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Electric Inline Skaters

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Abstract: ***This project presents the design and development of Electric Inline Skates for efficient, eco-friendly, and convenient transportation within campus environments. The system integrates an Arduino microcontroller with a wireless communication system to enable remote control of the skates. User input, such as speed variation, is transmitted wirelessly and processed by the Arduino, which generates Pulse Width Modulation (PWM) signals to regulate motor speed through a motor driver. The skates are powered by a rechargeable battery, ensuring portability and ease of use for short-distance travel. The design focuses on achieving smooth acceleration, controlled speed, and user safety while reducing physical effort compared to traditional inline skates. This system is particularly useful in places such as colleges, and industrial campuses, where quick and efficient movement is required.***

Keywords: Electric Inline Skaters, Arduino Uno, PWM Control, DC Motor, Motor Driver, Speed Control.

I. INTRODUCTION

With the growing need for quick and convenient transportation, especially in campuses, compact mobility solutions are becoming important. Traditional inline skates require continuous physical effort, making them less suitable for regular use. To overcome this, electric inline skates use motor assistance to reduce effort and improve efficiency. By combining simple electronic control with mechanical transmission, the system provides smoother and more convenient movement for everyday use.

II. SYSTEM OVERVIEW

Electric inline skaters are an upgraded version of normal skating shoes where a motor is used to assist movement. and uneven terrains within a campus environment. These types of skaters are part of modern personal mobility solutions, which are becoming popular for short-distance travel.

A. Control Unit

The control unit uses an Arduino Uno to process input signals from the joystick and generate PWM signals for motor control. It acts as the central controller, coordinating the operation of all system components and ensuring smooth speed regulation.

B. Motor Driver and Actuation System

The actuation system consists of a BTS7960 motor driver and a high-torque DC motor. The motor driver receives PWM signals from the Arduino and supplies the required current to drive the motor. The motor provides the necessary motion for the system.

C. Transmission and Power System

The motion from the motor is transmitted to the wheel using a timing belt and pulley mechanism, which helps in reducing speed and increasing torque. A rechargeable battery supplies power to both the control and motor systems, ensuring stable and continuous operation.

III. WORKING PRINCIPLE

The system operates when power is supplied to all components, and the joystick provides input to control the speed. The Arduino Uno reads the joystick input and generates corresponding PWM signals, which are sent to the motor driver. Based on these signals, the motor driver controls the DC motor speed. The motor rotates and transmits motion to the wheel through a timing belt and pulley mechanism. The system continues to operate with varying speed based on user input, providing stable and controlled forward movement.

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IV. ADVANTAGES

The proposed system offers several advantages: Reduces physical effort by providing motor-assisted movement, allows smooth and controlled speed using a joystick, compact and portable design for easy use, suitable for short-distance personal mobility, and can be further improved for advanced features.

V. APPLICATIONS

short-distance personal mobility, reducing user effort during travel, and controlled movement in crowded areas, recreational and fitness purposes with assisted motion, experimental and research-based mobility platforms, and as a base model for developing advanced electric transportation systems with improved features.

VI. EXPERIMENTAL SETUP AND DISCUSSION

The experimental setup consists of the fully assembled motorized electric inline skating system integrated with all hardware components such as the Arduino Uno, BTS7960 motor driver, high-torque DC motor, joystick module, timing belt and pulley mechanism, and rechargeable battery unit. The system was tested under controlled conditions to evaluate its performance in terms of speed, stability, and load handling. The setup ensures proper alignment of mechanical components and stable power supply for smooth operation.

VII. FUTURE SCOPE

Future developments may include. enhancing the existing wireless control for better range, reliability, and response time.Additional safety features such as advanced braking systems, speed limiting, and better stability control can be incorporated to improve user safety.

VIII. CONCLUSION

The Electric Inline Skaters project presents a functional, compact, and portable solution for personal mobility. The system demonstrates the feasibility of combining mechanical, electrical, and software components into a lightweight and user-friendly personal transport device.

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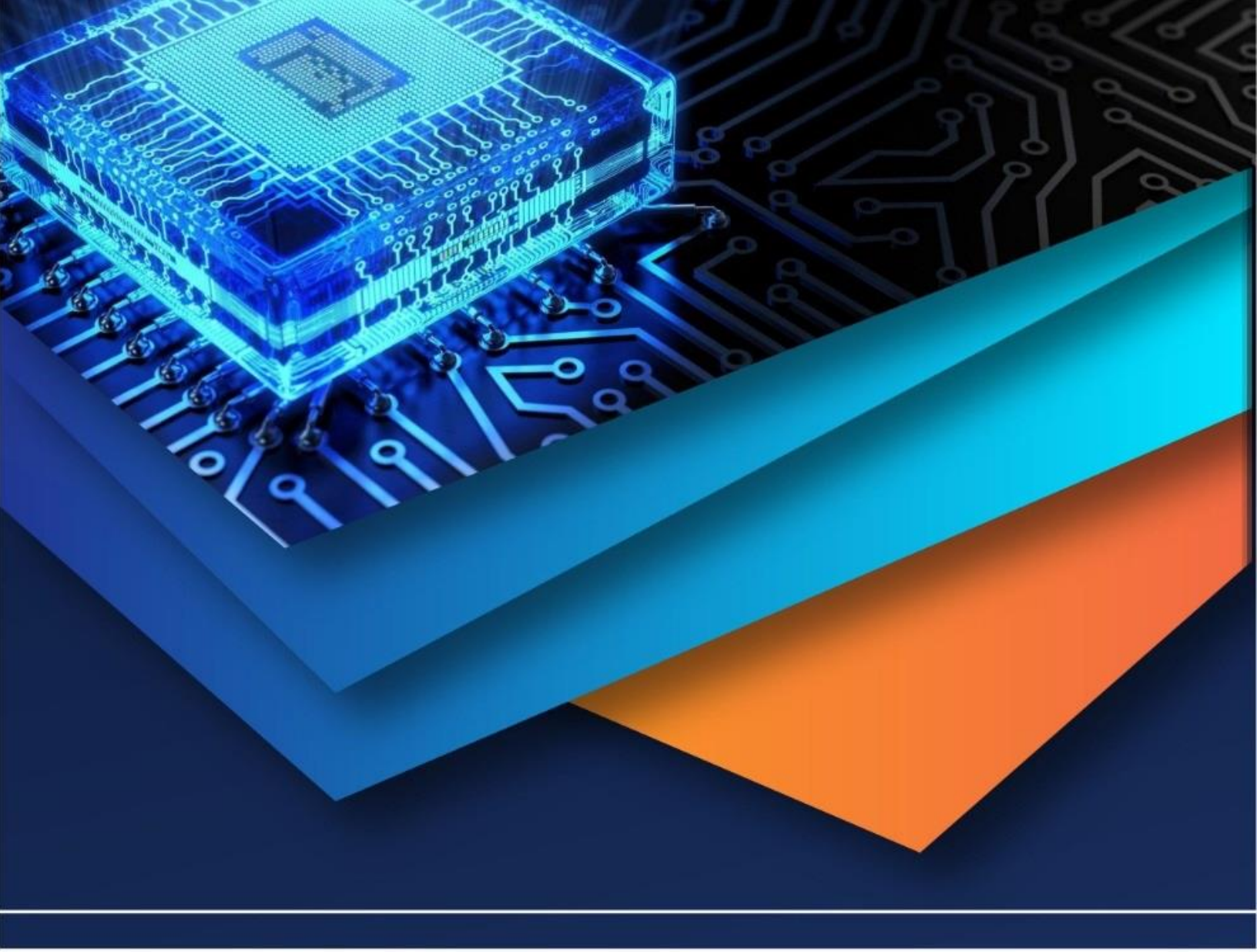

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