Industrial Internship Report on

”Automatic Door Control System”

Prepared by

Akram Shaik

NRI INSTITUTE OF TECHNOLOGY

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.

This project automates the door opening and closing process using a PIR motion sensor and an Arduino Uno. The PIR sensor detects human motion and triggers a servo motor to open or close the door accordingly. It is a cost-effective and smart solution for contactless door automation in homes, offices, and institutions.

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.

The **Automatic Door Control System** is a smart embedded application designed to open and close a door **automatically** when it detects human motion. This system uses a **Passive Infrared (PIR) sensor** to detect motion and an **Arduino Uno** microcontroller to control a **servo motor**, which physically moves the door.

The main goal is to enable **contactless entry**, enhancing hygiene and convenience, especially in public places or post-pandemic environments where minimizing physical contact is essential.

TABLE OF CONENTS:

- **1. Preface**

This internship offered by Upskill Campus and The IoT Academy in collaboration with UCT provided practical exposure to real-world IoT projects. My project was to design and implement an Automatic Door Control System using PIR Sensor and Arduino. This report reflects the progress, implementation, testing, and learnings gathered throughout this project.

- **2. Introduction**

IoT-based automation systems have become increasingly vital in the modern world. This project focuses on automating door access using embedded sensors and microcontrollers, offering an affordable solution for smart access control.

- **2.1 About UniConverge Technologies Pvt Ltd**

UCT is a tech company focusing on digital transformation using IoT, AI, cloud, and cybersecurity. It develops platforms and solutions for smart industries and digital infrastructure.

- **2.2 About Upskill Campus**

Upskill Campus, along with The IoT Academy, offers industry-aligned internships and training programs that allow students to work on hands-on projects and gain technical skills through real-time exposure.

- **2.3 Objective**
- Develop an automated door control system
- Minimize human contact in public places
- Apply embedded systems and IoT concepts in real-world projects
- Improve documentation and GitHub practices
- **2.4 Reference**

[1 https://github.com/AkramShaik-67/automatic_door_control_arduino.git

- **2.5 Glossary**
- PIR – Passive Infrared Sensor
- Arduino – Open-source electronics platform
- IDE – Integrated Development Environment
- IoT – Internet of Things

- **3. Problem Statement**

Design and implement a low-cost automatic door control system using PIR sensor and Arduino Uno that enables contactless operation of a door to enhance hygiene and accessibility.

- **4. Existing and Proposed Solution**

Existing System: Involves manual door operation or costly automation systems.

Proposed System: A cost-effective, Arduino-based system using a PIR sensor to detect motion and control a servo motor for door movement.

- **5. Proposed Design / Model**

The system consists of a PIR motion sensor to detect human presence and a servo motor connected to an Arduino Uno board to operate the door.

- **5.1 High Level Diagram**

Motion Detected → Signal to Arduino → Servo Motor Activated → Door Opens → Delay → Door Closes

- **5.2 Low Level Diagram**

(Not included – circuit diagram can be added manually if available)

- **5.3 Interfaces**
- PIR Sensor Interface (Digital Input)
- Servo Motor Control (PWM Output)

- **6. Performance Test**
- **6.1 Test Plan / Test Cases**

Test Case	Input	Expected Output
1	Motion detected	Door opens
2	No motion	Door remains closed

- **6.2 Test Procedure**

1. Upload code to Arduino board.
2. Power the board and sensor.
3. Observe system response to motion.

- **6.3 Performance Outcome**

The door successfully opened when motion was detected and closed after a delay. System performed reliably in multiple test runs.

- **7. My Learnings**
- How to connect and test PIR sensors
- Writing and debugging Arduino code
- Designing small-scale IoT systems
- Using GitHub for code and report management

- **8. Future Work Scope**
- Integrate with mobile app for manual override
- Add cloud monitoring and alerts
- Implement access control using RFID or face recognition
- Improve design for industrial-scale use

1 Preface

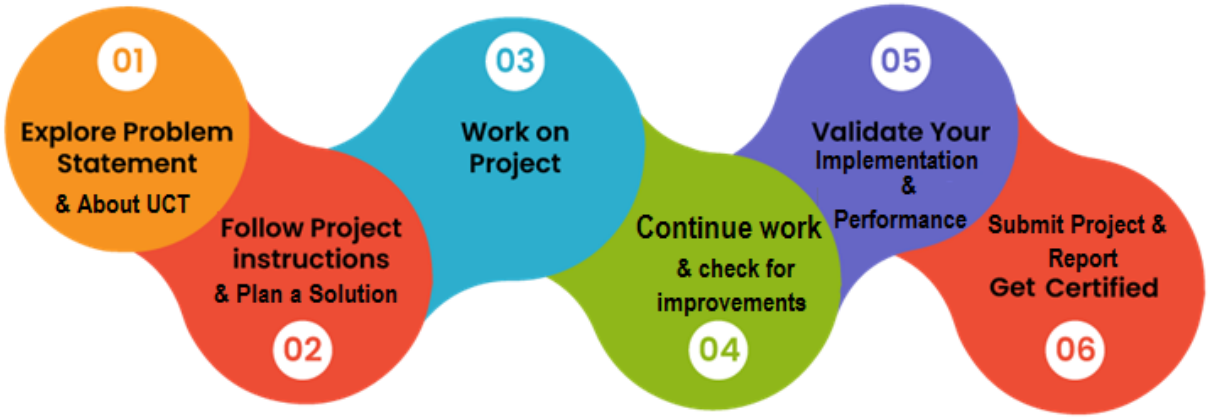
Summary of the whole 6 weeks' work.

About need of relevant Internship in career development.

Brief about Your project/problem statement.

Opportunity given by USC/UCT.

How Program was planned



Your Learnings and overall experience.

Thank to all (with names), who have helped you directly or indirectly.

Your message to your juniors and peers.

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.

i. UCT IoT Platform (UCT Insight)

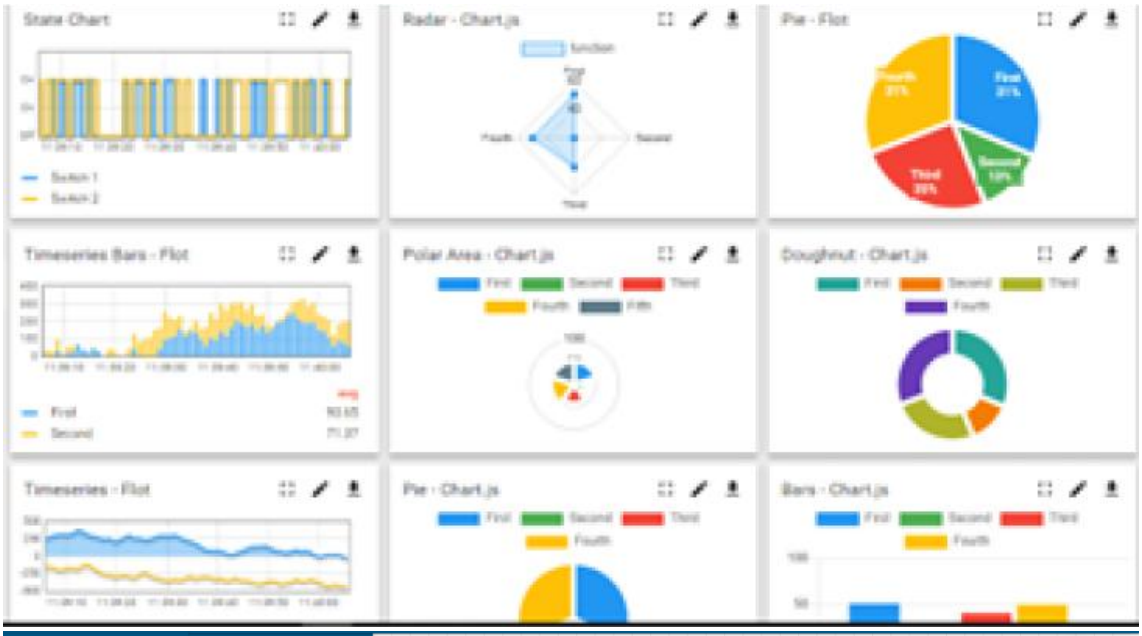
UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable "insight" for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

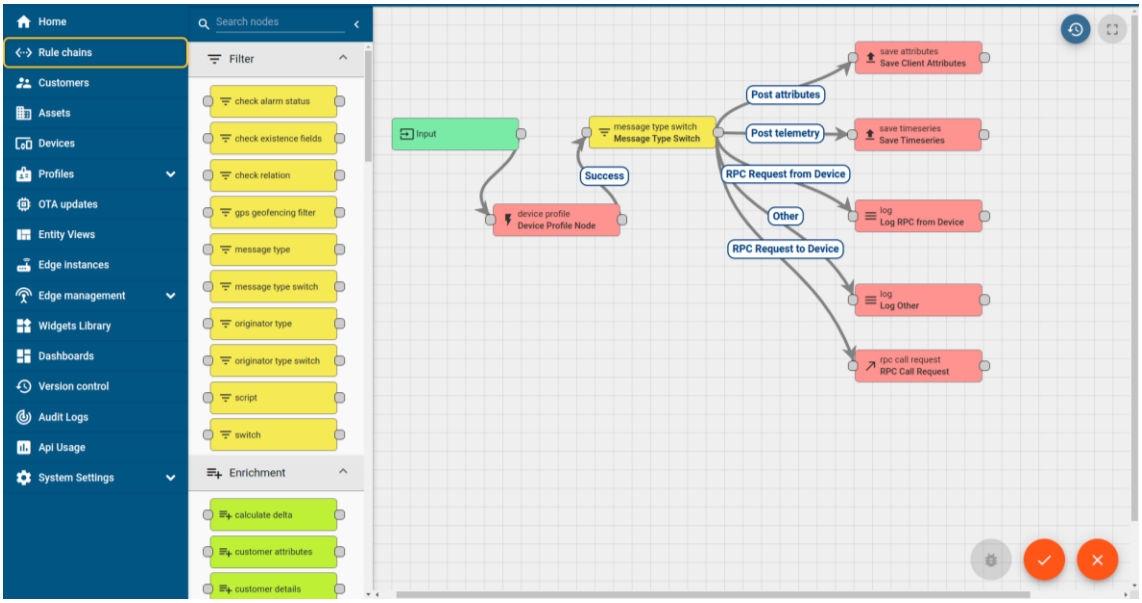
- It enables device connectivity via industry standard IoT protocols - MQTT, CoAP, HTTP, Modbus TCP, OPC UA

- 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





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 unleased 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.

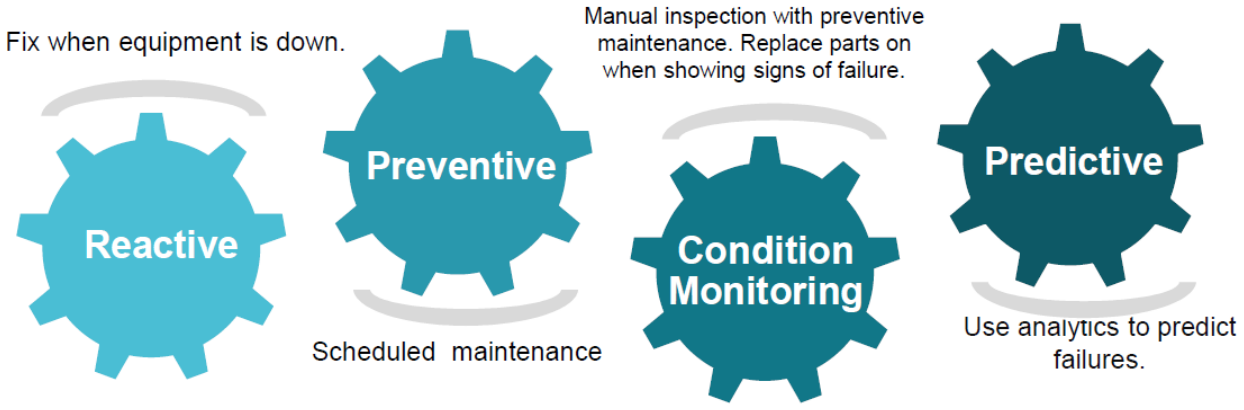
Machine	Operator	Work Order ID	Job ID	Job Performance	Job Progress		Output		Rejection	Time (mins)				Job Status	End Customer
					Start Time	End Time	Planned	Actual		Setup	Pred	Downtime	Idle		
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i
CNC_S7_81	Operator 1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

iii. LoRaWAN based Solution

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

iv. Predictive Maintenance

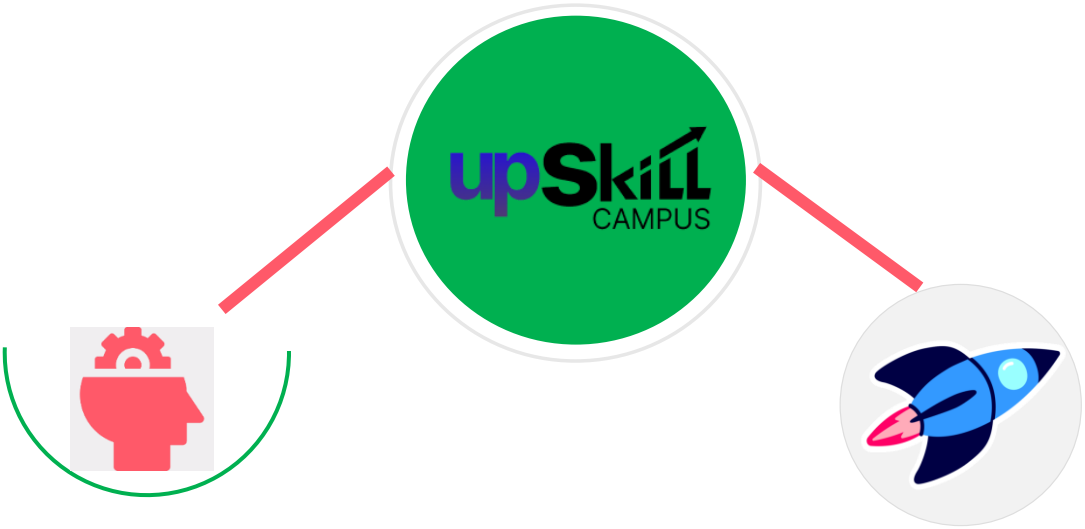
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



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.

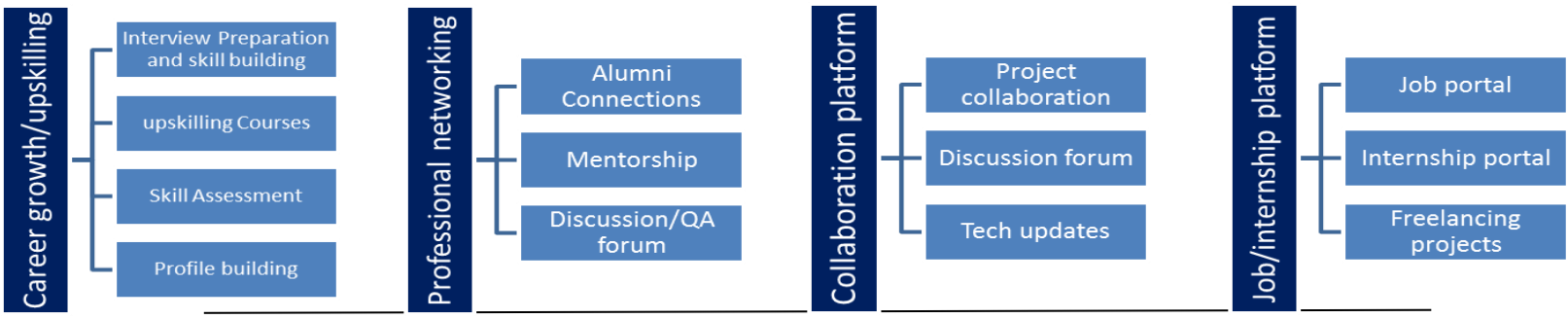
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.



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] **GitHub Repository (Code & Report):**
https://github.com/AkramShaik-67/automatic_door_control_arduino.git

Arduino Official Documentation:
https://www.arduino.cc/reference/en/

PIR Motion Sensor Tutorial (Circuit Basics):
https://www.circuitbasics.com/how-to-use-a-pir-motion-sensor-with-arduino/

Servo Motor Control with Arduino:
https://www.arduino.cc/en/Tutorial/LibraryExamples/Sweep

 The IoT Academy – Internship Portal
https://theiotacademy.co/

2.6 Glossary

- **PIR (Passive Infrared Sensor):** A sensor that detects motion by measuring changes in infrared radiation.
- **Arduino Uno:** A microcontroller board used to control electronic components.
- **Servo Motor:** A motor that rotates to a specific angle based on input signals, used for precision control.
- **IoT (Internet of Things):** A network of interconnected devices that can collect and exchange data.
- **IDE (Integrated Development Environment):** A software platform used to write and upload code to microcontrollers.
- **PWM (Pulse Width Modulation):** A technique to control the amount of power delivered to a device like a servo motor.
- **GitHub:** A web-based platform for version control and code sharing.

3 Problem Statement

In the assigned problem statement

In many homes, offices, hospitals, and public buildings, doors are operated manually, which often requires physical contact. This not only reduces convenience but also increases the risk of spreading germs and infections, especially in a post-pandemic world.

While there are commercial automatic door systems available, they are often **expensive** and **complex** to install, making them unsuitable for low-cost or small-scale applications.

Therefore, the **problem** is to design and implement a **cost-effective**, **simple**, and **reliable** automatic door control system that:

- **Uses motion detection** to open or close the door without manual effort.
- **Eliminates the need for physical contact**, enhancing safety and hygiene.

- Is built using **easily available components** like PIR sensors, Arduino Uno, and a servo motor.
- Can be **easily integrated** into smart home or small office environments.

This project aims to solve that problem using embedded system principles and basic IoT integration.

4 Existing and Proposed solution

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

What is your proposed solution?

What value addition are you planning?

4.1 Code submission : https://github.com/AkramShaik-67/automatic_door_control_arduino.gi

4.2 Report submission : https://github.com/AkramShaik-67/automatic_door_control_arduino.g

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 (if applicable)

[Human Presence]

↓

[PIR Sensor]

↓

[Arduino UNO]

↓

[Servo Motor]

↓

[Door Opens/Closes]

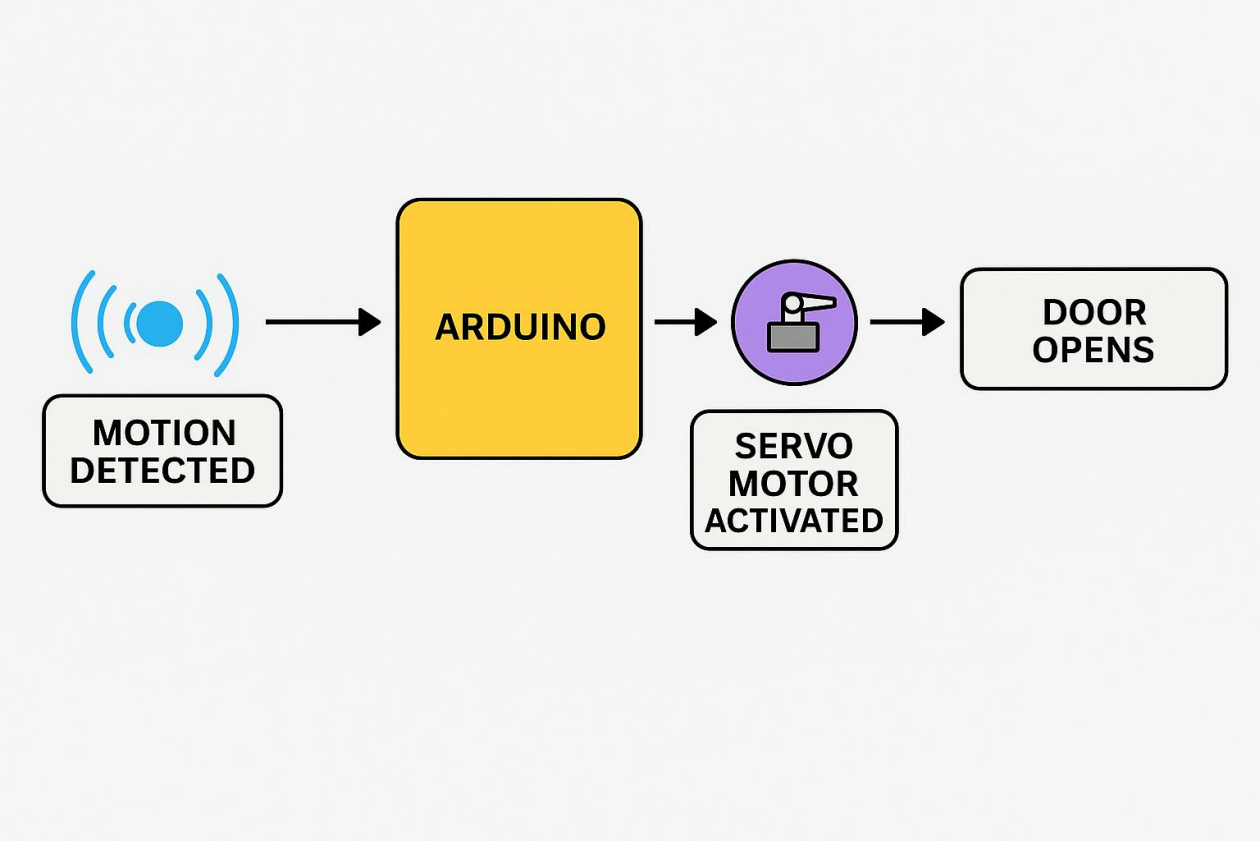


Figure 1: HIGH LEVEL DIAGRAM OF THE SYSTEM

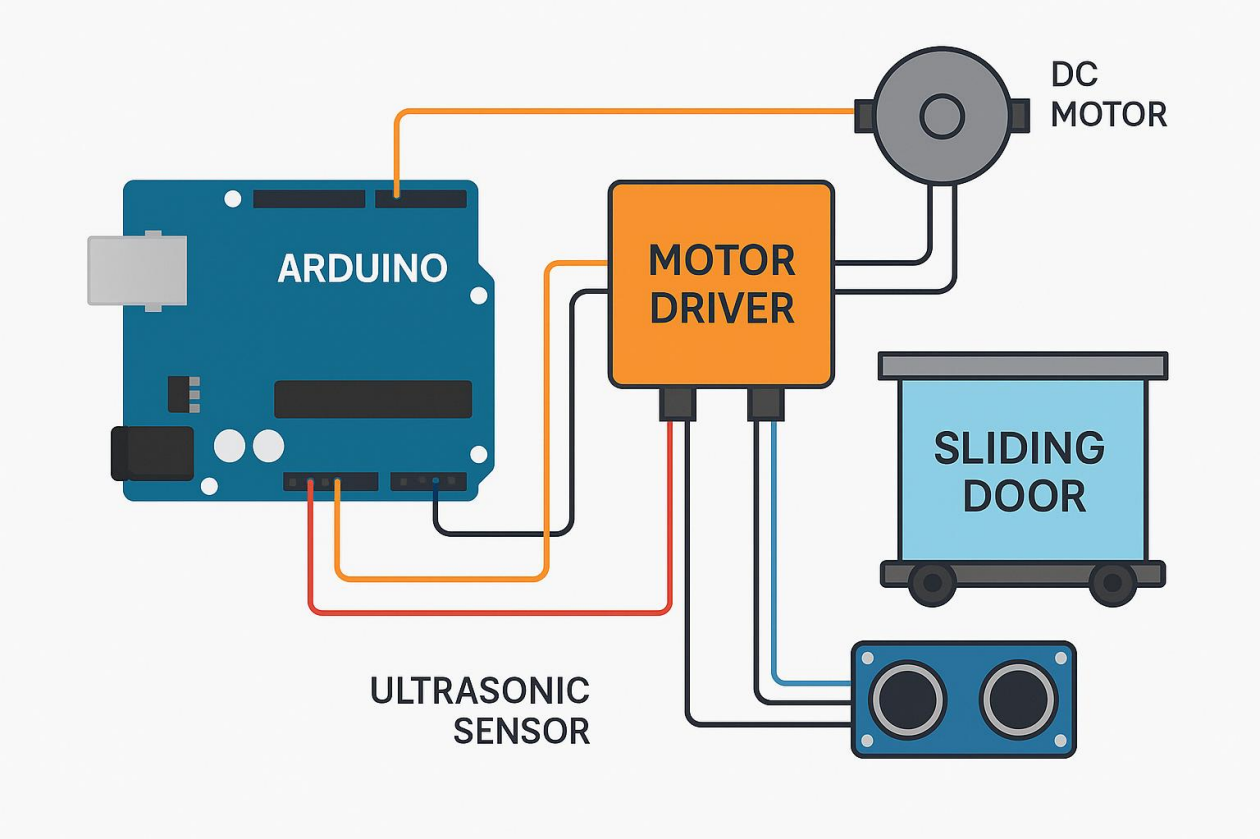
5.2 Low Level Diagram (if applicable)

This shows actual hardware connections between components:

Connections:

- PIR Sensor:
  - VCC → 5V
  - GND → GND
  - OUT → Digital Pin 2 (Arduino)

- Servo Motor:
    - Signal → Pin 9 (Arduino)
    - VCC → 5V
    - GND → GND
- Arduino powered via USB or external power



5.3 Interfaces (if applicable)

Update with Block Diagrams, Data flow, protocols, FLOW Charts, State Machines, Memory Buffer Management.

- **Input Interface:** PIR Sensor (Digital input)
- **Output Interface:** Servo Motor (PWM output)
- **Programming Interface:** Arduino IDE (via USB)
- **Optional Interface:** Serial Monitor for testing

6 Performance Test

This is very important part and defines why this work is meant of Real industries, instead of being just academic project.

Here we need to first find the constraints.

How those constraints were taken care in your design?

What were test results around those constraints?

Constraints can be e.g. memory, MIPS (speed, operations per second), accuracy, durability, power consumption etc.

In case you could not test them, but still you should mention how identified constraints can impact your design, and what are recommendations to handle them.

6.1 Test Plan/ Test Cases

6.2 Test Procedure

6.3 Performance Outcome

To ensure the project could be used in real industrial applications and not just as an academic model, several performance constraints were considered:

Key Constraints:

- **Memory Usage:** The Arduino Uno has limited memory (2KB SRAM), so code was optimized to avoid memory overflow.
- **Speed (MIPS):** The system needed to respond quickly to motion. Arduino's 16MHz speed was sufficient for real-time motion detection.
- **Accuracy:** PIR sensor's sensitivity was tuned to avoid false triggers.
- **Power Consumption:** Since the system is expected to run continuously, low-power components were chosen.
- **Durability:** Components were selected based on long operation life and stability.

Constraint Handling:

- Used interrupt-free, delay-controlled logic to minimize CPU usage.
- Servo tested for repeated motion cycles to validate long-term performance.
- Added serial feedback for debugging sensor response and improving reliability.
- **6.1 Test Plan / Test Cases**

Test Case	Input	Expected Output	Actual Result
1	Motion detected	Door opens	Passed
2	No motion	Door remains closed	Passed
3	Continuous motion	Door remains open briefly	Passed
4	Sudden motion	Quick response from system	Passed

- **6.2 Test Procedure**

1. Upload Arduino code.
2. Place system in controlled area.

3. Simulate human motion.
4. Observe door response and log results using serial monitor.

- **6.3 Performance Outcome**

The system worked consistently under repeated tests. It accurately detected motion and activated the servo with minimal delay. Memory usage remained within safe limits. Power consumption was low and steady. Overall, the project showed high potential for real-time, practical automation solutions.

7 My learnings

You should provide summary of your overall learning and how it would help you in your career growth.

This internship helped me:

- Understand real-world application of embedded systems.
- Learn Arduino programming and sensor interfacing.
- Improve debugging, documentation, and project presentation skills.
- Gain hands-on experience with GitHub and technical writing.

These skills will help me in my future career in IoT, embedded design, and software development

8 Future work scope

You can put some ideas that you could not work due to time limitation but can be taken in future.

Due to time limitations, the following ideas could not be implemented but hold potential for future:

- Add mobile app integration for remote control
- Integrate with cloud for monitoring/logging access events
- Add security features such as RFID tag scanning or biometric authentication
- Upgrade power supply to include solar or backup battery for reliability