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IOT BASED CLUSTER FOR ELECTRIC – SCOOTER

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Abstract

Electric vehicles are predicted to be the next market disruptive technology in transportation and technology. They have the potential to transform the way energy is used, generated, and redirected. The electric-scooter industry is developing technology that will allow GPS tracking as one of many other features to be embedded in peddlers. Such devices will significantly improve the rider experience. To accomplish this, a decision on the IoT technology to be used must be made. This paper will examine the selection of IoT technology in electric scooters and reach a conclusion on the best option for the e-bike industry. In this project, we have use the most recent TFT screen found in automobiles. This has assisted bike makers and designers to maximize every pixel, color range, and motion possibility, and according to current trends, they are. This screen will be integrated with various IoT sensors via Cluster programming, which will provide the necessary information as well as the functionality of the TFT screen. This screen will include various function options such as navigation, GPS system, security via thumb or password, speed limit, battery status indication, battery voltage indication, km travelled, and call alert, among others

Keywords – Electric scooter, Cluster, TFT Display, Voltage

INTRODUCTION

Electric scooters are without a doubt a lot more environmentally friendly option than traditional petrol or diesel vehicles. Electric vehicles are expected to become the next disruptive force in technology and transportation. They could completely alter the way energy is produced, utilised, and directed. The electric-bike business is developing a technology that can be integrated into the paddles and offers numerous functionalities, including GPS tracking. The rider experience will significantly improve as a result of these devices. The most recent TFT screen will be utilised in this project The rider experience will be greatly improved by such technologies. We're going to use a modern TFT screen for this project, just like they use in cars. Through cluster programming, which will provide the necessary information and enable the TFT panel to function, this screen will be integrated with various Internet of Things sensors. This screen will be equipped with a variety of function options, including navigation, GPS, security via a thumbprint or password, speed limit, battery condition and voltage indicators, miles travelled, call alert, and others.

LITERATURE REVIEW

The paper, titled IOT Based Model for GPS System Monitoring aimed to provide an integrated solution for monitoring environmental turbulences in data centres in order to achieve the business concept [1]. Continuity 24 hours a day, seven days a week is based on Internet of Things (IOT), a new technology used in the Fourth Industrial Revolution. In paper [2], E-RBQ data from Guilin and Nanning cities

were obtained with the goal of investigating the formation mechanism and differences in risky riding behaviours of various e-bike riding clusters.

DESIGN AND WORKING

Details of hardware and software

Open source software such as the Proteus Simulation Software is incorporated into the Arduino IDE.
1) SPI.h - Using the Arduino as the controller device, you can interface with SPI devices using this library.
2) Adafruit GFX.h: Adafruit GFX graphics core library; this is the core class used by the Adafruit ILI9341 library to show graphics.
3) Adafruit ILI9341.h is a library for the ILI9341 displays from Adafruit.
4) ESP32: ESP32 is a line of inexpensive, low-power system-on-a-chip microcontrollers that include built-in dual-mode Bluetooth and Wi-Fi.
5) TFT Display: A thin-film-transistor liquid-crystal display, or TFT LCD, is a type of LCD that uses thin-film transistor technology to enhance image characteristics including addressability and contrast. In contrast to passive matrix LCDs and
Simple, direct-driven (i.e., with segments directly connected to electronics outside the LCD) LCDs with a few segments, a TFT LCD is an active matrix LCD.
6) GPS Module: The Global Positioning System (GPS), a satellite-based navigation system, delivers position and timing data.
7)ESP32 MCU Node: The ESP32 is integrated with antenna switches, RF Baluns, power amplifiers, low-noise amplifiers, filters, and management modules, and the overall solution takes up the least amount of PCB space.

IOT based cluster for electric scooter has following blocks:

1. Arduino Uno
2. MEMS sensor i.e. Accelerometer
3. GPS
4. Bluetooth or GSM module
5. LED indicator
6. TFT Module

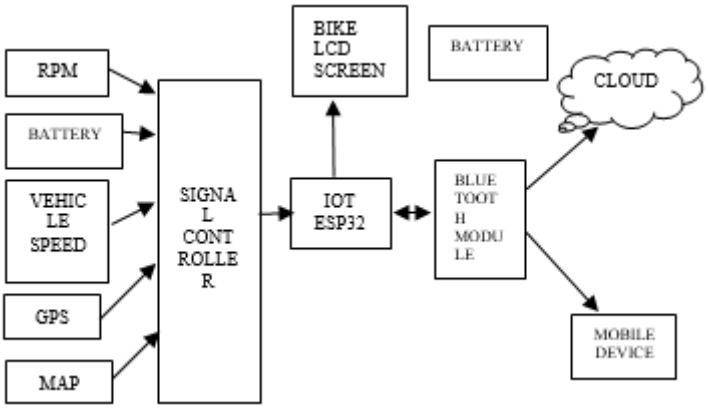


Fig (1): Block diagram of IOT based cluster.

WORKING

We have implemented many features listed below:

Task 1: Light Indication

We created a system utilising an Arduino board and an LED that blinks the right indicator when the right button input is high and the left indicator when the left button input is high.

- We made use of Arduino's logic high and low notion.
- When the button is pressed, the PIN becomes HIGH,
  Turning on the led thanks to the 5Volt supply.
- To make a pin blink, we add a delay and set the pin to go
  High for a brief period of time before going low.

• One head lamp: Mounted on the front of the scooter to provide sufficient white or yellow light for the road ahead.
• The idea behind making the pin high for light and low for no light is the same.

Task 2: Speed of electric scooter

Through a software programme called BlynkApp, which shows the speed of the vehicle on the panel of a TFT display, we may regulate the speed of the car or scooter in this task.

Task 3: Battery voltage and Battery percentage

When you turn on the scooter while charging the batteries inside, you can see the battery percentage and remaining time on the dashboard. A battery indicator (also known as a battery gauge) is a device that provides battery information. This is usually a visual indication of the battery's charge level.

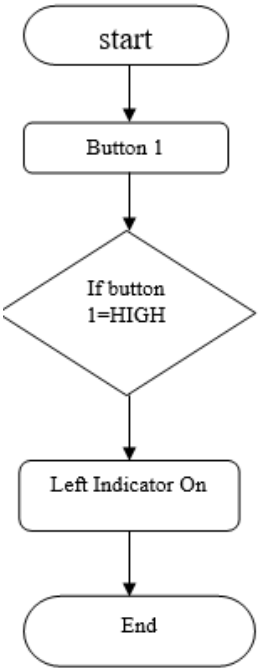
Task 4: GPS Location

Since the GPS sends specific satellite signals to them, the GPS receivers included into the gadgets can calculate time and velocity in addition to pinpointing the actual location.
The GPS receiver measures the amount of time it takes for a signal from at least three satellites to arrive at its position in order to determine its own location.
Since the microwave signals travel at a consistent pace, the receivers can use time measurements to calculate their distance from each satellite in real-time.

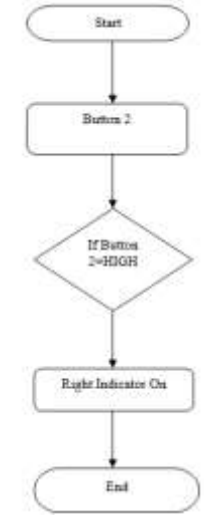
Task 5: Call notification on screen

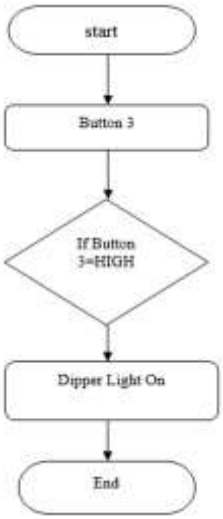
Notifications in the automobile have a streamlined user engagement model with the following elements to guarantee that drivers can concentrate on the road: Complex controls cannot be used with notifications.

ALGORITHM

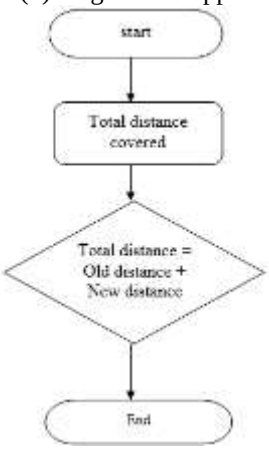


Block Diagram (1): Left Light Indicator





Block Diagram (2): Right and Dipper Light Indicator



Block Diagram (3): Distance Calculator

IV. Methodology

1) Connecting all of the components with an esp32 and obtaining input from the scooter controller. Plan our requirements accordingly.

2) Reveal the required outputs such as speed, battery voltage, light indicators, and so on. We used Arduino ide for programming and proteus for simulation.

3) We also use the Arduino IDE and libraries such as adafruit and adafruit GFX for call notification and GPS locator. Etc

4) Receiving the signal form electric scooter sensors to esp32 and display on display. For smartphone connectivity we use Wi-Fi and Bluetooth module.

V. Analysis

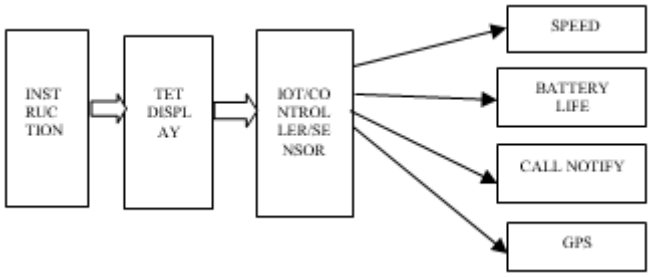


Fig (2): Block Diagram for Methodology

We use an esp32 Wi-Fi Bluetooth module, a TFT (Thin Film Transistor) display, and a GPS locator module in our system.

For our system steps, we use the Arduino IDE to programme the esp32 and Blynk for application development.

1) Communicating all of the components with the esp32, such as the speed sensor, battery, lights, and GPS module.

2) We programme the esp32 and display the required output of the TFT display using the Arduino IDE.

3) We make extensive use of libraries such as adafruit, gfx, touch library, and GPS module programming.

4) The final step is to install the components inside the electric scooter.

Result

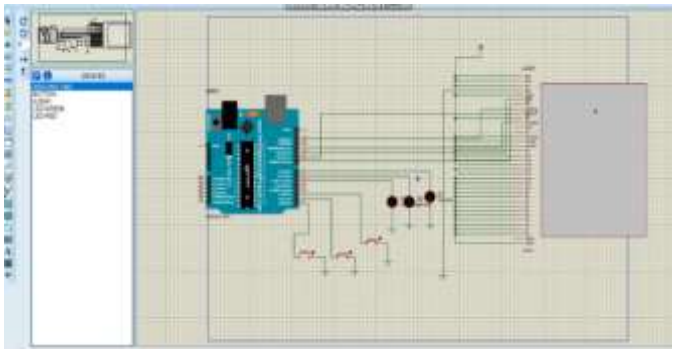


Fig (3):- Simulation of IOT Based Cluster

Table1: Connection of Arduino to TFT

Arduino Pin	TFT Display Pin
8	CS
9	WR/DC
10	RES
11	SDA
12	NC
13	DC/SCL
0	Push Button 1
1	Push Button 2
2	Push Button 3
5	Led 1
6	Led 2
7	Led 3

Arduino pin no 8 is connected to display pin of CS. WR/DC 9 is connected to Pin 10 is connected to reset. Pin 0, 1, 2 is button for taking input. Pin 5 6 7 is Led output,

Introduction to Proteus

- Proteus is used for electronic circuit simulation, design, and drawing. The Lab Center electronic created it.
- You can also design two-dimensional circuits with proteus.
- You can use this engineering software to build and simulate various electrical and electronic circuits on your personal computers or laptops.
- There are numerous advantages to simulating circuits on proteus before implementing them in practice.
- Designing circuits on the proteus takes less time than practical circuit construction.

- In software simulation, the possibility of error, such as loose connections, which take a long time to find in a practical circuit, is lower. Expensive electronic tools, such as an oscilloscope, are easily obtained in proteus.
- You can find various circuit parameter using proteus, such as current, voltage value of any component, and resistance at any instant, which is extremely difficult to implement.
- How to Make Circuit in Proteus.

Step 1: To begin, go to your computer's proteus icon and select the new file option, as shown in the figure below

Step 2: First, in your computer, click on the proteus icon and then on the new file option, as shown in the figure below.

Step 3: After that, go to the component option, as shown in the figure below, and choose the elements for your projects.

Step 4: After selecting components mode, you'll notice two buttons, P and L. If you move your mouse over the P button, you will see Pic from Libraries.

• It is used to choose various components for circuit construction.

Step 5: • When you click the P button, you will see the box shown in the figure below. Fill in the blanks with your circuit component.

Step 6: As I type button, you can see a button in the right figure that shows different buttons that you can select based on your needs.

• When you select components for your project, you will see them in the box shown in the figure below.

• I've also chosen some components for the creation of a simple circuit. the component selection Make a circuit diagram for your project and connect all of the components with wires.

• To connect one component to another, click the leftmost terminal of the first component and drag it to the other components.

• To remove a component or its connection, simply double-click on the component of wire in question. If you want to change the values of any component, such as resistance or capacitor, click right on it, select the desired value, and then click the OK button.

Step 7: As shown in the diagram below, I vary the voltages of the batteries.

• When you connect all of the components in the circuit, such as the run button in the left bottom, you will be able to see how your circuit works in practise.

Step 8: After you have observed the simulation of your circuit, click the stop button on the left bottom to stop the circuit from working.

•I've also uploaded a video for Proteus simulation, which will help you gain a practical understanding of Proteus.

VI. Conclusion

Electric scooters are more environmentally friendly option than traditional petrol or diesel vehicles. Electric vehicles are expected to become the next disruptive force in technology & transportation. They could completely alter the way energy is produced, utilized & directed. The Electric - scooter business is developing a technology that can be integrated into the paddles & offers numerous functionalities, including GPS tracking. In the current situation, many displays or models are available with limited features & also are very costly. The major motivation behind our project is to contribute in developing EV world. Keeping this in mind, we've done this project in which we've developed a system using IOT & added the features like light indication, speed limiting function, battery percentage or battery voltage, call alert & GPS Location. In this project, we've used the latest TFT screen as seen in cars. This screen will be w integrated with different IoT sensors through programming which will give the required information on TFT screen. This screen will be facilitated with different function options such as Navigation, GPS System, Speed Limit, Battery Status Indication, Total Kilometers Travelled & Call alert etc. Here, Light Indication can be done with Arduino & LED. Speed of Electic Scooter can be observed by Blynk App. Battery Voltage or Battery percentage can be observed by a Battery Gauge or Battery Indicator of the vehicle. Location can be noted with help of GPS System. Also, Notifications can be observed through a Streamlined User Engagement Model.

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