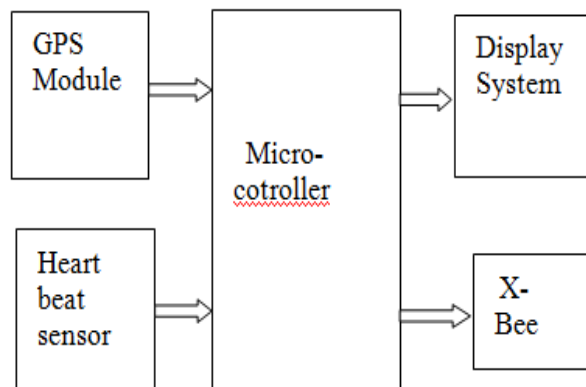


Fig 5: Heart Beat Monitoring System

If the stampede occurred at that time number of peoples get injured and pulse rate will be change. If pulse rate of any people goes very high or low then it is shown by red signal and the position of that person is find out by using the GPS module. Also the acknowledgement given to the authorities to give them instant help.

6. ADVANTAGES

With this module, we can monitor the activity of people and save their life from any mishap.

1. We can do proper management.
2. We can provide the instant help to the victims of stampede.
3. Our system anticipates the stampede and prevents it from occurring.
4. The system will be very useful to be install in the places where large number of people are expected and protect their life by giving an alert.

7. DISADVANTAGES

We can just prevent stampede situation by alerting people and authorities but we can't completely avoid the stampede.

8. CONCLUSION

1. From above discussion we conclude that our module is an important step towards the prevention of life of people in our country where so many population lives and are socially gathered in every religious event. So coming up with this idea is really a worth.
2. Also through these project we are trying to fill the gap between the technology and society.
3. In our project we also make use of Heart Beat Sensor which is use to provide the instant help to the victims of stampede.

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