

A MINOR PROJECT SYNOPSIS
ON
SMART HARD HELMET
FOR CONSTRUCTION
WORKERS

SUBMITTED IN PARTIAL FULFILLMENT FOR THE AWARD OF THE DEGREE OF

BACHELOR OF TECHNOLOGY
IN
ELECTRONICS AND COMMUNICATION ENGINEERING



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DECLARATION

We with this declare that the title of Minor Project-2, EVEN 2024 is not repeated/copied from the previous submitted project works and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission.

Place: IIIT Noida

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PROBLEM STATEMENT

In our Minor Project-2, We built a Smart Hard Helmet for Construction Workers that helps to monitor their health during working hours and reduce the number of accidental deaths during construction. The structure composed of a regular ISI Marked Safety Helmet and a box attached to it containing PCB and other components assembled onto it.

INTRODUCTION

In this project, for the bachelor's thesis in ECE, the construction of a smart hard helmet is considered. The aim was to build a device that can monitor a worker's health when he/she is working in a construction or manufacturing job. The goal was to reduce the chances of any mishap or accident to any worker during their working hours by constantly monitoring their health and providing fall detection and SOS systems in the helmet. This would also help in providing better legal terms and rights to the worker class as the data provided by the helmet can be used to prevent overuse of any worker and claim their health insurance from Thekedaars in case of any mishap.

Health monitoring is a cutting-edge area of technology that is gaining prominence in the fields of the Health and Performance sector[1]. It has the potential to revolutionize the construction sector by enhancing each worker's productivity and protection. Unfortunately, this market has been untapped and left behind because of the ample amount of people in this sector making it cheap to get another worker rather than investing in them.

In this project, We have used various sensors to monitor the worker's health and it's surroundings, the information will be transferred to the server, and in case if the threshold values for any sensor exceeded, the server gets notified and an alert is sent to the worker[2]. We have incorporated a Fall Detection System, which will alert the server if the system detects any fall or dis-balance of the worker.

METHODOLOGY

The following Sensors have been used for the functioning of the Smart Hard Helmet:

- ❖ MAX30100 SPO2 and Heartbeat Monitoring Sensor
- ❖ MQ2 Gas Sensor to check for any Gas Leak
- ❖ MPU-6050 3-Axis Accelerometer Gyro Sensor used for Fall Detection

All these sensors were incorporated on a PCB and implemented using the ESP32 development board. It serves as the main microcontroller for the helmet. All the information is transferred to the server using ESP32 Wi-Fi Direct and Simple Mail Transfer Protocol.

TIME SCHEDULE OF ACTIVITIES

Work done by Mid Viva:

- ❖ Research and prerequisite is completed.
- ❖ Each Component has been studied and implemented individually.
- ❖ Components required are issued/ purchased.
- ❖ Circuit containing all components working together from a single microcontroller has been developed and implemented on bread-board.

Work that will be done by End Viva:

- ❖ Prototype of the Smart Hard Helmet has been prepared.
- ❖ Real time data collection between the helmet and remote server was achieved.
- ❖ A PCB of the whole circuit of the project was designed and fabricated on software.
- ❖ The sensors used were calibrated for optimal performance and algorithms were implemented to filter out noise and improve data reliability.
- ❖ Buzzers and LEDs were added to the circuit for more vivid representation.

REFERENCES

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