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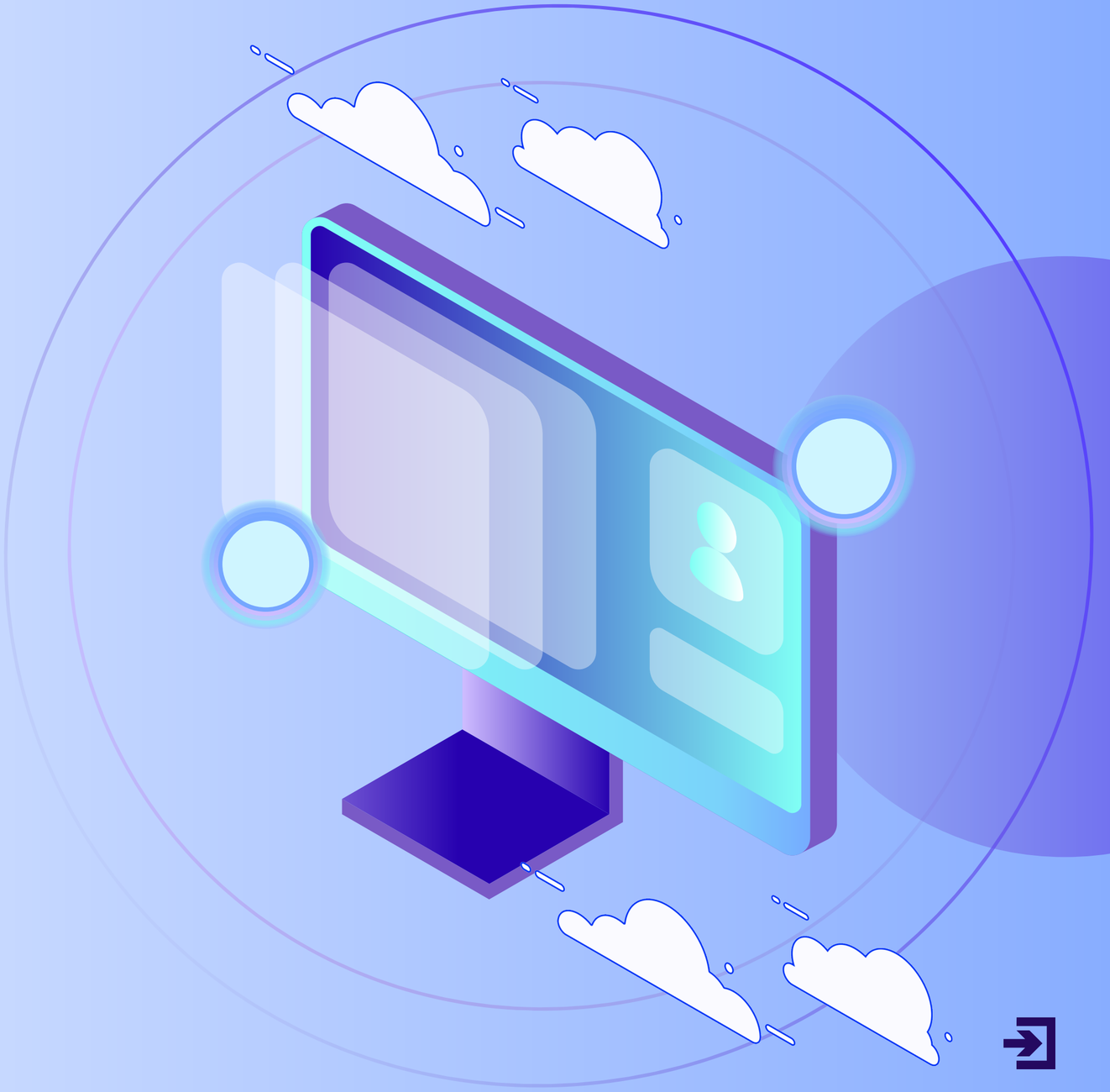
SMART OFFICE AUTOMATION

& ENERGY MANAGEMENT

Optimizing Energy Usage with
Motion Detection & Automated Control

Presented by: EcoTech Innovators



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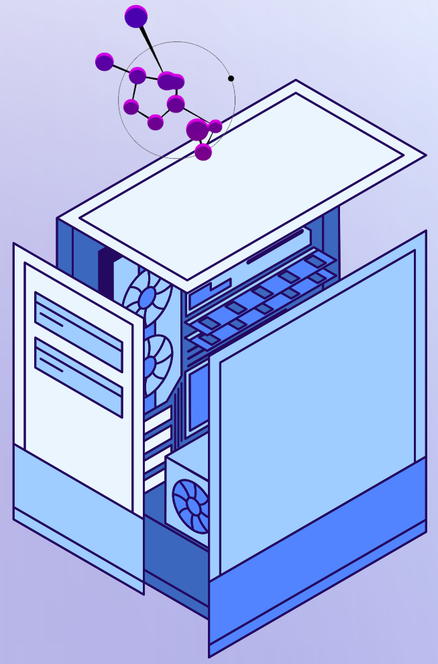
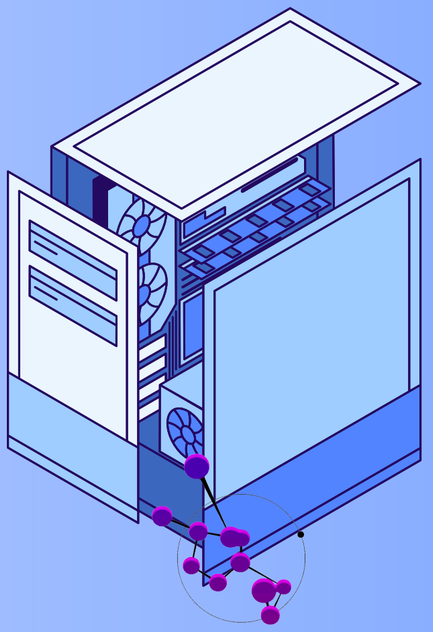
WHAT IS SMART OFFICE AUTOMATION?





Smart office automation optimizes energy consumption by automatically controlling lights and appliances based on motion detection.

Importance...

Reduces energy wastage
Enhances efficiency & sustainability
Provides a hands-free experience

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PROBLEM STATEMENT

Problem:

- Offices often waste electricity due to lights and fans being left ON when no one is present.
- Manual control leads to inconvenience & inefficiency.

Solution:

- An automated system that turns devices ON when motion is detected and OFF when no motion is detected.

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HOW IT WORKS

Key Components:

Motion Detection using OpenCV

Energy Logging & Data Analysis (CSV & Pandas)

Automated Device Control (Tkinter GUI)

Working Mechanism:

Detects any movement (hands, objects, body, etc.)

If movement is detected, lights & fans turn ON

If no movement for 5 seconds, devices turn OFF

Logs all activities for data analysis

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SYSTEM ARCHITECTURE

Technology Stack:

- Python (Core Programming)
- OpenCV (Motion Detection)
- Flask (Dashboard & Web Interface)
- Tkinter (GUI for Manual Control)
- Pandas & Matplotlib (Data Logging & Visualization)

Flow Diagram:

Camera detects movement
Motion triggers device control
Data gets logged for analysis
Dashboard visualizes energy usage

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FEATURES & FUNCTIONALITIES

Motion-Based Automation

- Highly Sensitive Motion Detection
- Face recognition removed (detects hand & object movement)

Energy Consumption Tracking

- Logs each activity in CSV file
- Dashboard visualizes energy usage trends

Fully Automated Control

- Turns ON instantly when movement is detected
- Turns OFF after 5 seconds of no motion

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REAL-WORLD APPLICATIONS

Where can it be used?

- ✓ Smart Offices & Workspaces
- ✓ Conference Halls & Meeting Rooms
- ✓ Homes & Smart Buildings
- ✓ Classrooms & Educational Institutions

Environmental Benefits:

- ✅ Saves Energy → Reduces electricity bills
- ✅ Eco-Friendly → Supports sustainable living

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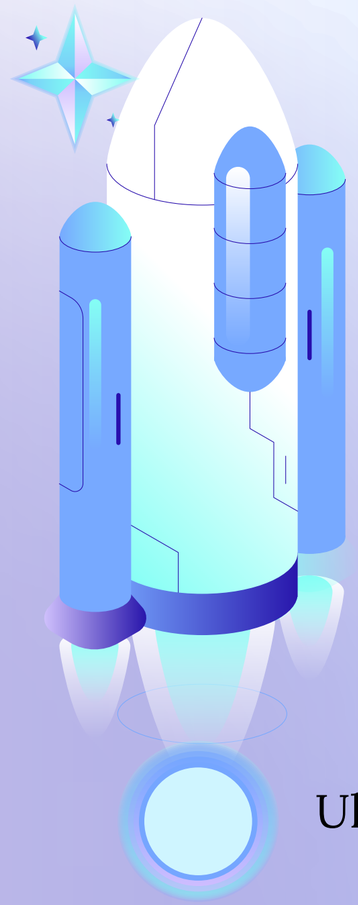
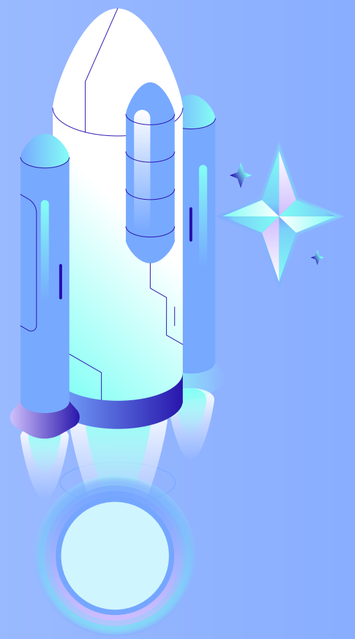
CHALLENGES & FUTURE IMPROVEMENTS





Current Challenges

Limited Hardware Support: Currently works with basic electrical appliances, requires integration with smart home devices.

Data Accuracy: Motion logs may need optimization for real-time tracking and analysis.

Future Enhancements

PIR Sensor – Detects motion based on body heat to trigger automation.

Ultrasonic Sensor – Measures distance and detects movement of non-living objects.

Mobile App & Cloud Connectivity – Enables remote monitoring and control.

Energy Consumption Analytics – Tracks and optimizes electricity usage.

AI & Machine Learning Integration – Predicts occupancy and automates device control.

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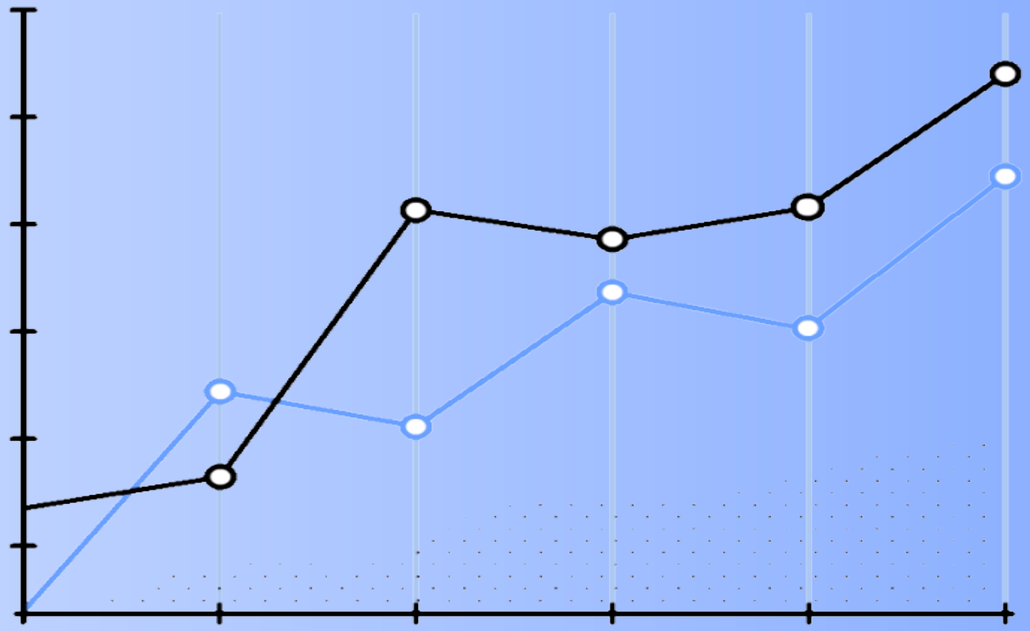
CONCLUSION & Q&A



Key Takeaways:

Smart Automation enhances efficiency & sustainability

Motion-Based Control eliminates manual switching

Energy Dashboard helps track usage & optimize power

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EcoTech Innovators

THANK YOU!

"We appreciate your time and attention! Smart Office Automation is just the beginning of a more efficient and sustainable future. Let's innovate together!"