# Title: Motion-Based Automatic Door Opener

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Proposed Topic:

- Motion-Based Automatic Door Opener

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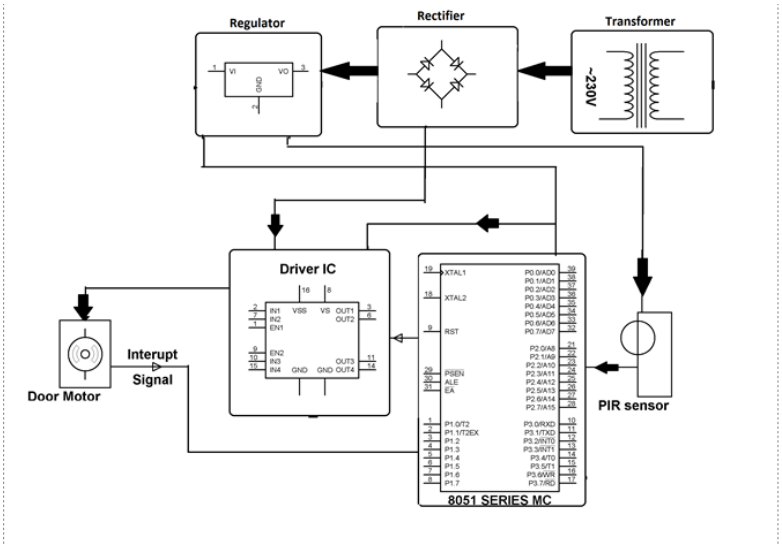
# Synopsis:

## 1. Introduction:

The project aims to develop a motion-based automatic door opener system, utilizing sensor technology to detect human movement and trigger the door-opening mechanism. The system is designed to enhance accessibility and convenience in various environments, such as homes, offices, and public spaces.




## 2. Objectives:

- Implement a motion detection system for recognizing human presence.

- Develop a mechanism for automatic door opening and closing.
- Utilize sensors and microcontrollers for efficient and reliable operation.
- Enhance accessibility for individuals with mobility challenges.

**3. Technology Integration:**

The project incorporates passive infrared (PIR) sensors or ultrasonic sensors to detect motion. An Arduino microcontroller is employed to process sensor inputs and control the door-opening mechanism. The system ensures smooth and timely door operation, improving user experience and optimizing energy efficiency.

**4. Literature Review:**

Motion-Based Automatic Door Opener

The development of motion-based automatic door openers has gained significant attention in recent years, driven by the need for enhanced accessibility, convenience, and energy efficiency in various environments. This literature review explores key studies and technologies related to motion detection systems and automatic door opening mechanisms.

Sensor Technologies:

- Passive Infrared (PIR) Sensors: PIR sensors are widely used in motion-based systems due to their simplicity and cost-effectiveness. They detect changes in infrared radiation within their field of view, making them suitable for applications where human presence needs to be recognized.
- Ultrasonic Sensors: Ultrasonic sensors utilize sound waves to detect motion. They emit ultrasonic pulses and measure the time taken for the waves to bounce back. While effective, they may be influenced by environmental factors such as temperature and humidity.
- Computer Vision: Advanced computer vision systems, often using cameras and image processing algorithms, have been explored for motion detection. These systems offer high precision but may be costlier and computationally intensive.

Control Mechanisms:

- Microcontrollers (e.g., Arduino): Microcontrollers play a crucial role in processing sensor inputs and controlling the door-opening mechanism. Arduino, with its open-source nature and ease of programming, has become a popular choice for integrating sensor technologies into automation projects.
- Machine Learning Algorithms: Some studies have explored the use of machine learning algorithms to improve the accuracy of motion detection. These algorithms can adapt to changing environments and recognize specific patterns associated with human presence.

Applications and Use Cases:

- Residential Spaces: Motion-based automatic door openers find applications in homes, providing convenience and accessibility, especially for individuals with disabilities or limited mobility.
- Commercial and Public Spaces: In commercial and public settings, these systems contribute to energy efficiency by reducing the unnecessary opening of doors when not in use. They also enhance accessibility in high-traffic areas.

Challenges and Considerations:

- False Positives and Negatives: Achieving a balance between sensitivity and specificity is critical to minimize false positives (unintended door openings) and false negatives (missed detections).
- Power Consumption: Optimizing the power consumption of the system is essential, especially in applications where energy efficiency is a priority.
- Security Concerns: Ensuring the security of the system to prevent unauthorized access or tampering is a key consideration in the design and implementation of motion-based door openers.

Future Directions:

- As technology continues to advance, integrating more sophisticated sensor technologies and exploring the potential of edge computing and IoT connectivity could further enhance the capabilities of motion-based automatic door openers

**5. Methodology/Planning of Work:**

Outline the step-by-step process for project development, including the integration of sensors, programming of the microcontroller, and interfacing with the door-opening mechanism. Specify the hardware components and software tools required, emphasizing their roles in achieving the project objectives.

Facilities Required:

- PIR sensors or ultrasonic sensors
- Arduino microcontroller and programming tools
- Door-opening mechanism (motorized or servo-driven)
- Power supply components
- Door for testing and experimentation

Expected Outcomes:

The project aims to demonstrate a functional motion-based automatic door opener system that effectively detects human presence and opens the door accordingly. The outcome includes a

prototype showcasing the feasibility and practicality of the proposed technology for improving accessibility in diverse settings.

Sign of students;

Date:

Sign of mentor;

Date: