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Hoverboard Monitoring And Controlling By Using Iot

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Abstract: Hoverboards have emerged as a popular means of personal transportation, combining convenience and entertainment. However, the lack of monitoring and control mechanisms often results in safety issues and mechanical failures. This paper presents a comprehensive IoT-based system for hoverboard monitoring and control, utilizing key components such as Arduino UNO, Johnson gear motors, Bluetooth communication, and more. The proposed system ensures real-time control, enhanced safety, and improved user experience. By employing wireless communication and remote-control capabilities, the system addresses critical challenges associated with traditional hoverboards.

***Index Terms* – Hoverboard, IoT-based, Communication, Arduino UNO**

I. INTRODUCTION

Hoverboards are self-balancing electric scooters that have gained widespread popularity among youth and adults. Despite their appeal, these devices often face challenges related to stability, motor efficiency, battery management, and safety. The lack of a reliable monitoring and controlling system makes users vulnerable to accidents and equipment failures.

The advancement of the Internet of Things (IoT) has opened new avenues for integrating real-time monitoring and control into hoverboards. By utilizing IoT technology, users can remotely manage hoverboard functions, receive real-time updates, and enhance safety through automated controls.

This paper proposes an IoT-based hoverboard system that leverages Arduino UNO as the central processing unit and employs gear motors driven by Johnson 12V 60RPM motors. The system also incorporates Bluetooth communication for seamless connectivity with mobile applications, providing users with real-time control and monitoring capabilities.

II. OBJECTIVES

The primary objectives of this hoverboard monitoring and controlling system are as follows:

- To develop a robust monitoring system for detecting critical parameters like speed, power, and motor status.
- To integrate Bluetooth-based wireless control for easy operation.
- To enhance safety through real-time data acquisition and automated response mechanisms.
- To create a cost-effective and user-friendly system with minimal hardware components.

III. COMPONENTS USED

The proposed hoverboard system comprises the following essential components:

- Main PCB Controller (Arduino UNO ATMEGA328P)
  Acts as the central control unit for processing signals and managing motor operations. Provides flexibility through easy programming and efficient interfacing with sensors and actuators.
- Drive Motors (Johnson 12V 60RPM Gear Motors)
  Delivers high torque and stable rotation, suitable for supporting loads up to 50 kg. Ensures smooth and balanced movement with consistent speed control.
- Bluetooth Module (HC-05)
  Enables wireless communication between the hoverboard and a smartphone application. Supports long-range connectivity and low power consumption.
- Relay Module (5V, 2-Channel)
  Used to switch power to the motors, allowing for precise control of speed and direction. Enhances the safety of power management by isolating high-current circuits.
- Battery (Lead Acid 12V)
  Supplies the necessary power for motors and control circuits. Provides long-lasting performance with efficient charging and discharging characteristics.
- Push Button (PBS 110)
  Manually initiates hoverboard power or acts as an emergency stop button. Provides a simple yet effective way to control the system directly.
- Caster Wheels (2-inch)
  Used for added stability and smooth motion. Essential for balancing the hoverboard when stationary or in motion.
- Plywood Fabrication and Mounting
  Acts as the structural base for mounting all components securely. Provides durability and resistance to mechanical stress.
- Motor Bracket
  Ensures firm attachment of the motors to the hoverboard chassis. Minimizes vibration and improves balance during operation.

IV. SYSTEM ARCHITECTURE

The proposed system architecture consists of the following modules:

- Control and Processing Module
  Arduino UNO is used as the primary controller for processing data and sending signals to the motors via relays. Receives input from the Bluetooth module and executes motor control commands.
- Communication Module
  The HC-05 Bluetooth module enables wireless control from a smartphone. Uses serial communication to transmit and receive data from the mobile app.
- Power Management Module
  The 12V lead-acid battery powers the entire system, including the Arduino and motors. Relay modules efficiently control the power supplied to the motors.
- Motor Drive System
  Johnson gear motors provide the necessary torque for forward and backward movement. Controlled via relays to manage the speed and direction.
- User Interface
  A mobile application acts as the user interface for controlling the hoverboard's movement. Features include forward, backward, left, right, and stop functions.

V. SOFTWARE CODE

```
int left = 6, right = 7;
#define trigger A0
#define echo A1
float t = 0;
float cm = 0;
float inch = 0;
void setup() {
  pinMode(trigger, OUTPUT);
  pinMode(echo, INPUT);
  pinMode(left, OUTPUT);
  pinMode(right, OUTPUT);
  digitalWrite(left, HIGH);
  digitalWrite(right, HIGH);
  Serial.begin(9600);
}

void loop() {
  digitalWrite(trigger, LOW);
  delayMicroseconds(2);
  digitalWrite(trigger, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigger, LOW);
  delayMicroseconds(2);
  t = pulseIn(echo, HIGH);
  cm = t * 340 / 20000;
  if (cm > 0 && cm < 20) {
    digitalWrite(left, HIGH);
    digitalWrite(right, HIGH);
  }
  if (Serial.available() > 0) {
    char x = Serial.read();
    if (x == '1') {
      digitalWrite(left, LOW);
      digitalWrite(right, LOW);
    } else if (x == '2') {
      digitalWrite(left, HIGH);
      digitalWrite(right, HIGH);
    } else if (x == '3') {
      digitalWrite(left, LOW);
      digitalWrite(right, HIGH);
    } else if (x == '4') {
      digitalWrite(left, HIGH);
      digitalWrite(right, LOW);
    }
  }
  delay(200);
}
```

VI. WORKING PRINCIPLE

The user interacts with the hoverboard through a mobile application that connects via Bluetooth. Commands from the mobile app are received by the HC-05 Bluetooth module and sent to the Arduino UNO. The Arduino processes these commands and activates the appropriate relays to control motor functions. The hoverboard is powered by a 12V lead-acid battery, and the power flow is managed by the relay module.

Depending on the command, the motors rotate in the desired direction, providing smooth motion and stability.

Fig: Hoverboard Monitoring and Controlling by Using IoT

VI. RESULTS AND OBSERVATIONS

The hoverboard system was tested under various conditions to evaluate performance and reliability. Key findings include:

- Wireless Control: The Bluetooth module provided a stable connection up to 10 meters, allowing for responsive and precise control.
- Motor Efficiency: The Johnson gear motors delivered adequate torque to carry the designated load without overheating.
- Power Management: The lead-acid battery maintained consistent voltage during operation, ensuring smooth performance.
- Safety Features: The push button acted effectively as an emergency stop, halting the motors instantly.

VII. ADVANTAGES

- Enhanced Safety: The push button and relay-based control reduce the risk of motor malfunction.
- Wireless Convenience: Bluetooth connectivity allows seamless control via a smartphone app.
- Cost-Effective Solution: Utilizes affordable and readily available components.
- Stability and Control: Gear motors and caster wheels ensure balanced and smooth movement.

REFERENCES

[i]. Kumar, R., & Singh, P. (2024). "Bluetooth-Based Vehicle Automation." International Journal of Embedded Systems, 22(3), 115-122.
[ii]. Gupta, A., & Verma, T. (2023). "Motor Control Techniques for Electric Mobility Devices." Journal of Applied Robotics, 17(2), 89-97.
[iii]. Rao, S., & Patel, K. (2022). "IoT in Personal Mobility Solutions." Journal of Smart Transportation, 15(4), 102-110.