INTELLIGENT HELMET LOCKING ALARM SYSTEM

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CONTRIBUTION TO THE PROJECT BY THE MEMBERS IN GROUP

WORKS	2019/E/129	2019/E/139	2019/E/140
Topic selection	✓	✓	✓
Details Gathering	✓	✓	✓
Proposal preparation			✓
Components Collection	✓	✓	
Hardware Assembling	✓	✓	
AVR Micro Controller Programming	✓	✓	✓
Final Report Preparation			✓

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Chapter 1: INTRODUCTION

1.1 Problem Statement and Solution

Motorcycle riding provides a sense of freedom and exhilaration for riders, but it also comes with significant risks. One of the most crucial safety measures for motorbike riders is wearing a helmet, as it can save lives and reduce the severity of head injuries in the event of an accident. However, even with the best intentions, riders may unintentionally neglect to lock their helmets properly, compromising their safety on the road.

The motivation behind the "Intelligent Helmet Locking System" project is to address this serious safety concern and contribute to the reduction of motorcycle accidents caused by improperly secured helmets. By creating an intelligent embedded system that can detect the status of the helmet lock and alert the rider in real-time, we aim to instill greater awareness and responsibility among motorbike riders regarding the proper usage of safety gear.

The successful implementation of the project is expected to have a significant impact on motorcycle rider safety. By encouraging riders to double-check and secure their helmets properly, the system will help reduce the number of accidents caused by preventable helmet-related issues.

The project's outcomes will include a functional, user-friendly, and reliable Helmet Lock Alert System that can be easily installed in various types of helmets. Furthermore, the project aims to promote a culture of responsible riding by fostering greater awareness and adherence to safety measures among motorbike riders. Ultimately, the "Intelligent Helmet Locking System" project seeks to contribute to the overall improvement of road safety, protect lives, and create a safer riding environment for motorcycle enthusiasts everywhere.

1.2 Aims and Objectives

The project aims to improve rider safety by reducing helmet risks, promoting responsible riding, and contributing to road safety by reducing accidents caused by helmet-related issues. Real-time alerts will be provided to riders who haven't locked their helmets properly. The "Intelligent Helmet Locking System" will play a pivotal role in safeguarding motorcyclists and other road users.

The primary objective of this project is to design and implement an intelligent embedded system that can detect the status of the helmet lock and provide immediate feedback to the rider. The specific goals include:

a. Develop a compact and cost-effective circuit to be integrated into the motorcycle helmet.
b. Create a sensor mechanism to detect the proper locking of the helmet, ensuring rider safety.
c. Design an efficient alerting system (beep sound) that notifies the rider in real-time if the helmet is not securely locked.
d. Ensure the system's reliability, responsiveness, and low power consumption to make it suitable for long-term use.

Chapter 2: PROJECT DESIGN AND IMPLEMENTATION

2.1 Hardware Design

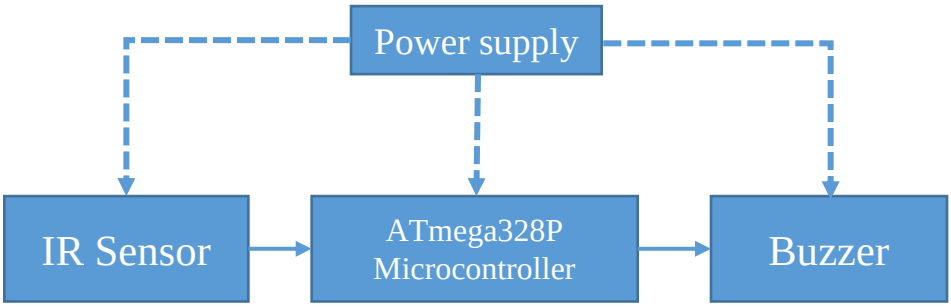

Figure 2-1: Power Supply for the components

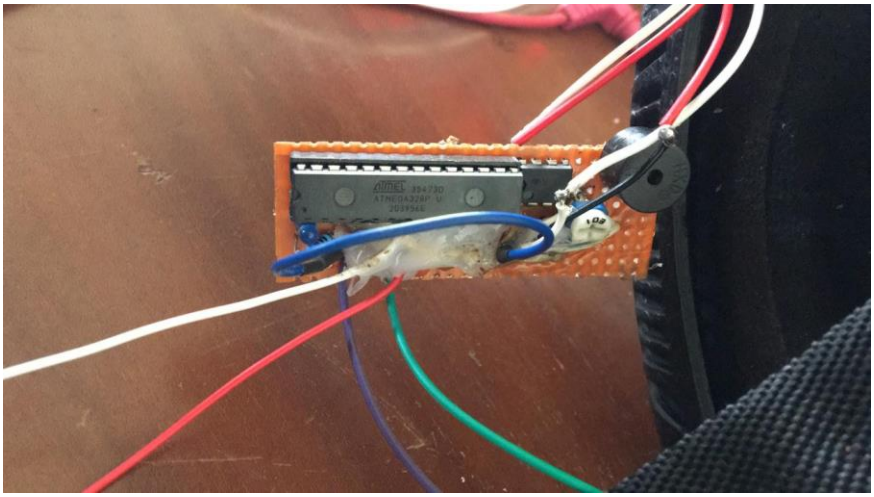

Figure 2-2: Circuit placed inside the Helmet

2.2 Software Design

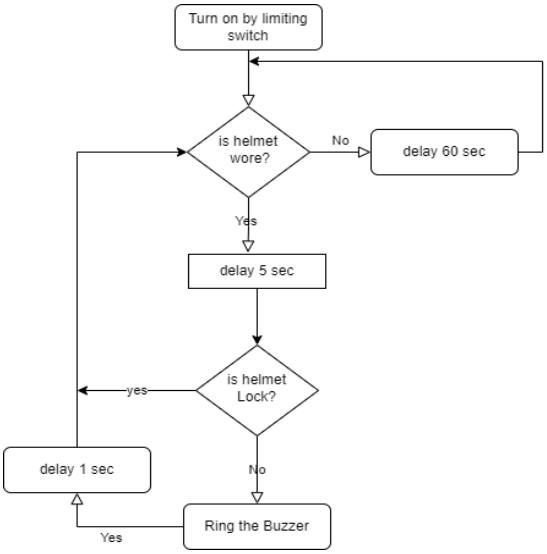

Figure 2-3: Flow chart of the process

2.3 Implementation

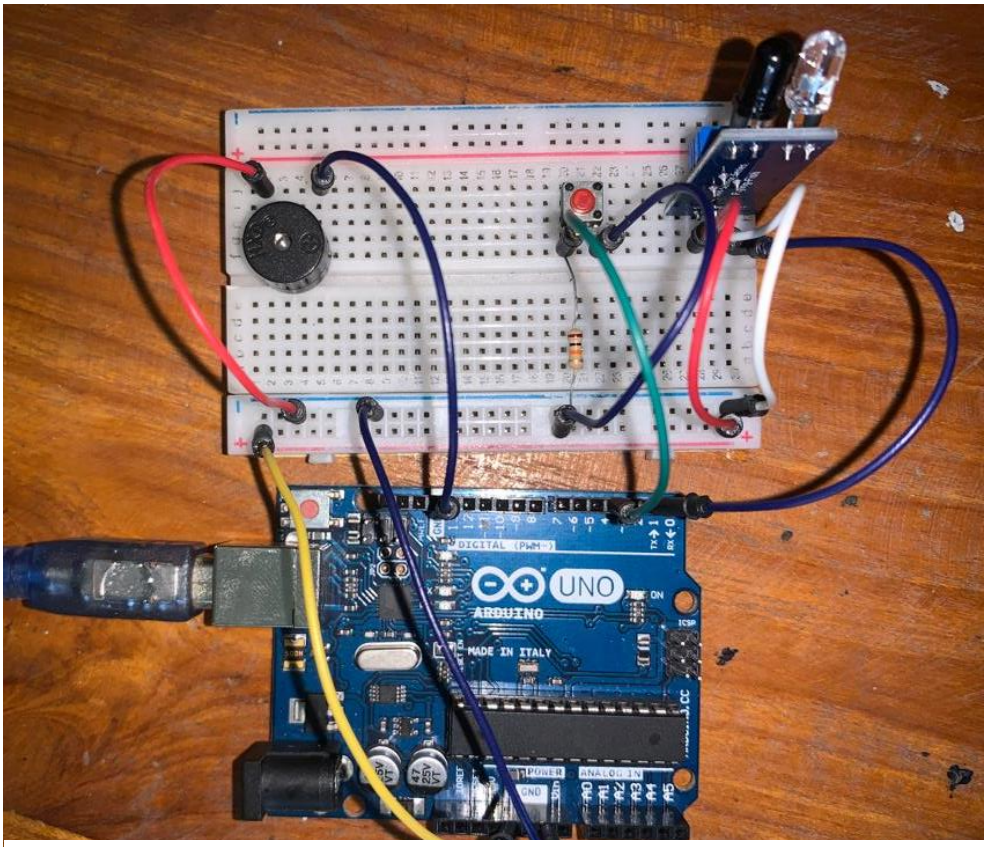

Figure 2-4: Circuit in the mid evaluation

Figure 2-5: Power Supply

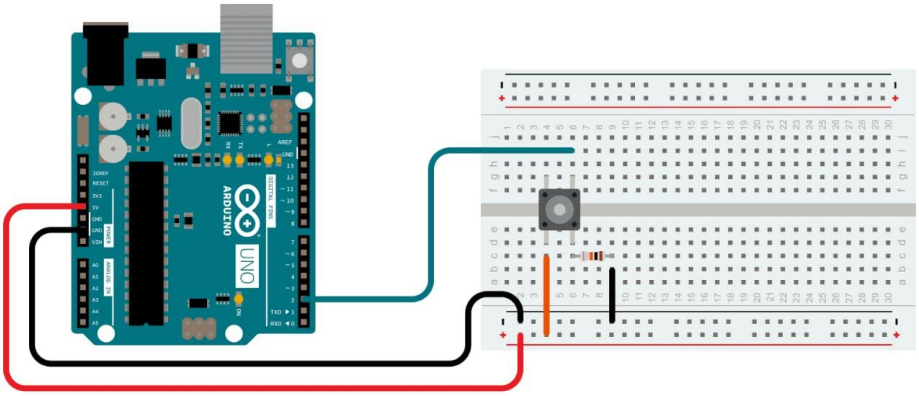

Figure 2-6: Circuit of Clip Switch

Chapter 3: PROJECT PLAN

3.1 Time line

Allocated work	1st week	2nd week	3rd week	4th week	5th week	6th week
Topic selection and Proposal writing						
Collecting and assembling hardware components						
Mid Review						
Implementation						
Final Product						

3.2 Budget

	Price per piece(Rs)	No of pieces	Total(Rs)
Atmega328P	1200	1	1200
IR sensor	300	1	300
Limiting Switch	100	1	100
CMOS battery	250	2	500
Buzzer	120	1	120
Crystal oscillator	100	1	100
Jumper wires	Few wires		
	Total		2320

Chapter 4: CHALLENGES OR PROBLEM FACED AND THE SOLUTIONS

Table 4-1: Challenges and Solutions

CHALLENGES	SOLUTIONS
DESIGN AND IMPLEMENTATION OF EFFECTIVE TOUCH SENSOR	With our best practice and innovative idea we successfully fix it.
SENSOR SOLDERING AND ENSURE PROPER TOUCH DETECTION	We change the placement of the sensor which have proper touch detection.
DETECTING WHETHER THE HEKMET IS WORN OR NOT IN LOW-LIGHT CONDITIONS INSIDE THE HELMET USING IR SENSOR	Careful selection of coloured materials or cap to enhance the reflective properties.

Chapter 5: REFLECTION ON APPLIED KNOWLEDGE FROM THINGS LEARNED IN THE COURSE

As we studied embedded system is single-functioned, tightly constrained, and reactive and real-time.
Let's analyse the project based on the characteristics of embedded systems:

Single-functioned: The "Helmet Lock Alert System" is designed with a single specialized function: to monitor and detect the locking status of the motorcycle helmet. The system continually checks the helmet's locking mechanism, ensuring it is securely fastened. The system's primary focus is to provide immediate feedback to the rider if the helmet is not locked properly.

Tightly constrained: The design metrics of the “Intelligent Helmet Locking System " are optimized to fit within the limited space available in a motorcycle helmet. The circuit and components are compact to ensure seamless integration without adding unnecessary bulk or discomfort for the rider. The system must be highly efficient in terms of power consumption. The system is portable and lightweight, as it is seamlessly integrated into the motorcycle helmet. Its unobtrusive design ensures that it does not hinder the rider's comfort or mobility.

Reactive and Real-time: The “Intelligent Helmet Locking System” is reactive as it continuously reacts to changes in the helmet's locking status. When the rider attempts to lock the helmet, the embedded system immediately processes the sensor data to determine if the helmet is secured properly or not. The system operates in real time, providing instant alerts to the rider if the helmet is not locked correctly. Real-time feedback is crucial in ensuring the rider's safety and preventing potential accidents.

CONCLUSION

Our project is dedicated to revolutionizing motorcycle rider safety through advanced embedded technology. Our primary objective is to tackle the alarming issue of improperly secured helmets, which poses a serious risk to riders on the road. By creating a cutting-edge system that monitors and alerts riders about their helmet's locking status, we aim to significantly reduce the number of accidents caused by this preventable oversight. Our approach involves meticulous research, creative design, and rigorous testing to ensure the system's effectiveness and reliability. The embedded technology we're developing is smart and intuitive, providing real-time feedback to riders without any delay. This instant alert mechanism will empower motorbike users to double-check their helmets, fostering responsible riding behaviour and a culture of safety on the roads. We are passionate about the potential impact of our project and remain committed to achieving our goals. With the seamless integration of the "Intelligent Helmet Locking System" into motorcycle helmets, we envision a safer and more secure riding experience for motorcyclists of all backgrounds. Our dedication to innovation and safety will pave the way for a brighter future, where accidents caused by improperly secured helmets become a thing of the past. Together, we can make the roads safer for everyone and safeguard the lives of countless motorbike riders.

REFERENCES

[1]
https://www.transport.gov.lk/web/index.php?option=com_content&view=article&id=29&Itemid=149&lang=en#type-of-vehicles-involved-in-accidents

[2]
http://dl.lib.uom.lk/bitstream/handle/123/14115/TH3652.pdf?sequence=1&isAllowed=n

[3]
Amarasingha, Niranga & Gunathilaka, O.H.. (2018). An Observational Study on Motorcycle Helmet Use in a Sri Lankan City.

APPENDIX

Arduino C code:

```
const int ir_read = 2;      //pin ir sensor

const int clip_read = 3;

const int Buzzer =13;



void setup() {

  // put your setup code here, to run once:

 pinMode(ir_read,INPUT);

 pinMode(clip_read,INPUT);

 pinMode(Buzzer,OUTPUT);

 Serial.begin(9600);

}



void loop() {

  // put your main code here, to run repeatedly:

  bool ir_state;

  bool clip_state;

  bool overall_state;
```

```
  ir_state = digitalRead(ir_read);
  clip_state = digitalRead(clip_read);
  overall_state =  !(ir_state) &  (clip_state);    //


  Serial.print(ir_state);
  Serial.print(clip_state);
  Serial.print(overall_state);
  Serial.println();


//if (ir_read == LOW)
//  delay(20000);


if (overall_state == HIGH)
{
  digitalWrite(Buzzer,HIGH);
  delay(100);
  digitalWrite(Buzzer,LOW);
  delay(20000);
  while(clip_state == HIGH){
```

```
    clip_state = digitalRead(clip_read);
    Serial.print(clip_state);
    Serial.println();
    digitalWrite(Buzzer,HIGH);
    delay(100);
    digitalWrite(Buzzer,LOW);
    delay(100);
  }
}
else
{
  digitalWrite(Buzzer,LOW);
}
}
```

AVR C code:

```
#include <avr/io.h>

#include <util/delay.h>

int main(void)

{

 DDRB = DDRB | (1<<5);          //declare PORTB5 as output

 DDRD = DDRD & ~(1<<2);         // PB2 ir, PB4 clip

 DDRD = DDRD & ~(1<<4);        //declare PIND2, and PIND4 as input



 while(1)

 {

  if(PIND & 0b00010000)

  {

    _delay_ms(20000);

    PORTB = PORTB | (1<<5);

    _delay_ms(100);

    PORTB = PORTB & (0<<5);

    _delay_ms(100);

    runMode();
```

```
    }
    else
    {
      PORTB = PORTB & (0<<5);
    }
  }
}

void runMode(){
  while(1){

  }
}
```

Poster

INTELLIGENT HELMET LOCKING ALARM SYSTEM

"Stay Safe, Ride Smart: Introducing our Intelligent Helmet Locking Alarm System – Your Guardian on the Road!"

Problem Identified!!!

Without proper helmet usage, motorcycle riders are at a significantly higher risk of sustaining severe head injuries in the event of an accident.

WHAT WE HAVE FOR YOU

- Real-Time Safety Assurance
- Instant Alerts for Unlocked
- Helmets User friendly

OUR TEAM

2019/E/129
2019/E/139
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