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"SOLAR POWERED SMART HELMET AND INTELLIGENT BIKE SYSTEM"

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ABSTRACT:

Solar-Powered Smart Helmet and Intelligent Bike System aimed at enhancing rider safety and promoting environmentally friendly commuting. The smart helmet is equipped with photovoltaic cells to harness solar energy, ensuring a sustainable power source for its electronic components, including LED indicators, a Bluetooth communication module, and various sensors. The intelligent bike system complements the helmet with a suite of features such as GPS navigation, real-time traffic updates, and a collision detection system.

Key Words: Biker's safety, Accident detection and alert system, Smart helmet, Alcohol detection.

I. INTRODUCTION :

The advent of smart technology has revolutionized various aspects of daily life, including personal transportation. In the context of urban mobility, the integration of smart systems into bicycles and helmets represents a significant advancement in enhancing rider safety, convenience, and sustainability. This paper introduces a novel approach through the development of a Smart Helmet and Intelligent Bike System. The Smart Helmet is designed to provide enhanced safety and monitoring capabilities. It is equipped with advanced sensors, including accelerometers, gyroscopes, and heart rate monitors, which continuously track the rider's physiological and motion data. These sensors facilitate real-time monitoring and can trigger emergency alerts in the event of a crash or abnormal health conditions. The helmet also includes LED indicators for signalling turns and stops, which improve the rider's visibility and communication with other road users.

II. PROBLEM STATEMENT

The Increase in the number of accidents in recent days due to the negligent driving habits. Nowadays drink and drive cases are increased and even rash driving leads to severe accidents.

III. PROPOSED SYSTEM

we divide our project in to two units namely helmet and bike. In helmet unit, the force sensing resister is placed on inside upper part of the helmet where actually head was touched with sensor surface and alcohol sensor is placed in front of rider's mouth. It can sense easily. Solar panels are mounted on upper side of helmet which is in direct contact with sunlight. And the battery and regular circuits are fixed inside the helmet. Secondary controller and RF transmitter is placed inside the helmet, antenna are located outside the helmet. The bike unit is placed on the actual bike. Accelerometer is fixed on the bike, for the fall detection. Our main controller is positioning in to case of bike and circuit is placed on the handle of bike So the GPS location is sent to web page.

IV. PROPOSED SYSTEM ARCHITECTURE

Helmet side :

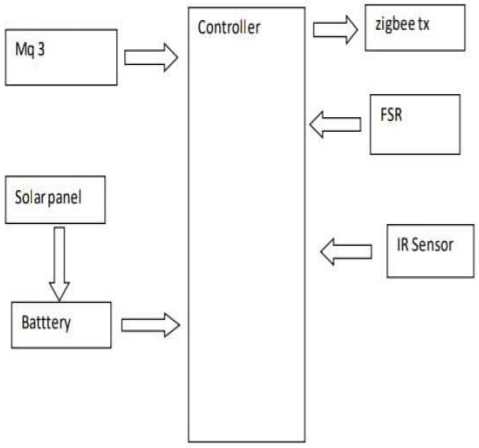

Fig.1.Block Diagram of Helmet side

Bike Side :

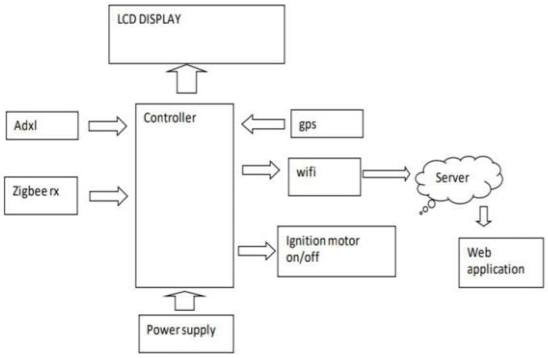

Fig.2.Block Diagram of Bike Side.

V. FLOW CHART

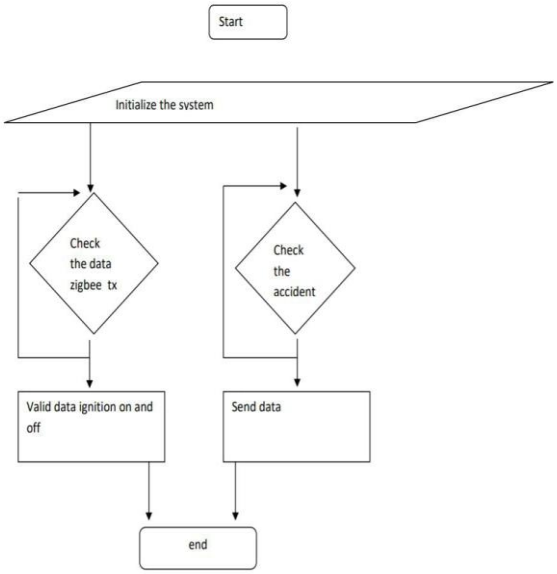

Fig.3. Helmet side Flow Chart.

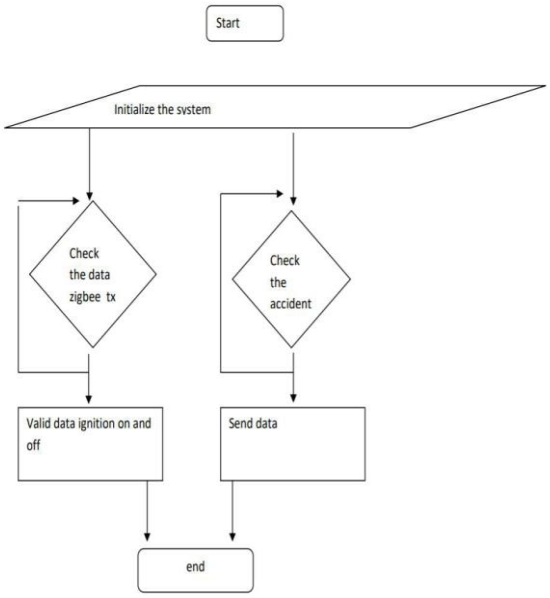

Fig.4.Bike Side Flow chart.

VI. HARDWARE DESCRIPTION

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 Analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

FSR (FORCE SENSING RESISTOR)

A Force Sensing Resistor (FSR) is a type of sensor that changes its resistance when a force, pressure, or mechanical stress is applied to it. FSRs are used in a variety of applications where detecting physical pressure is required. They are particularly popular in user interface applications such as touch-sensitive panels and pressure measurement devices

C. MQ3 ALCOHOL SENSOR

The MQ-3 sensor is a widely used gas sensor that is particularly sensitive to alcohol. It is commonly used in breath analysers, gas leakage detection systems, and other applications where the detection of ethanol vapor is required.

D. ZIG BEE Tx Rx

Zigbee is a specification for a suite of high-level communication protocols using low-power digital radios based on the IEEE 802.15.4 standard for wireless personal area networks (WPANs). Zigbee is designed to be simpler and less expensive than other WPANs, such as Bluetooth or Wi-Fi, and is particularly suited for applications that require secure, low data rates, and long battery life.

E. GPS (Neo 6M GPS Module)

The NEO-6M GPS module is a robust GPS receiver featuring a built-in ceramic antenna measuring 25 x 25 x 4mm, enhancing its satellite search capabilities. The power and signal indicators provide real-time module status monitoring. Thanks to the data backup battery, the module can preserve data even in the event of accidental power loss.

F. ADXL335 Accelerometer

The ADXL335 Triple-Axis Accelerometer is a breakout board for Analog Devices analog 3-axis accelerometer. The ADXL335 is a small, thin, low-power, complete 3-axis accelerometer with signal-conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

G. RELAY

A relay in a smart helmet is typically a component that facilitates communication between different systems within the helmet. For instance, in a smart motorcycle helmet, a relay might be used to transmit data from sensors (like those for speed, temperature, or impact) to the helmet's onboard computer or to a connected smartphone app.

V. SOFTWARE REQUIREMENTS

- ARDUINO IDE
- ADAFRUIT

ARDUINO IDE

The Arduino Integrated Development Environment (IDE) is a software platform used for writing, compiling, and uploading code to Arduino microcontroller boards. It provides a user-friendly interface that simplifies the process of programming microcontrollers, making it accessible to both beginners and experienced developers.

ADAFRUIT

Adafruit is a company that designs, manufactures, and sells a wide range of electronics components, kits, and accessories, particularly focused on the DIY (do-it-yourself) electronics and maker communities. They provide a diverse selection of products catering to makers, hobbyists, students, and professionals interested in electronics, embedded systems, and DIY projects.

VI. APPLICATIONS

- Safety Enhancement.
- Navigation and Route Guidance.
- Fitness Tracking and Performance Monitoring.
- Communication and connectivity.
- Theft Prevention and Recovery.
- Integration and Smart Infrastructure.

VII. CONCLUSION

In conclusion, smart helmets and intelligent bike systems represent a significant advancement in cycling technology, offering a wide range of features and functionalities aimed at enhancing safety, convenience, and overall user experience for cyclists, motorcyclists, and e-bike riders.
These systems leverage a variety of technologies, including sensors, connectivity, GPS, and data analytics, to provide innovative solutions to common challenges faced by riders on the road. From collision detection and route guidance to fitness tracking and communication, smart helmets and intelligent bike systems offer a comprehensive suite of capabilities designed to address the diverse needs of riders in different situations and environments.

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