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Smart Automated Cricket Bowling System Using Motor Control and Sensors

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Abstract: Cricket training traditionally depends on manual bowling practice, which often lacks consistency and requires continuous human effort. To overcome these limitations, this research presents the design and implementation of a smart automated cricket bowling system that utilizes motor control techniques combined with sensor-based feedback mechanisms. The system is capable of delivering cricket balls at adjustable speeds and trajectories with improved accuracy and repeatability. A high-torque motor arrangement is used to propel the ball, while sensors are integrated to monitor ball presence, wheel rotation, and system safety conditions. A microcontroller coordinates the overall operation, enabling controlled ball release timing and speed regulation. The proposed solution provides a cost-effective and portable training platform suitable for beginners and intermediate players. Experimental evaluation demonstrates that the developed system offers reliable performance, reduced manual intervention, and consistent ball delivery compared to conventional practice methods.
Keywords: Cricket automation, Motor control, Embedded system, Sports engineering, Sensor integration.

I. INTRODUCTION

Technological advancements have significantly influenced sports training methodologies, allowing athletes to improve their skills through automated assistance systems. In cricket, bowling machines are widely used for practice sessions; however, commercial machines are often expensive and inaccessible for many institutions and individual learners. Additionally, manually operated training methods cannot ensure uniform ball speed and trajectory over repeated trials. The objective of this project is to develop an intelligent automated cricket bowling system that delivers balls with controlled velocity and direction using electronic motor control and sensing technologies. The system integrates mechanical components with embedded electronics to achieve accurate ball projection and automated operation. By implementing sensors and programmable control, the machine can maintain consistent performance and enhance training efficiency. The proposed system aims to provide an economical alternative to commercial machines while maintaining sufficient accuracy for skill development. It also introduces automation features such as ball detection and safety monitoring, which improve usability and reliability.

II. SYSTEM ARCHITECTURE

The automated bowling system consists of mechanical, electrical, and control subsystems working together to achieve desired performance. The main components include motors, sensors, a microcontroller unit, motor drivers, and a power supply unit.

A. Motor Control Mechanism

A pair of high-speed DC motors is used to rotate the bowling wheels, generating the required kinetic energy to project the cricket ball. The speed of the motors determines the ball velocity, which can be adjusted through pulse width modulation (PWM) control signals provided by the microcontroller. Motor drivers are incorporated to supply sufficient current and protect the control circuitry.

B. Sensor Integration

Sensors are employed to enhance system automation and safety. A ball detection sensor ensures that the machine activates only when a ball is properly positioned. A rotational feedback sensor monitors wheel speed, enabling consistent delivery. Additional safety sensors prevent operation when abnormal conditions are detected, such as obstruction or overload.

C. Control Unit

The microcontroller serves as the central processing unit of the system. It receives input signals from sensors, processes them according to programmed logic, and generates output signals to control motors and actuators. Timing control algorithms ensure accurate ball release intervals during operation.

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III. WORKING PRINCIPLE

The working process begins when a cricket ball is placed into the feeding mechanism. The detection sensor confirms ball presence and sends a signal to the controller. The microcontroller then activates the motor driver, causing the wheels to rotate at a predefined speed. Once the required rotational speed is achieved, the feeding mechanism releases the ball between the rotating wheels, propelling it forward toward the player. The system continuously monitors sensor feedback to maintain consistent operation. Speed variation can be adjusted through control inputs, allowing users to simulate different bowling conditions. Automated timing ensures that balls are delivered at controlled intervals without manual assistance.

IV. HARDWARE COMPONENTS

The primary hardware components used in the system include:

1) Microcontroller board for control logic
2) High-speed DC motors for ball propulsion
3) Motor driver module for power amplification
4) Infrared or proximity sensors for ball detection
5) Power supply unit with voltage regulation
6) Mechanical wheel assembly and frame structure

Each component is selected based on efficiency, cost, and availability to ensure practical implementation.

V. ADVANTAGES OF THE PROPOSED SYSTEM

The developed system offers several benefits:

1) Consistent ball speed and trajectory
2) Reduced dependency on human bowlers
3) Adjustable speed control for different training levels
4) Portable and economical design
5) Improved training efficiency and repeatability
6) Enhanced safety through sensor monitoring

VI. APPLICATIONS

The system can be utilized in multiple areas, including:

1) Cricket academies and sports training centers
2) Educational institutions for sports research
3) Personal practice sessions for players
4) Automated sports training equipment development

VII. RESULTS AND DISCUSSION

Experimental testing of the prototype demonstrated stable motor performance and accurate ball projection. The sensor-based detection mechanism successfully ensured proper ball feeding before activation. Speed control functionality allowed variation in ball velocity, enabling different training scenarios. The system showed reliable operation over repeated cycles, confirming its suitability for practical use.

Compared with manual bowling practice, the automated system provided improved consistency and reduced physical effort. The integration of electronics and mechanical design resulted in a functional training device with satisfactory performance.

VIII. CONCLUSION

This work presents the design and implementation of a smart automated cricket bowling system using motor control and sensors. The developed system successfully demonstrates automated ball delivery with adjustable speed and reliable operation. By combining embedded control techniques with mechanical design, the project achieves an affordable and efficient solution for cricket training applications. Future improvements may include advanced trajectory control, mobile application connectivity, and machine learning-based performance analysis.

IX. FUTURE SCOPE

The proposed smart automated cricket bowling system can be further enhanced by incorporating advanced technologies to improve performance and user experience. Future developments may include the integration of wireless communication modules such as Bluetooth or Wi-Fi to enable remote operation through mobile applications. Machine learning algorithms can also be implemented to analyze player performance and automatically adjust bowling parameters such as speed, angle, and frequency based on training requirements. Additionally, the system can be upgraded with multi-axis control mechanisms to simulate different bowling styles including spin, swing, and bounce variations. Battery optimization and lightweight materials may improve portability, making the device suitable for outdoor training environments. These advancements will transform the system into a more intelligent and adaptive sports training solution.

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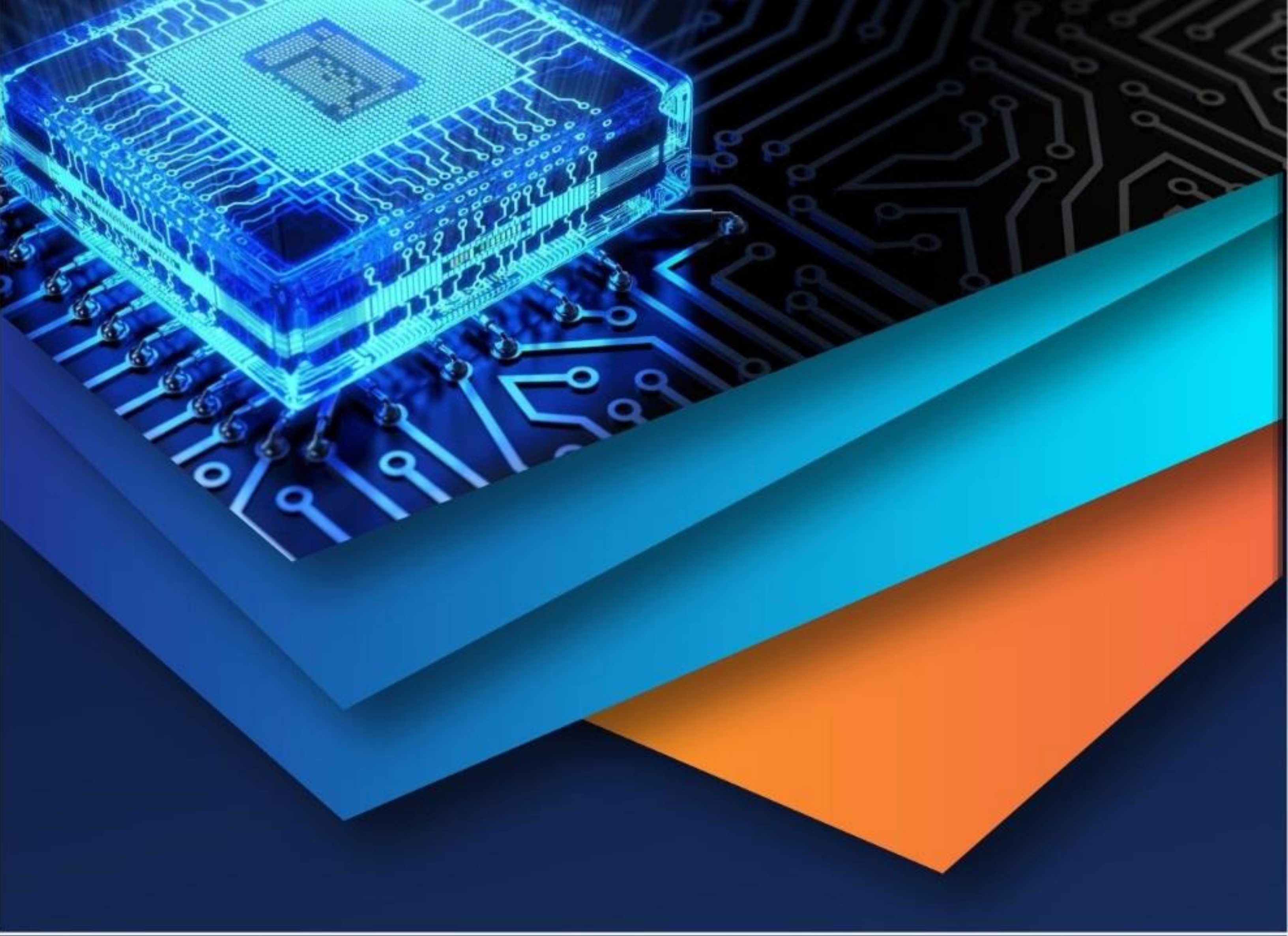
REFERENCES

[1] J. Smith, “Design of Automated Sports Training Systems,” Journal of Sports Engineering, vol. 10, no. 2, pp. 45–52, 2020.
[2] R. Kumar and P. Singh, “Motor Control Techniques in Embedded Applications,” International Journal of Electronics, vol. 8, no. 1, pp. 12–18, 2019.
[3] A. Brown, Embedded Systems Fundamentals, 2nd ed. New York: Tech Publications, 2018.
[4] Microcontroller Datasheet Manual, Manufacturer Documentation, 2022.



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