

**Industrial Internship Report on****" Automatic door opening system"****Prepared by****Abin Shinson*****Executive Summary***

This report provides details of the Industrial Internship provided by upskill Campus and The IoT Academy in collaboration with Industrial Partner UniConverge Technologies Pvt Ltd (UCT).

This internship was focused on a project/problem statement provided by UCT. We had to finish the project including the report in 6 weeks' time.

My project was to develop an **Automatic Door System** that opens and closes the door without physical contact, enhancing convenience and hygiene

This internship gave me a very good opportunity to get exposure to Industrial problems and design/implement solution for that. It was an overall great experience to have this internship.



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1 Preface

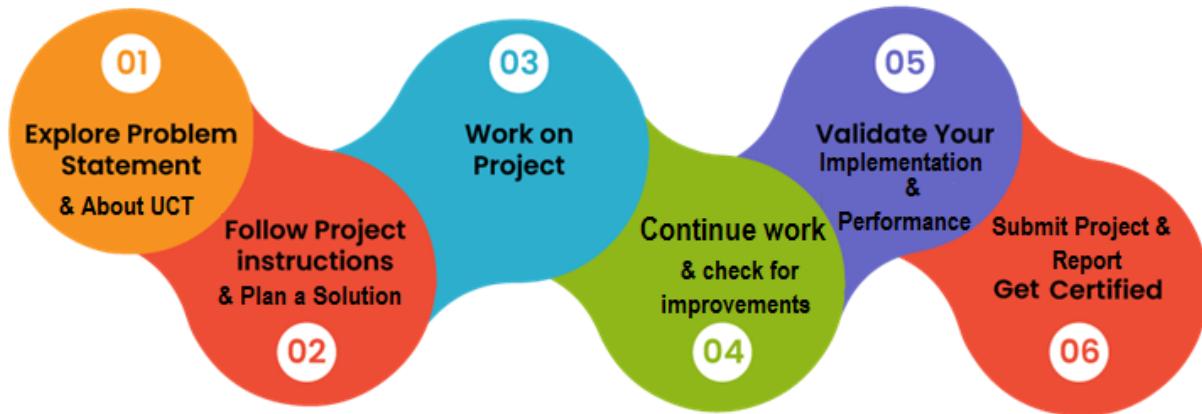
Summary of the whole 6 weeks' work.

About need of relevant Internship in career development.

My project is an Automatic Door System which opens and closes a door automatically without any physical touch. This system is particularly appropriate for public areas like hospitals, offices, malls, and smart homes, where hygiene and convenience matter. The issue it addresses is manually opening doors, which can cause germs to spread or be challenging for elderly or disabled people. The device operates through the use of a sensor, such as an ultrasonic or PIR (Passive Infrared) sensor, that recognizes when a user is approaching the door. Upon detecting movement, the door opens automatically through a motor or servo action and then closes after a brief waiting period. This ensures the whole process is smooth, safe, and contact-free. It also assists with energy efficiency by preventing the door from being left open unnecessarily. The project not only enhances daily life but also encourages intelligent automation in buildings, which aligns with contemporary IoT and smart home trends.

Opportunity given by USC/UCT.

How Program was planned



From this project, I acquired knowledge of how to use sensors and automation systems. I acquired practical experience in the use of elements such as PIR/ultrasonic sensors, microcontrollers (such as Arduino), and servo motors to construct a workable system. I also enhanced my knowledge in basic electronics, circuit configuration, and programming. Thanks to all (with names), who have helped you directly or indirectly.

I would like to encourage all my peers and juniors to participate actively in practical projects, regardless of how basic they might appear at the beginning. Projects such as the Automatic Door System might



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seem simple, but they teach you a lot regarding real-world problem-solving, hardware components, and coding logic.



2 Introduction

2.1 About UniConverge Technologies Pvt Ltd

A company established in 2013 and working in Digital Transformation domain and providing Industrial solutions with prime focus on sustainability and RoI.

For developing its products and solutions it is leveraging various **Cutting Edge Technologies e.g. Internet of Things (IoT), Cyber Security, Cloud computing (AWS, Azure), Machine Learning, Communication Technologies (4G/5G/LoRaWAN), Java Full Stack, Python, Front end etc.**

Uniconverge Technologies

IIOT Products

We offer product ranging from Remote IOs, Wireless IOs, LoRaWAN Sensor Nodes/ Gateways, Signal converter and IoT gateways

IIOT Solutions

We offer solutions like OEE, Predictive Maintenance, LoRaWAN based Remote Monitoring, IoT Platform, Business Intelligence...

OEM Services

We offer solutions ranging from product design to final production we handle everything for you..

i. UCT IoT Platform ([uct Insight](#))

UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable “insight” for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- It enables device connectivity via industry standard IoT protocols - MQTT, CoAP, HTTP, Modbus TCP, OPC UA
- It supports both cloud and on-premises deployments.



It has features to

- Build Your own dashboard
- Analytics and Reporting
- Alert and Notification
- Integration with third party application(Power BI, SAP, ERP)
- Rule Engine

State Chart:

Series	Value
Series 1	100
Series 2	100

Radar - Chart.js

Dimension	Value
Function	80
Quality	70
Price	90
Delivery	85

Pie - Plot:

Category	Percentage
First	30%
Second	30%
Third	20%
Fourth	20%

Timeseries (Bars - Plot)

Time	First	Second
T1	100	50
T2	150	100
T3	200	150
T4	180	120
T5	220	180

Polar Area - Chart.js

Category	Value
First	100
Second	120
Third	110
Fourth	130

Doughnut - Chart.js

Category	Percentage
First	30%
Second	20%
Third	20%
Fourth	30%

Timeseries - Echart

Time	First	Second
T1	100	50
T2	150	100
T3	200	150
T4	180	120
T5	220	180

Pie - Chart.js

Category	Percentage
First	30%
Second	30%
Third	20%
Fourth	20%

Bars - Chart.js

Category	Value
First	100
Second	120
Third	110
Fourth	130

Home

- Rule chains**
- Customers
- Assets
- Devices
- Profiles
- OTA updates
- Entity Views
- Edge instances
- Edge management
- Widgets Library
- Dashboards
- Version control
- Audit Logs
- Api Usage
- System Settings

Search nodes

Filter

```

graph LR
    Input[Input] --> MTW((Message Type Switch))
    MTW -- Success --> DPN[Device Profile Node]
    DPN --> PA[Post attributes]
    DPN --> PT[Post telemetry]
    PA --> RRFD[RPC Request from Device]
    PT --> RRFD
    RRFD --> ORP[RPC Request to Device]
    ORP --> LOGRPC[log RPC from Device]
    ORP --> LOGO[log Other]
    LOGRPC --> RCR[RPC Call Request]
    LOGO --> RCR
  
```



FACTORY

ii. Smart Factory Platform (FACTORY WATCH)

Factory watch is a platform for smart factory needs.

It provides Users/ Factory

- with a scalable solution for their Production and asset monitoring
- OEE and predictive maintenance solution scaling up to digital twin for your assets.
- to unleashed the true potential of the data that their machines are generating and helps to identify the KPIs and also improve them.
- A modular architecture that allows users to choose the service that they what to start and then can scale to more complex solutions as per their demands.

Its unique SaaS model helps users to save time, cost and money.



Machine	Operator	Work Order ID	Job ID	Job Performance	Job Progress		Output		Rejection	Time (mins)				Job Status	End Customer
					Start Time	End Time	Planned	Actual		Setup	Pred	Downtime	Idle		
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i
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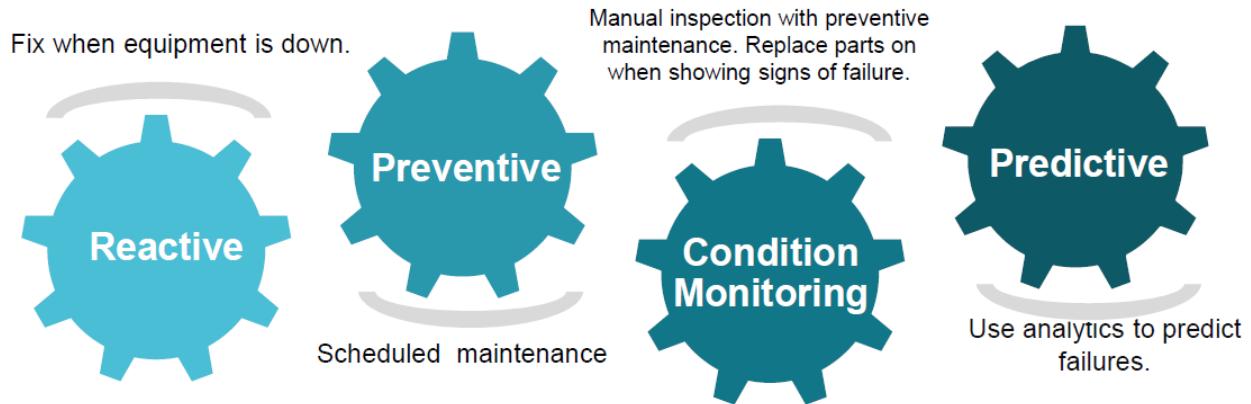


iii. LoRaWAN™ based Solution

UCT is one of the early adopters of LoRAWAN technology and providing solution in Agritech, Smart cities, Industrial Monitoring, Smart Street Light, Smart Water/ Gas/ Electricity metering solutions etc.

iv. Predictive Maintenance

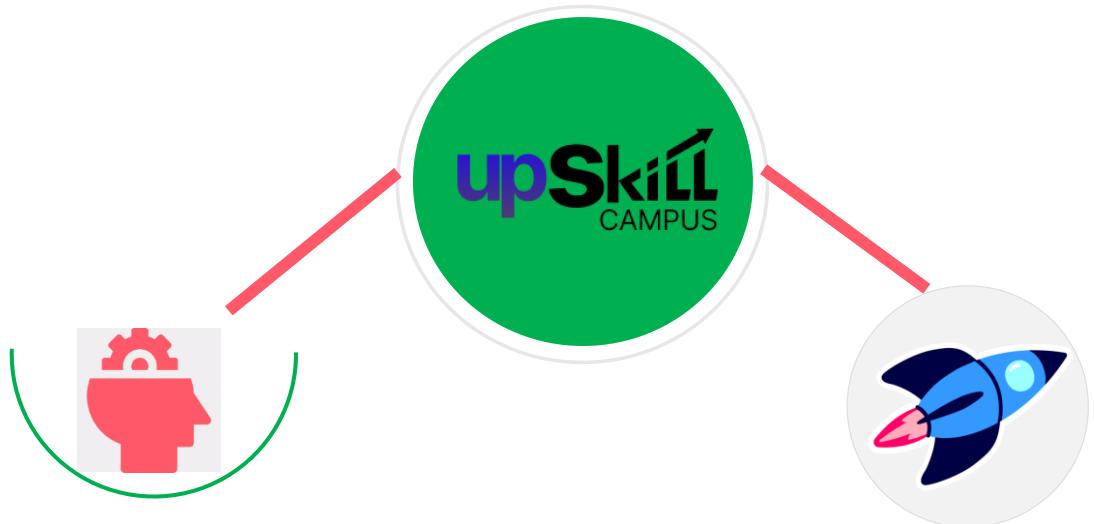
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



2.2 About upskill Campus (USC)

upskill Campus along with The IoT Academy and in association with Uniconverge technologies has facilitated the smooth execution of the complete internship process.

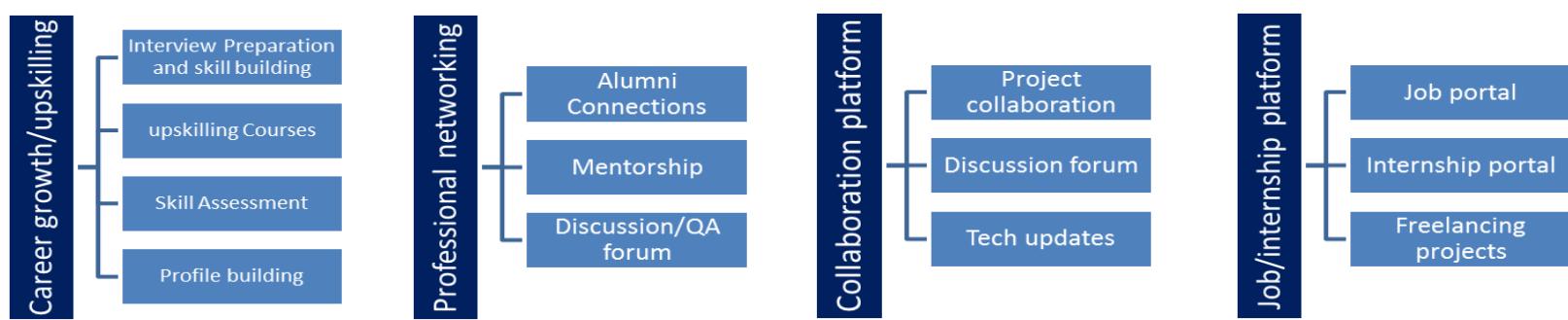
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.



Seeing need of upskilling in self paced manner along-with additional support services e.g. Internship, projects, interaction with Industry experts, Career growth Services

upSkill Campus aiming to upskill 1 million learners in next 5 year

<https://www.upskillcampus.com/>





2.3 The IoT Academy

The IoT academy is EdTech Division of UCT that is running long executive certification programs in collaboration with EICT Academy, IITK, IITR and IITG in multiple domains.

2.4 Objectives of this Internship program

The objective for this internship program was to

- ☛ get practical experience of working in the industry.
- ☛ to solve real world problems.
- ☛ to have improved job prospects.
- ☛ to have Improved understanding of our field and its applications.
- ☛ to have Personal growth like better communication and problem solving.

2.5 Reference

[1] Books

[2] Technical Documentation

[3] YouTube Tutorials / Blogs

2.6 Glossary

Terms	Acronym
1.Automation	The use of technology to perform tasks with minimal human input.
2.Contactless Operation	Functionality does not require physical touch to activate a system.



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3. Circuit	A closed loop of electrical components through which current flows.



3 Problem Statement

In the assigned problem statement

In most public and private environments, individuals must still manually open and close doors, which may be inconvenient, unhygienic, and challenging for those with disabilities or when holding something. Particularly in settings such as hospitals, offices, or residential areas, manually touching door handles poses the risk of germ and infection spreading. The issue is that there is no cost-effective, touchless, and automatic system to efficiently operate doors. In order to address that, my project emphasizes the development of an Automatic Door System with sensors and microcontrollers to sense human presence and automatically open/close the door with zero physical contact. This system introduces a safer, more intelligent, and more convenient means of accessing spaces, enhancing hygiene and convenience through automation.



4 Existing and Proposed solution

Provide summary of existing solutions provided by others, what are their limitations?

My project focuses on creating a **cost-effective, easy-to-install, and customizable alternative** using simple sensors and microcontrollers. It is ideal for educational purposes, small setups, and smart home applications, making automation more accessible.

What is your proposed solution?

My solution is to create and construct a low-cost, contactless Automatic Door System with simple electronic components such as PIR or ultrasonic sensors, a microcontroller (e.g., Arduino), and a servo or DC motor.

What value addition are you planning?

1. Battery Backup – Including a basic power backup system so that the door can still function during power outages.

2. Obstacle Detection – Adding sensors to detect if there's any object or person in the path of the door while closing, to avoid accidents and improve safety.

4.1 Code submission (<https://github.com/Abin198/iot-project.git>)

4.2 Report submission (<https://github.com/Abin198/iot-project.git>)



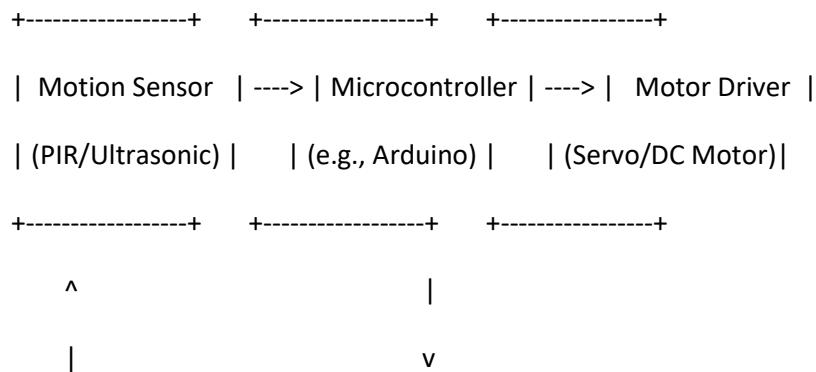
5 Proposed Design/ Model

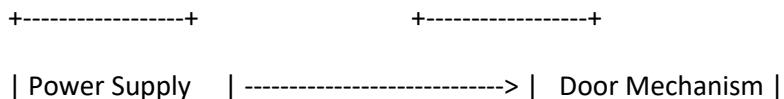
Given more details about design flow of your solution. This is applicable for all domains. DS/ML Students can cover it after they have their algorithm implementation. There is always a start, intermediate stages and then final outcome.

5.1 High Level Diagram (not applicable)

5.2 Low Level Diagram (not applicable)

5.3 Interfaces (if applicable)

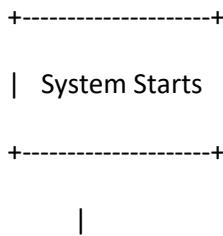


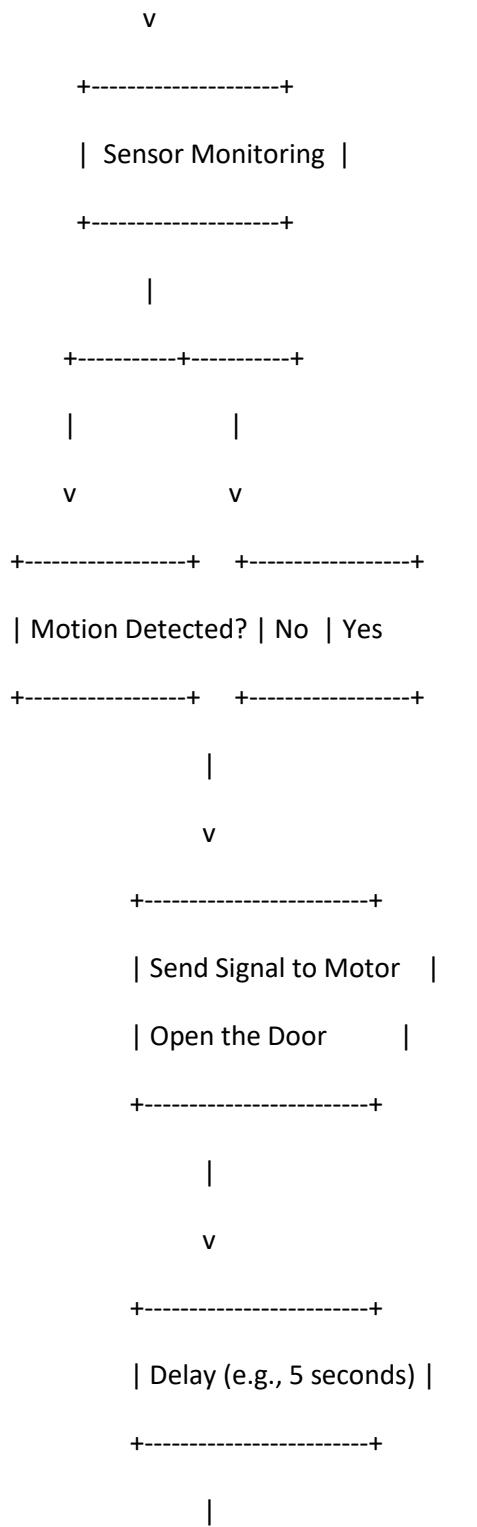
**DATA FLOW**

1. **Sensor detects motion**
2. Sensor sends **HIGH signal** to microcontroller
3. Microcontroller processes signal using logic in code
4. If motion is detected:
 - Send signal to **motor driver**
 - Door opens
 - Waits a few seconds
 - Sends signal again to close the door

Memory Buffer Management

1. Motor Control Buffer: PWM values or signal instructions are briefly held in memory before execution
2. Optional Serial Buffer: If using UART, Arduino uses a 64-byte serial buffer for communication/logs

FLOWCHART





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v

+-----+

| Send Signal to Motor |

| Close the Door |

+-----+

|

v

+-----+

| Return to Idle State |

+-----+



6 Performance Test

How were those constraints taken care in your design?

1. Cost Constraint:

- I used **low-cost components** such as an Arduino Uno, PIR sensor, and servo motor, which are affordable and easily available.

2. Power Efficiency:

- The system is designed to operate **only when motion is detected**, which saves energy.

3. Space and Installation Limitations:

- I used **compact sensors** and components to keep the system small and easy to mount on existing doors.

What were test results around those constraints?

1. Cost Constraint

- **Impact:** High-cost components could make the project inaccessible for home or educational use.
- **Solution:** Used low-cost components like an **Arduino Uno**, **PIR sensor**, and a **servo motor**.
- **Recommendation:** For larger or long-term applications, consider using **custom PCBs** or **ESP8266** boards for added connectivity and lower recurring costs.

2. Power Constraint

- **Impact:** Continuous power usage may drain energy quickly, especially in battery-powered setups.
 - **Solution:** System activates **only when motion is detected**, saving power.
 - **Recommendation:** Add **sleep modes** for sensors/microcontroller and use **solar or rechargeable batteries** to improve sustainability.
-



- **3.Space Constraint**
 - **Impact:** Bulky components may not fit or be practical on narrow door frames.
 - **Solution:** Chose **compact sensors and a lightweight motor**, which are easy to mount.
 - **Recommendation:** Use **3D-printed or custom enclosures** to reduce space usage and improve durability.
-

- **4. Response Time & Sensor Accuracy**
 - **Impact:** Slow or inaccurate response can result in delayed door opening or false triggers.
 - **Solution:** Used **high-sensitivity sensors** and tested optimal placement for quick response.
 - **Recommendation:** For high-traffic areas, use **dual sensor setups** (entry/exit) and **threshold filtering** in code to reduce false positives.
-

- **5. Safety & Reliability**
- **Impact:** Door closing while someone is still in the way can cause accidents.
- **Solution:** Added **delay before closing** and considered adding obstacle detection.
- **Recommendation:** Use **IR or ultrasonic range sensors** to confirm the path is clear before closing. Consider **manual override or emergency stop** buttons.

6.1 Test Plan/ Test Cases

The goal of the test plan is to verify that the Automatic Door System operates as expected under different conditions. The plan consists of discrete tests for sensors, controller logic, motor operation, and overall system integration.

6.2 Test Procedure

1.Sensor Detection Test



- 2.Motor Response Test
- 3.Delay Timing Test
- 4.Power Test**
- 5.Overall Functionality Test

6.3 Performance Outcome

1.Accurate Motion Detection:

The PIR/ultrasonic sensor accurately detects the presence of humans in the specified range and triggers the door mechanism instantaneously.

2.Smooth Door Operation:

The door smoothly opens and closes with the servo or DC motor, maintaining a predictable response time and little mechanical delay.



7 My learnings

1.Understanding of Sensors and Automation:

I understood how PIR/ultrasonic sensors function and are applied in motion detection in automation systems.

2.Hands-on with Microcontrollers:

I worked hands-on with Arduino (or Raspberry Pi), crafting code to read sensor input and drive outputs such as motors.

3.Circuit Design and Connections:

I studied how to design basic electronic circuits and wire up sensors, motors, and drivers to the microcontroller in a correct manner.



8 Future work scope

1. Obstacle Detection for Safety

Add IR or ultrasonic sensors to sense whether a person or object is in the path of the closing door. This would avert accidents and make it more reliable.

2. Smartphone or Remote App Control

Create an app on your smartphone via Bluetooth or Wi-Fi (using modules such as HC-05 or ESP8266) to open or close the door manually remotely and track its status.

3. Voice Assistant Integration

Interact with Google Assistant or Alexa to allow voice commands, making the device more accessible to the aged and differently abled.