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SOLAR POWERED SMART HELMET WITH VENTILATION

Abhijith.s[1], Serin Skariah Koshy[2], Tom Shaji[3], Dr. Godwinraj.D[4], Ranjitha Rajan[5]

Electronics & Communication Engineering, Amal Jyothi College of Engineering, Kanjirapally, India.

Electronics & Communication Engineering, Amal Jyothi College of Engineering, Kanjirapally, India.

Electronics & Communication Engineering, Amal Jyothi College of Engineering, Kanjirapally, India.

Abstract: The solar helmet with a cooling system is a groundbreaking project that combines renewable energy and user comfort. This innovative headgear incorporates photovoltaic cells to harness solar power, supplying energy to an integrated cooling system. The abstract highlights the synergy between sustainable technology and personal well-being, showcasing a solution that not only generates clean energy but also prioritizes user comfort through effective temperature regulation. An Arduino nano microcontroller processes data from a gyroscope sensor, enabling real-time tracking of head movements for enhanced user comfort and safety. The solar helmet project aims to integrate photovoltaic technology into a wearable, efficient, and aesthetically pleasing design. By harnessing solar energy through the helmet, it seeks to provide a sustainable power source for various electronic devices, enhancing user convenience and reducing dependence on traditional charging methods. The abstract encapsulates the innovative fusion of technology and fashion, promoting eco-friendly solutions in everyday life.

Keywords: solar panel, IOT (internet of things).

I INTRODUCTION

The solar helmet with a cooling facility represents a pioneering fusion of sustainable energy and personal comfort. This innovative headgear integrates solar panels to capture and convert sunlight into electricity, powering an advanced cooling system embedded within the helmet. This introduction sets the stage for exploring the dual benefits of renewable energy generation and thermal comfort, emphasizing the potential impact of such a solution in promoting eco-friendly, user-centric technology for diverse applications.

The solar helmet project stands at the intersection of renewable energy and wearable technology, presenting an innovative solution to address power needs in a portable and sustainable manner. By incorporating photovoltaic technology into a helmet design, this initiative aims to harness solar energy to meet various electronic requirements, offering a versatile and eco-friendly alternative. This introduction sets the stage for exploring how the solar helmet project seamlessly integrates functionality, mobility, and environmental consciousness to create a cutting-edge accessory for the modern world.

II PROBLEM STATEMENT

This project's main goal is to create a solar helmet with gyro integration and ventilation in order to tackle the following challenges Heat Protection: By including a solar-powered cooling mechanism to control the helmet's internal temperature,the Solar Helmet should offer efficient protection against extreme temperatures. Ventilation: To provide proper airflow, reduce heat accumulation, and keep the wearer comfortable, the helmet should have a ventilation system.

Gyro Integration: By warning employees about possible risks or accidents brought on by weariness, gyro sensors that monitor head motions might improve rider or worker safety. Gyro Integration: By warning employees about possible risks or accidents brought on by weariness, gyro sensors that monitor head motions might improve rider or worker safety. Ergonomics: To provide extended wearability without creating discomfort or fatigue, the design should prioritize comfort, adaptability, and lightweight construction. Durability and Reliability: The helmet needs to be strong and dependable in order to survive from humid climate to riders rough, such as bumps, wetness, and dust. Energy Efficiency: In order to reduce dependency on external power sources, the solar-powered components should maximize the consumption of renewable energy sources. User Interface: To improve the wearer's situational awareness, the helmet should include an easy-to-use user interface that offers real-time input on the surroundings, gas levels, and head movements. Improved safety features can be obtained when riding a solar helmet equipped with an impact sensor, especially when cycling, motorcycling, or skateboarding. The operation of an impact sensor built into a solar helmet might be as follows: Finding the Impact: The impact sensor is incorporated into the helmet's construction, usually in close

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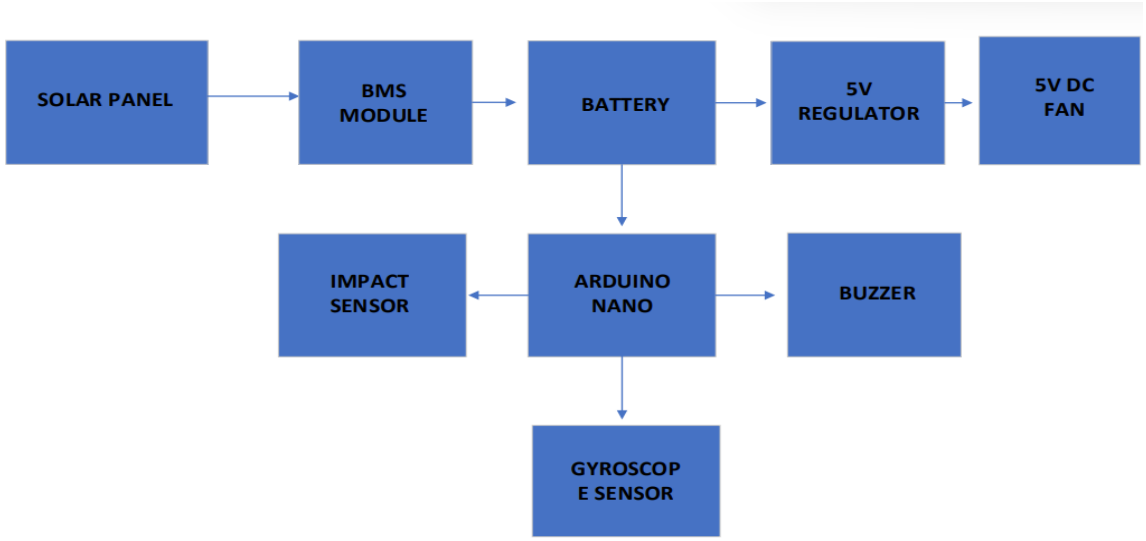
proximity to the sides or crown. Its purpose is to identify abrupt shifts in acceleration or deceleration that point to an accident or collision.

III BLOCK DIAGRAM



Block diagram of smart helmet component and their input voltages

IV LITERATURE SURVEY

This item includes an accelerometer, switch, microcontroller, RF transmitter, and alcohol sensor. The rider's helmet status is shown by a switch, and their level of intoxication is determined by an alcohol sensor. Via an RF transmitter, the alcohol sensor transmits a signal to the bike portion. When the eyeblink sensor senses tiredness, the bike slows down. B. Section for Bicycles This section contains an RF receiver, microcontroller, ignition key, GPS, relay, dc motor, LCD, GSM modem. The signal is received by the RF receiver. The project's objective is ultimately presented in the result and analysis section. After demonstrating our project, we achieved the outcome depicted in the figures. His figure shows the MQ5 Alcohol sensor, which measures a person's breath to determine whether or not they are intoxicated. The bike won't start if he is intoxicated. The Arduino Uno, L293D motor driver/relay, ADXL accelerometer, 12V battery supply, DC motor, RF receiver, GPS, and GSM module are all displayed in this project part, which is a complete bike portion. Via RF transmission, all of the conditions from the helmet portion are sent to the receiver, where they are all analysed. An accelerometer is used to gauge how reckless a driver is.

1. Solar power helmet

There are various types of energy. Energy takes the form of light. Heat is also in. Electrical power is also. One type of energy can frequently be transformed into another. This information is crucial because it clarifies how we obtain electricity, which is used in a variety of ways. In addition to being used to power computers, TVs, and numerous other devices at home, at school, and at work, electricity is also needed to illuminate buildings and streets. This widely used method of producing energy is one way to obtain it. However, there are a few issues with it. Coal and oil are finite resources on our planet. This approach includes information on Understanding Electricity, Solar Cells Galore, Endless Energy, and Energy from Sunshine.

2. Effect of ventilated safety helmet in a hot environment.

Due to thermal discomfort, forest workers are inclined to take off their head protection in hot and muggy weather. OSHA's revised regulations on topics, engineering, and occupational safety and health are mandatory for all employees. In order to determine the factors that lead to thermal discomfort among forest workers, this study evaluated the psychophysical and physiological responses of participants during tasks that mimicked the workload of forest workers in a high-temperature environment similar to that found in the southeastern United States during the summer. The environmental conditions of the helmet dome were also evaluated. Three different types of helmets were used in this investigation: an active-ventilated helmet, a passively-ventilated helmet, and a regular helmet. It was found that none of

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the helmets under test significantly taxed the body given the physiological factors under investigation. An evaluation of he environmental conditions in the dome space revealed that both the dry-bulb. .The suggested system, or smart helmet, is divided into two sections: software and hardware. Tools from Android, Firebase, and Arduino were used to launch the helmet, which has accident detection and helmet holder tracking capabilities. A piezoelectric sensor converts temperature, force, acceleration, pressure, and strain into an electrical charge in order to measure changes in these parameters. This adaption limits the current and voltage produced by the piezo element while also safeguarding the analogy source by connecting a 1-megohm resistor in parallel with the piezo sensor.

3. Riview on Investigation on Design, Development and performance analysis of helmet under Dynamic Loding condition.

The goal of this study's model development is to identify the best material for the two layers of helmets. The model was created in Catia with specific dimensions, and Ansys Workbench 15 was used for analysis. The model was tested in two different positions at a speed of 30 m/s (108 kmph), or horizontal and inclined. From these tests, the Von-Mises stresses, equivalent elastic strains, and deformations at horizontal impact are obtained as critical for Pc and EPS Combination. The varied values for the helmet under horizontal impact are the Elastic strain (-0.29), Von-Mises stress (-62.7 Mpa), and Deformation (-0.0189 m).The varied values for the helmet under slanted impact are the Elastic strain (-0.047), the Von-Mises stress (53.9 Mpa), and the deformation (-0.0068 M).

4. Solar Powered Smart Modular Helmet and Tail PIPE Exhaust Gas Monitoring and Alert System for Bike.

In this project the accident of vehicle be detected and positioning of that accident place is done in the basis of longitude and latitude using GPS receiver. This longitude and latitude data is sent to the family member, which is predefined in the controller using GSM module. Using this latitude and longitude value in Google map can find out the exact location and take early action depends on situation. And also, the bike ignition cast beturned on until and unless rider will not wear the helmet. The accident can be identify based on the data which is received by the sensors present in helmet as well as bike unit. The system also informs carbon monoxide gas rise in the vehicle to traffic police using GSM. The Expected performance is achieved through implementation of the proposed system.

5. Intelligent Smart Helmet System.

After going over every paper, we were able to determine that the smart helmet system needed to be highly efficient in order to ensure the safety of the biker. The smart helmet improves rider security by utilizing sensors such as force sensing resistor, alcohol sensor, flex sensor, accelerometer, temperature sensor, pressure sensor, IR sensor, gravity sensor, bioelectric sensor, LDR, and speed sensor. In the intelligent smart helmet system, the sensors work in tandem with microcontrollers such the ZIGBEE, Arduino, and PIC microcontrollers as well as GPS and GSM technologies. This concept will help India develop in a safer and more secure manner. Simply go one step ahead of the group of people who ride bikes and use smart helmets.6. Smart helmet using internet of things.

In order to prevent interruptions to bikers, this paper presents a new model for tracking and accident detection system connected with Arduino mobile application through HC-05 module. Although this model may have a camera, accelerometer, and alcohol sensor, additional GPIO is required to comply with the new modifications. To put it another way, a second microcontroller with more GPIO is required to preserve the helmet's size and secure the component. These modifications can all be integrated into IoT helmet applications to meet various settings, such as mining, industrial, hiking, and riding

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V PROPOSED SYSTEM

An inventive solution to improve rider safety, comfort, and productivity in industries where extreme temperatures and hazardous situations are commonplace is the Solar Helmet with IoT-Based Gyro Integration. This system provides real-time monitoring and control by combining IoT connectivity with solar-powered ventilation, heating and gyroscopic sensing capabilities. Materials and Components: Gather the materials needed for the helmet, including a helmet shell, solar panels, small cooling fan, battery, wiring, and switches. Integration of Solar Panels: Determine the best placement for solar panels on the helmet to maximize exposure to sunlight while maintaining aesthetics and functionality. Cooling Fan Installation: Install the cooling fan in a strategic location on the helmet to provide airflow to the wearer. Ensure it's securely mounted and won't interfere with the helmet's structure or safety features. Battery and Wiring: Connect the solar

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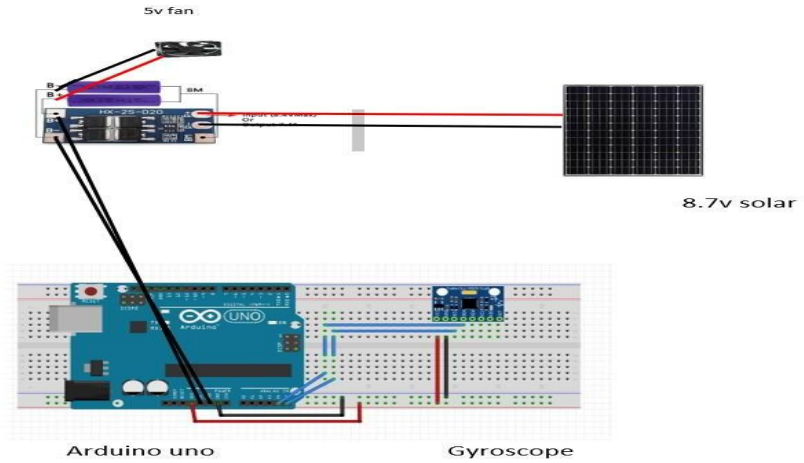
panels to a rechargeable battery, which will power the cooling fan. Set up the wiring to efficiently transfer energy from the solar panels to the battery and fan. Testing and Optimization: Test the helmet in various conditions to assess its cooling effectiveness and solar charging capabilities. Make adjustments as needed to optimize performance. Safety Considerations: Prioritize safety by ensuring all components are securely attached, and the helmet's structure isn't compromised by the added features. Consider adding reflective elements for visibility and incorporating ventilation to prevent overheating. Documentation and Presentation: Document each step of the project, including materials used, wiring diagrams, and testing results. Prepare a presentation to showcase your solar helmet and explain its features and benefits.

VI GRAPHICAL DIAGRAM

A modal diagram of smart helmet with all components

VII CIRCUIT DIAGRAM



Circuit diagram of smart helmet in a brad board.

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VIII CONCLUSION

In conclusion, the solar helmet with a cooling system represents a significant leap forward in sustainable wearable technology. By combining the benefits of solar energy generation and an integrated cooling facility, this project not only addresses the need for eco-friendly power sources but also prioritizes user comfort. The potential applications are diverse, ranging from outdoor activities to industrial settings, highlighting the versatility and practicality of this innovative solution. As technology continues to evolve, the solar helmet with a cooling system exemplifies a harmonious blend of environmental consciousness and user-centric design, paving the way for a more sustainable and comfortable future research and Design: Begin by researching existing solar-powered devices and cooling systems. Design your helmet layout, considering factors like comfort, efficiency, and safety.

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[15]. A Solar Powered Smart Helmet With Multifeatures Mr.P. Dileep Kumar1, Dr.G.N. Kodanda Ramaiah2 Mr.A. Subramanyam3 , Mrs.M.Dharani4 (Professor, Dept. of ECE,KUPPAM ENGINEERING COLLEGE) (Assistant Professor, Dept. of ECE,SV COLLEGE OF ENGINEERING.