



## Design and Implementation of Prototype Helmet Model to Detect and Monitor Concussion

S. Archana<sup>1</sup>, A. Nagamonickaa<sup>2</sup>, S. Vetrichelvi<sup>3</sup>, V. Vinithasri<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of Biomedical Engineering, Adhiyamaan College of Engineering (Autonomous), Dr. M. G. R. Nagar, Hosur, Tamil Nadu, India

<sup>2-4</sup>Student, Department of Biomedical Engineering, Adhiyamaan College of Engineering (Autonomous), Dr. M. G. R. Nagar, Hosur, Tamil Nadu, India

### ABSTRACT

Concussion alters the brain functionality when occurred for a greater number of iterations in accidents. It happens when a sudden blow is introduced to the head during a fall, hit or could be worse in case of accidents. In this project, we design a prototype model helmet, to measure the impact of a hit when a player, a biker and a construction site labor's head comes across a hit. The impact sensor measures the intensity of the hit and gives an output in terms of "Gravity (g)" force based on the threshold set. The measured "Gravity (g)" will help for further diagnosis of the patient. This diagnosis helps in the situation where a person cannot move his body and is in critical condition. The advanced Micro controller gets data from sensor its resolution is 1024 sample data. This project detects neck injuries also from flex sensor. The process is also automated to indicate the information to guide people.

**Keywords :** Helmet, Concussion, Threshold Values.

### I. INTRODUCTION

When head is injured continuously the disease may cause is known as concussion. Symptoms may include loss of conscious, depression, head ache. Concussion also known as mild brain injury it affects brain function when continuous hit occurs. Concussion is cured by continuous care on the patient. This problem may also lead to brain cancer. It also occurs during sports injuries, accidents, or when the brain receives a hit. This concussion may be caused by impact forces, in which head strikes or is struck by something, in which the head moves without any preventive measures. Concussion is prevented by using helmet during playing, driving and working in construction site. Repeated head injury may also

increase risk that leads to Parkinson's disease. To avoid these problems, use helmet during sports, driving which helps to protect the injury occurs to the brain. Sensors are used to detect the pressure occurred in the head. There are many different types of injury occurs in head but this concussion will be more harmful than others. Because it leads to coma in future if the person does not care about the head pain. In this proposed system, a helmet type model is designed to help the patient by detecting the injury for the treatment and to indicate the doctors, the occurred injury is major or minor. Buzzer is used to give the alarm sound to indicate the person wearing helmet or not.

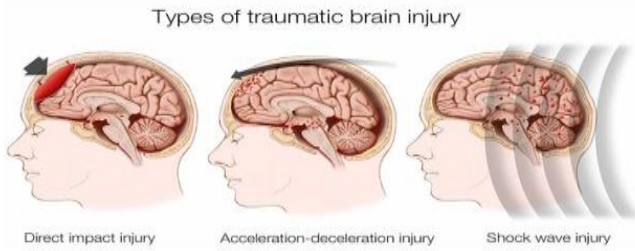


Fig.1 Types of Traumatic Brain Injury

II. METHODS AND MATERIAL

BLOCK DIAGRAM

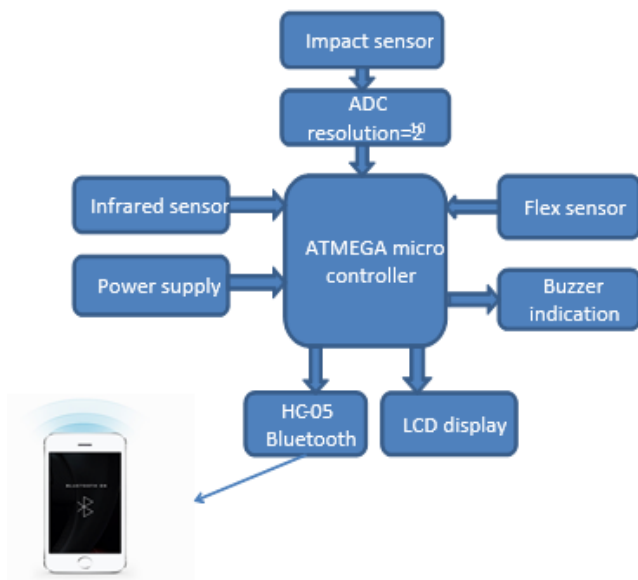


Fig.2 Block Diagram for Concussion Detection using Helmet

BLOCK DIAGRAM DESCRIPTION

Piezoelectric sensor is placed on the helmet, to detect the pressure applied over the head. IR sensor is connected inside it to detect the patient wearing helmet and to give indications through the buffer. The pressure given on the head is received by the piezoelectric sensor and gives it to the ATMEGHA Microcontroller. The ADC resolution is inbuilt within the microcontroller to convert binary values to digital values. The output values given to the LCD display

and transfer to the Android Application by Bluetooth. The Flex sensor also used to detect the neck injury. The output values will be changed depends on the force given by the user. It also indicates the injury becomes major or minor based on the threshold values.

CIRCUIT DIAGRAM

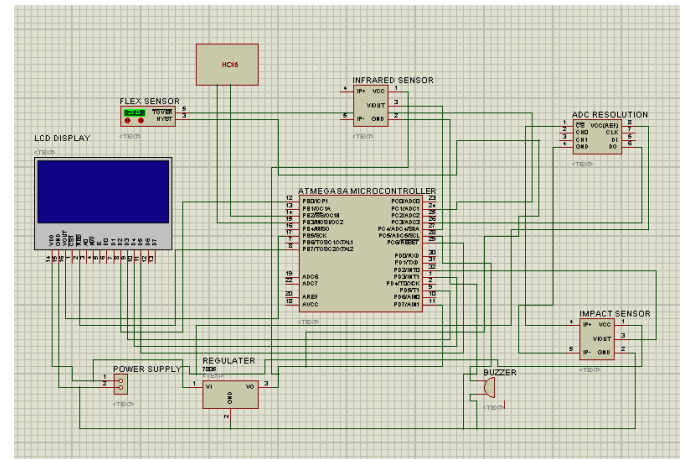


Fig. 3 Circuit Diagram

CIRCUIT DIAGRAM DESCRIPTION

Power supply connected to the regulator to control the input power. The input power range is about 0-2 voltage, this current flows to the regulator to reduce the Voltage required to operating the circuit. This input is given to the ATMEGHA microcontroller by connecting it to the 11th pin. Regulator and power supply connected to the ground of impact sensor. The output of the impact sensor connected to the pin1 of ATMEGHA microcontroller. The impact pin 4 and 5 is connected to the ADC resolution. VCC is connected to the power supply. VCC of IR sensor connected to microcontroller and regulator. Then ground is connected to the buzzer for indication. Flex sensor is connected to the 5th pin of IR sensor. This also connected to the Buzzer for indication. The value from the ATMEGHA microcontroller is displayed on the LCD. Here VDD and ground are connected to the

power supply other pins connected to the microcontroller. The values are stored to the mobiles via the Bluetooth.

### III. RESULTS AND DISCUSSION

When the power supply is given to the circuit. IR sensor is used to indicate about the helmet and it is done by blowing red light. Then the force is applied on the piezo electric sensor it gives the value and also it indicates the injury is mild or major. The flex sensor also indicates if any neck injury occurred and gives the value based on pressure applied on the neck. The output values displayed in the mobile phone by turn on the bluetooth. Based on the values which is displayed in the Mobile phone is helpful in diagnosing and for the treatment.

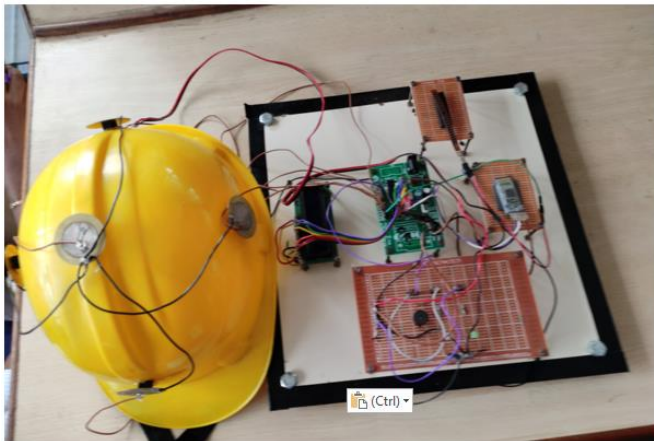


Fig.4 Result

### IV. CONCLUSION

The Values obtained by using the impact sensor gives the injury is mild or major for the diagnosis and the treatment of patient. This helmet is used in construction site for labors, players. This helmet gives the value based on the impact occurred and that value detects the impact of injury. The main use of this helmet is to avoid taking x-ray. Because continuous falling of radiation causes cancer to the patient. There

is limited way to diagnose concussion so this helps to detect head injury immediately after the hit occurs.

### V. FUTURE SCOPE

This Helmet has a wide scope of development. In near future this helmet is mainly used in sports, Construction site labors, and also in normal helmets. It indicates the injury occur is mild or major. It gives the information directly to the person or guide or to the doctor. And also indicate the place of injury occurs to the patient.

### VI. REFERENCES

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