



Project Proposal

**In21-S4-EE2044 - Electrical
Measurements and Instrumentation**

**Smart Helmet System for
Motorcycle Safety**

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01.Introduction

Motorcycle accidents are a significant concern worldwide, with a high number of fatalities and injuries reported annually. According to the World Health Organization (WHO), road traffic injuries are the leading cause of death among young adults aged 15-29 years globally, with motorcycles being a major contributor to these statistics. The lack of safety measures and the vulnerability of motorcycle riders to head injuries make it imperative to develop innovative solutions to enhance motorcycle safety.

In recent years, there has been a growing interest in the development of smart helmet systems to address these safety concerns. These systems integrate various technologies, such as sensors, communication devices, and augmented reality (AR) displays, to provide real-time information and warnings to the rider. By leveraging these technologies, smart helmets can help prevent accidents, reduce the severity of injuries, and improve overall road safety.

However, considering the cost and market availability of smart helmets, their adoption in Sri Lanka presents a complex challenge. Therefore, in this project, we aim to modify these helmets to be more cost-effective and compatible with the equipment available in our local market, thereby making them more suitable for Sri Lankan riders.

02. Background and Context

The increasing number of motorbike accidents in 2023 highlights the urgent need for creative safety solutions to protect riders. Motorcyclists are especially dangerous when driving since they are continuously in danger from fast-moving vehicles, risky behavior, and hazardous road conditions.

Although necessary, conventional helmets are not effective in actively preventing accidents or enabling prompt aid during emergencies. The current project suggests creating a smart helmet system to address this urgent issue. This system incorporates modern facilities technologies, such as sensors and communication modules, to improve post-accident responses and prevent accidents from happening in the initial stages.

The timing is right to establish an unique solution that not only encourages rider safety but also complements global efforts to reduce deaths on the roadways, given the growing global reliance on motorcycles for transportation and the advancements in sensor technology and data analytics. The project is considered urgent and required for maintaining a safer environment for motorcyclists in 2023 and beyond, as illustrated by legal and regulatory support for raising motorcycle safety requirements.

03. Objectives

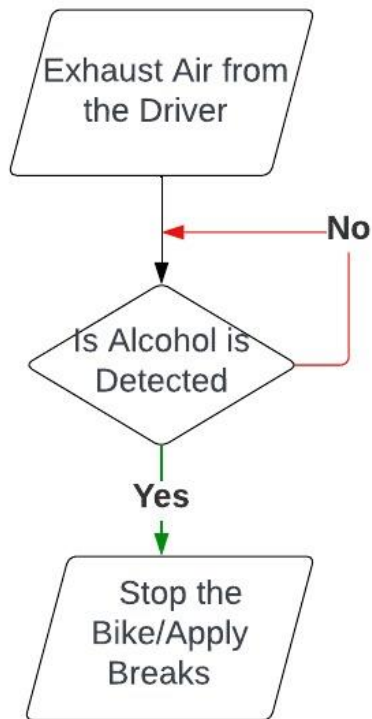
The primary objective of this project is to develop a smart helmet system that is cost-effective, locally available, and specifically tailored to the needs of Sri Lankan motorcycle riders. This will involve integrating advanced sensors, such as an alcohol sensor, temperature sensor, and speed sensor, into the helmet system to enhance rider safety and comfort. The alcohol sensor will detect alcohol levels in the rider's breath and stop the vehicle if the rider is under the influence of alcohol, while the temperature sensor will monitor the temperature inside the helmet to ensure optimal comfort. The speed sensor will detect the rider's speed and Apply Brakes if the rider is exceeding safe speed limits, thereby reducing the risk of accidents. Collaboration with manufacturers, motorcycle riders, and regulatory authorities, will be sought to ensure the successful adoption and implementation of the Smart Helmet System for Motorcycle Safety in Sri Lanka.

04. Project Scope

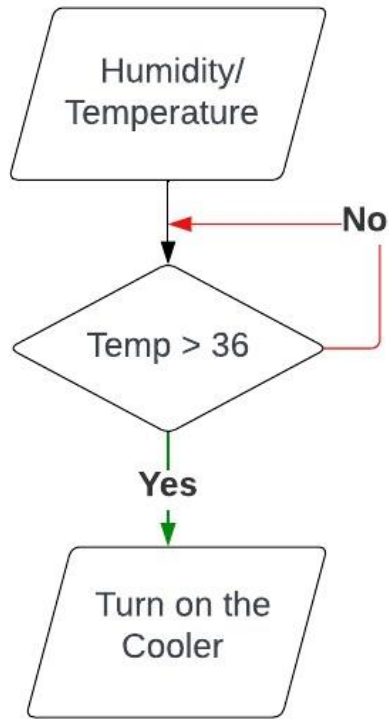
The objective of the project is to develop a smart helmet system with modern sensors to improve motorcycle rider safety. It involves building a working prototype that contains impact and alcohol detection sensors, humidity sensor, and alarms for speeding. Important information will be displayed in an easy-to-use interface. Complete testing will confirm the functionality of the system.

The project does, however, have several limitations. These include following current safety standards, not being allowed to be produced in large quantities, interacting only minimally with external systems, and not having any plans for ongoing maintenance and support. Delivering an efficient smart helmet system according to these guidelines is the aim.

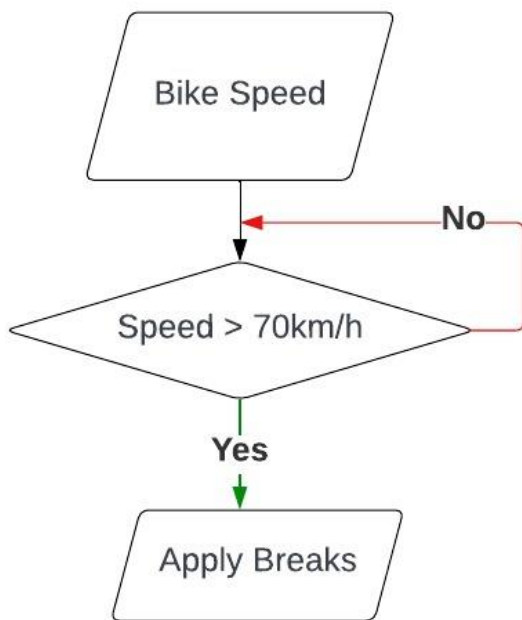
05. Methodology



Alcohol Sensor



Humidity or temperature Sensor



Speed Sensor

The integration of multiple safety elements into the smart helmet system is part of the project's methodology. First, a sensor for alcohol detection is integrated to find out if the rider has had alcohol. Providing rider safety, the alcohol sensor's signal is detected and linked to the brake system via a microcontroller. This allows for a gradual and controlled braking operation to bring the motorcycle to a complete stop.

The helmet has a constructed temperature sensor in addition to alcohol detection. Upon reaching a temperature higher than 36 degrees Celsius inside the helmet, this sensor activates a coolant fan system. This cooling system is intended to improve rider comfort by efficiently controlling the helmet's temperature, particularly when used for extended periods of time.

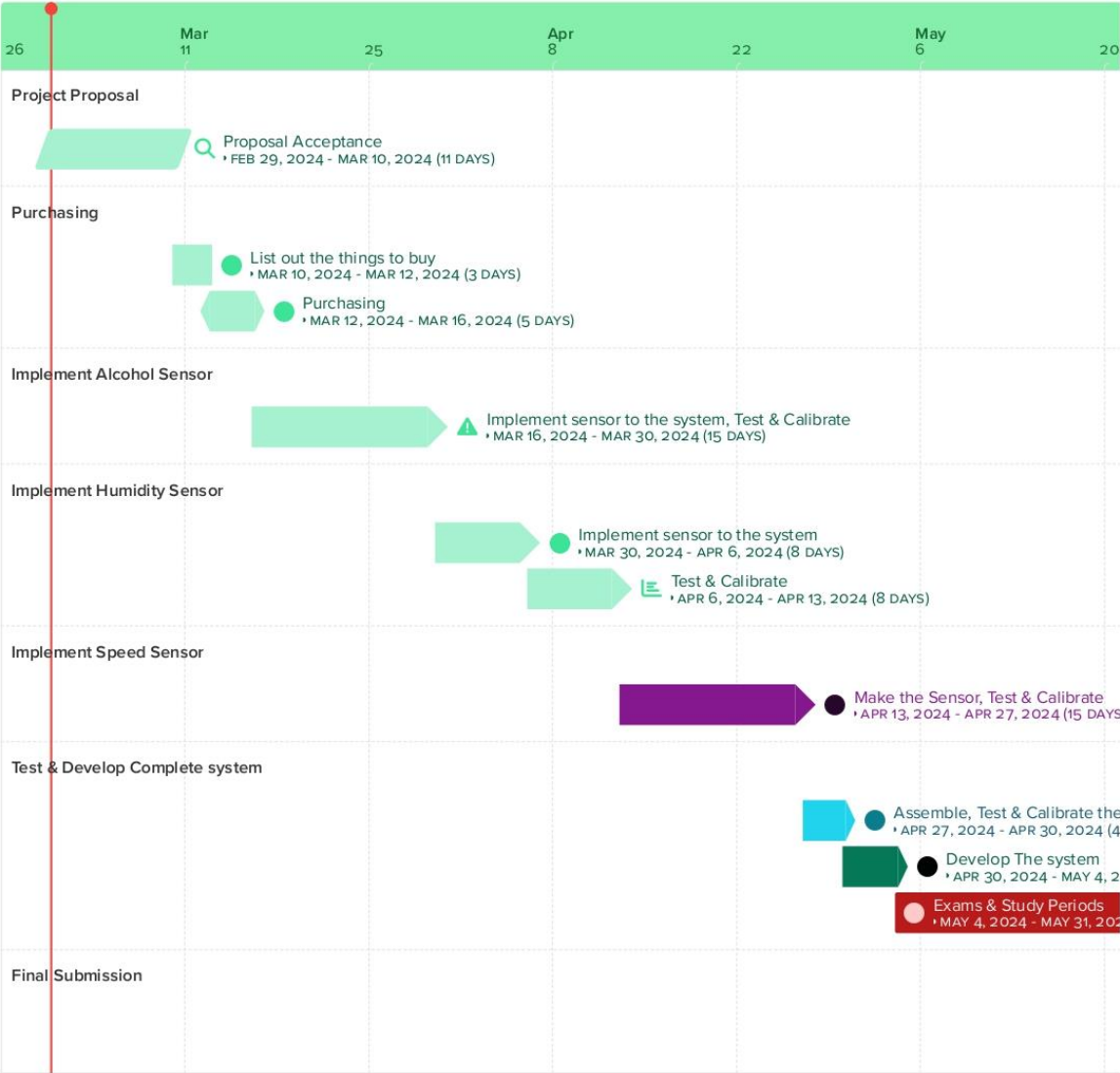
Actuators are activated to automatically apply the brakes when the motorcycle's speed exceeds a set limit, like 70 km/h. The purpose of this feature is to keep the rider moving at a controlled and safe speed.

To improve the system's performance and ensure accurate and responsive functionality, feedback loops, user training, and iterative testing are essential parts of the technique. In addition, thorough documentation will be kept up to date in order following to safety guidelines and laws controlling motorcycle safety systems and helmet technology. This strategy ensures that the upgraded safety features in the smart helmet system are successfully implemented.

06. Timeline

Startup Marketing Plan Timeline Starting Next Month

This timeline outlines the key milestones and activities for a startup marketing plan starting next month, covering market research, digital marketing initiatives, content creation, and strategy development to drive brand visibility and customer engagement.



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Proposal Acceptance
Feb 29, 2024 - Mar 10, 2024

Start the process of conducting market research to analyze target audience, competitors, and industry marketing strategies.

Purchasing

List out the things to buy
MAR 10, 2024 - MAR 12, 2024

Purchasing
MAR 12, 2024 - MAR 16, 2024

Commence preparations for launching the company website, including design, content creation, and

Develop a comprehensive plan for social media campaigns across platforms to increase brand awareness and engagement.

Implement Alcohol Sensor

Implement sensor to the system, Test & Calibrate
MAR 16, 2024 - MAR 30, 2024

Establish a content calendar outlining topics, formats, and distribution schedules for blog posts, video, and social media content.

Implement Humidity Sensor

Implement sensor to the system
MAR 30, 2024 - APR 6, 2024

Analyze and evaluate key performance metrics, including ROI, conversion rates, and engagement, to refine future marketing strategies.

Test & Calibrate
APR 6, 2024 - APR 13, 2024

Formulate a robust SEO strategy encompassing keyword research, on-page optimization, and link building to improve search engine rankings.

Implement Speed Sensor

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Make the Sensor, Test & Calibrate
APR 13, 2024 - APR 27, 2024

Test & Develop Complete system

Assemble, Test & Calibrate the Complete System
APR 27, 2024 - APR 30, 2024

Develop The system
APR 30, 2024 - MAY 4, 2024

Exams & Study Periods
MAY 4, 2024 - MAY 31, 2024

Final Submission

07. Conclusion

This paper describes our project's efforts to create a smart helmet system for motorcyclists that includes modern technology like temperature and humidity sensors, speed sensors, alcohol sensors, and some actuators to improve road safety. We will modify these helmets to make them more reasonably priced and appropriate for the Sri Lankan market, enabling riders to use them without sacrificing safety. The addition of temperature, speed, and alcohol sensors improves the helmet's safety features even more by giving riders timely alerts. In general, we think that our effort will help make Sri Lankan roads safer by lowering the number of accidents and deaths and improving conditions for all users of the roads.

08. References

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- [2] Mohd Khairul Afiq Mohd Rasli, Nina Korlina Madzhi, Juliana Johari, "Smart Helmet with Sensors for Accident Prevention", 2013 International Conference on Electrical, Electronics and System Engineering.
- [3] Shabrin, Bhagyashree Jagadish Nikharge, Maithri M Poojary, T Pooja, Sadhana B , "SMART HELMET - INTELLIGENT SAFETY FOR MOTORCYCLIST USING RASPBERRY PI AND OPEN CV", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056, Volume: 03 Issue: 03 | Mar-2016.
- [4] Dr.B.Paulchamy, C.Sundhararajan, Regin Xavier, A.Ramkumar, D.Vigneshwar, "Design of Smart Helmet and Bike Management System", Asian Journal of Applied Science and Technology (AJAST) (Open Access Quarterly International Journal) Volume 2, Issue 2, Pages 207-211, April-June 2018