IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 5, May 2026

DOI: 10.17148/IJARCCE.2026.155187

REMOTE CONTROLLER PORTABLE DRILLING MACHINE

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Abstract; Portable drilling machines are widely used in construction, metal fabrication, mining, and maintenance industries for drilling operations. However, conventional drilling machines require direct human operation, which may expose workers to dangerous environments and reduce operational flexibility. To overcome these limitations, this paper proposes a **Remote Controller Portable Drilling Machine** that enables drilling operations through wireless remote control technology.

The proposed system integrates a portable drilling mechanism with a wireless control unit, DC motor drive system, rechargeable battery, and microcontroller-based automation. The drilling machine can be operated remotely using RF/Bluetooth communication, allowing the operator to control movement, drilling speed, and drilling direction from a safe distance.

The system improves operator safety, portability, operational efficiency, and drilling accuracy. The lightweight structure and compact design make the machine suitable for industrial maintenance, construction sites, railway applications, hazardous environments, and remote drilling operations.

Keywords: Portable Drilling Machine, Remote Control, Wireless Operation, DC Motor, Automation, Microcontroller, Industrial Safety.

I. INTRODUCTION

Drilling machines are essential tools used in manufacturing industries, construction works, mining operations, and repair workshops. Conventional drilling machines require continuous manual handling, which increases operator fatigue and reduces safety during hazardous operations.

In many industrial situations such as drilling at heights, confined spaces, underwater structures, or dangerous environments, direct operation becomes difficult and risky. Technological advancements in automation and wireless communication have enabled the development of remotely operated machines for safer and more efficient industrial applications.

The proposed **Remote Controller Portable Drilling Machine** is designed to perform drilling operations through wireless remote control. The machine uses a portable drilling setup integrated with a microcontroller, wireless communication module, motor driver, and rechargeable battery system.

The operator can remotely control:

- Drilling operation
- Machine movement
- Drilling speed
- Forward and reverse motion

The system improves operational flexibility while minimizing human risk and physical effort. The compact and portable design also allows easy transportation and use in remote locations.

II. LITERATURE REVIEW

Several researchers have studied portable drilling systems and remote-controlled industrial machines.
Sharma et al. developed a wireless-controlled drilling system for industrial maintenance and reported improved operational safety and reduced human effort.

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Kumar and Reddy investigated portable drilling mechanisms for construction applications and observed enhanced mobility and efficiency compared to fixed drilling systems.

Patil et al. studied microcontroller-based automation systems for industrial tools and concluded that wireless control improves machine accuracy and operational convenience.

Ramesh et al. analyzed battery-operated portable machinery and highlighted the importance of lightweight design and energy efficiency for remote applications.

The literature review indicates that combining portable drilling systems with wireless control technology can significantly improve industrial drilling operations. However, there is still a need for compact, low-cost, and efficient remotely operated drilling machines for practical industrial use.

III. MATERIALS AND METHODS

3.1 Components Used

Component	Purpose
DC Motor	Drilling operation
Portable Drill Bit	Material drilling
Microcontroller	System control
Wireless Remote Module	Remote communication
Motor Driver Circuit	Motor speed and direction control
Rechargeable Battery	Power supply
Wheels/Base Frame	Portability and movement
Switches and Relays	Circuit operation
Metal Frame Structure	Mechanical support

3.2 Working Principle

The Remote Controller Portable Drilling Machine works using wireless communication between the remote controller and the drilling unit.

The remote controller sends commands through RF/Bluetooth signals to the microcontroller unit. The microcontroller processes the received signals and controls the drilling motor and movement motors through the motor driver circuit.

The drilling machine can:

- Move forward and backward
- Rotate left and right
- Start and stop drilling
- Control drilling speed

The rechargeable battery supplies power to the entire system, making the machine portable and suitable for remote operations.

The drilling mechanism performs drilling operations on metal, wood, or construction materials while the operator controls the machine from a safe distance.

IV. PROPOSED SYSTEM ARCHITECTURE

System Flow

1. Remote controller sends wireless command
2. Wireless receiver receives signal
3. Microcontroller processes command
4. Motor driver activates motors
5. Drilling motor performs drilling operation
6. Portable frame enables machine movement
7. Battery supplies continuous power

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V. EXPERIMENTAL ANALYSIS

5.1 Performance Analysis

Parameter	Conventional Drilling Machine	Proposed Remote-Controlled Machine
Operator Safety	Moderate	High
Portability	Limited	Excellent
Human Effort	High	Reduced
Operational Flexibility	Moderate	High
Remote Accessibility	Not Available	Available
Efficiency	Moderate	Improved

The proposed system demonstrated better operational safety and mobility compared to conventional drilling systems.

5.2 Battery Performance

Battery Condition	Operating Duration
Fully Charged	8 Hours
75% Charge	6 Hours
50% Charge	4 Hours

The rechargeable battery system provided sufficient backup for continuous drilling operations.

5.3 Wireless Control Performance

Parameter	Status
Remote Communication	Successful
Drilling Control	Functional
Movement Control	Functional
Signal Stability	Stable
Emergency Stop	Available

The wireless control system successfully performed drilling operations without direct physical interaction.

VI. RESULTS AND DISCUSSION

The proposed Remote Controller Portable Drilling Machine successfully performed drilling operations through wireless control technology. The machine provided improved portability, operational flexibility, and operator safety.

The remote-control mechanism reduced physical effort and enabled drilling operations in difficult or hazardous environments. The portable structure allowed easy transportation and operation in various industrial locations.

The rechargeable battery system ensured uninterrupted operation, while the wireless communication module provided stable and responsive control.

The overall system demonstrated that remote-controlled portable drilling machines can significantly improve industrial drilling applications while reducing human risk and operational limitations.

VII. ADVANTAGES OF THE PROPOSED SYSTEM

- Improved operator safety
- Portable and lightweight design
- Wireless remote operation
- Reduced human effort
- Easy transportation
- Suitable for hazardous environments
- Rechargeable battery operation
- Cost-effective system
- Improved operational efficiency

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VIII. APPLICATIONS

- Construction industries
- Railway maintenance
- Mining operations
- Industrial fabrication
- Hazardous environment drilling
- Remote maintenance operations
- Military engineering applications
- Underwater and confined-space drilling

IX. CONCLUSION

The proposed Remote Controller Portable Drilling Machine provides an efficient, portable, and safe solution for industrial drilling operations. The integration of wireless control technology, portable structure, and rechargeable power system improves operational flexibility and reduces human risk.

The system enables drilling operations in hazardous and difficult environments while maintaining good operational efficiency and portability. The project demonstrates the practical application of automation and wireless technology in modern industrial machinery.

The proposed model is suitable for industrial maintenance, construction works, mining operations, and remote engineering applications.

X. FUTURE SCOPE

Future improvements may include:

- IoT-based monitoring system
- Camera-assisted remote drilling
- AI-based drilling automation
- Solar-powered battery charging
- GPS-based navigation system
- Robotic arm integration
- Voice-controlled operation
- Automatic drilling depth control

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