Industrial Internship Report on

" Home Automation System"

Prepared by

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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 Home Automation System. The project is built on Arduino UNO and is used to control LED connected to the Arduino through relay. 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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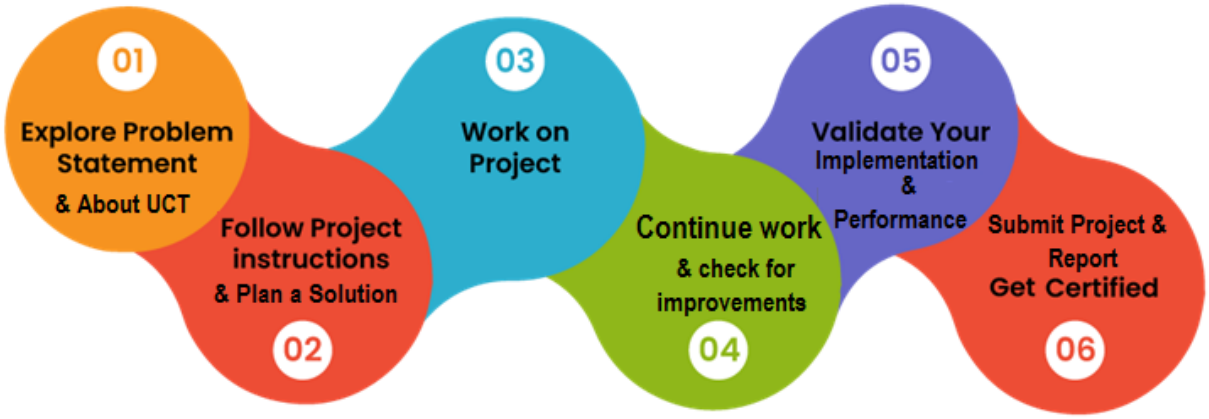
1 Preface

Over the course of a 6-week internship, I worked on a project focused on designing and implementing a home automation system using Arduino Uno. The primary goal of the project was to create a smart system that could control various household devices remotely and autonomously, enhancing convenience and energy efficiency.

A relevant internship can significantly contribute to your career development by providing practical experience, industry exposure, skill enhancement, networking opportunities, and a stronger resume. It's a bridge between academic learning and the professional world, helping you build a foundation for a successful and fulfilling career.

The project focused on developing a Home Automation System using Arduino Uno. The problem statement was to design and implement a smart system that could control and monitor various household devices remotely and autonomously. The aim was to enhance convenience, energy efficiency, and user experience within a home environment.

Both USC and UCT offer a range of opportunities that can contribute to my academic, professional, and personal growth. The specific opportunities available to you would depend on your chosen field of study, interests, and the programs they offer. It's important to explore their official websites, contact their admissions or academic departments, and possibly speak with current students or alumni to get a more detailed understanding of the opportunities available to you



Engaging in a home automation project using Arduino Uno offers a hands-on learning experience. It enhances technical skills in electronics, coding, and sensor integration, while fostering problem-solving abilities and project management. Through creating automation logic and user interfaces, you gain insights into efficient system design and user experience considerations. The project encourages creativity in finding unique solutions and provides exposure to interdisciplinary learning. Successfully completing the project builds confidence, offering real-world application of theoretical knowledge and fostering a sense of accomplishment.

Thanks to all to the Upskill Campus and IoT Academy Team members for helping a lot of students like me and my teachers and friends who have been helped me in this project, who have helped you directly or indirectly

1 Introduction

1.1 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.

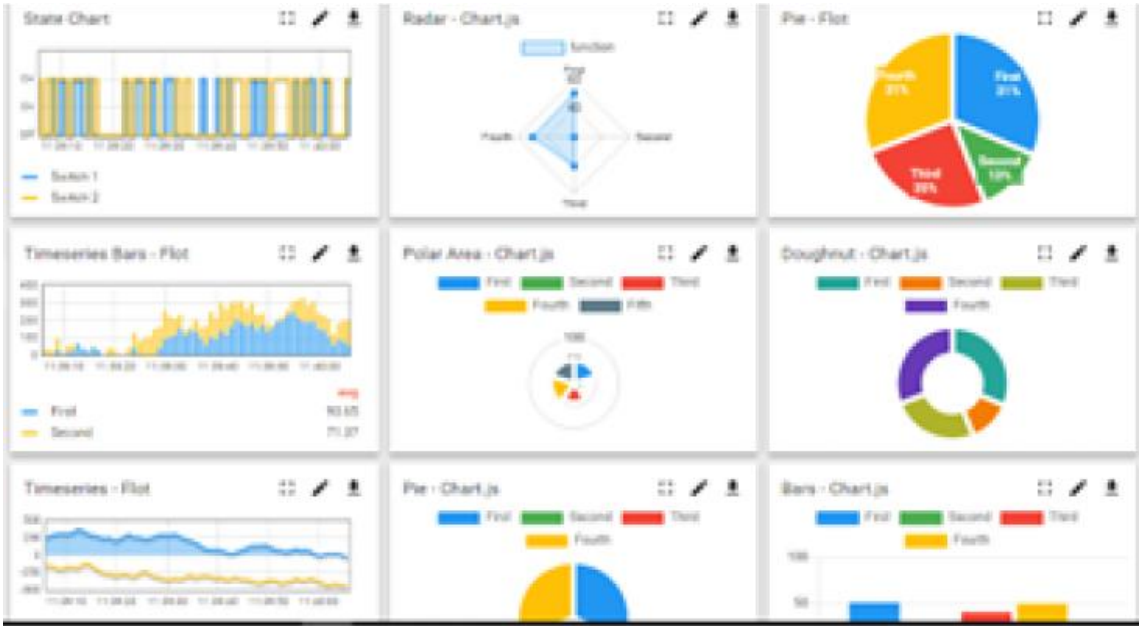
i. UCT IoT Platform (UCT Insight)

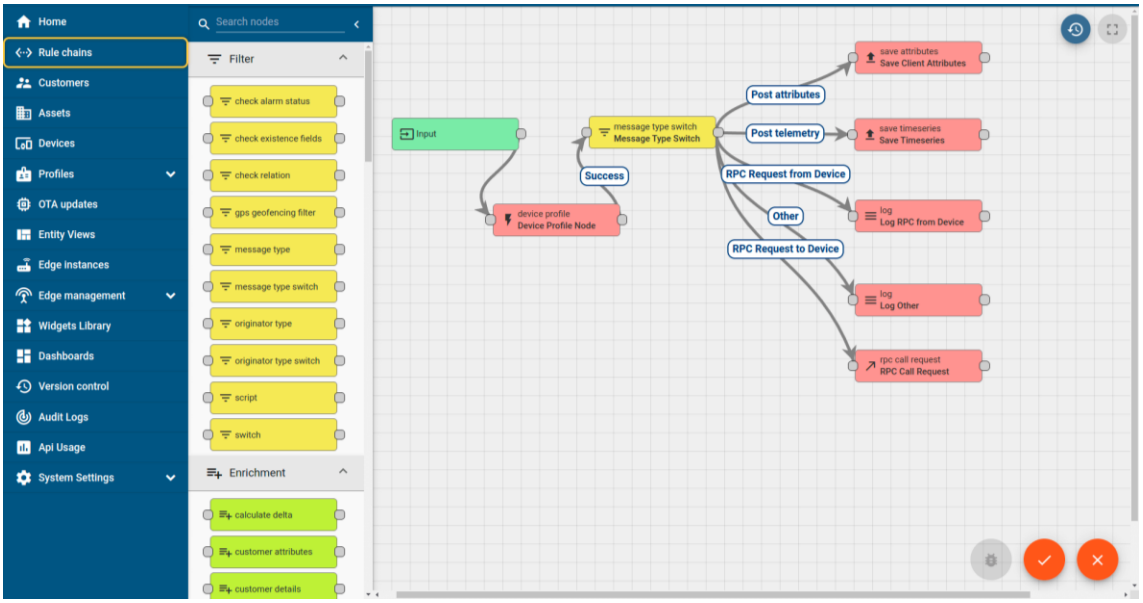
UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable "insight" for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- 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.

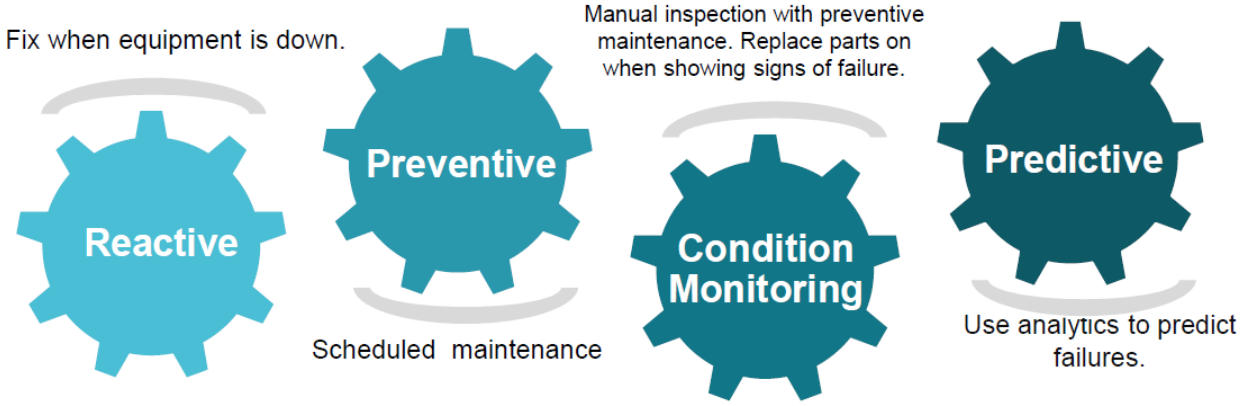
Machine	Operator	Work Order ID	Job ID	Job Performance	Job Progress		Output		Rejection	Time (mins)				Job Status	End Customer
					Start Time	End Time	Planned	Actual		Setup	Pred	Downtime	Idle		
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i
CNC_S7_81	Operator 1	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 technology and providing solution in Agritech, Smart cities, Industrial Monitoring, Smart Street Light, Smart Water/ Gas/ Electricity metering solutions etc.

iv. Predictive Maintenance

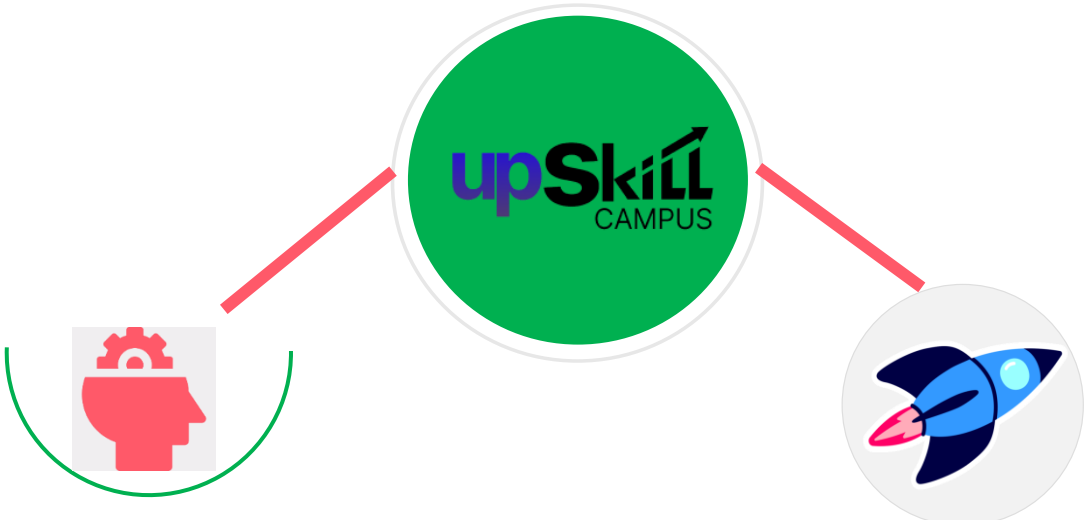
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



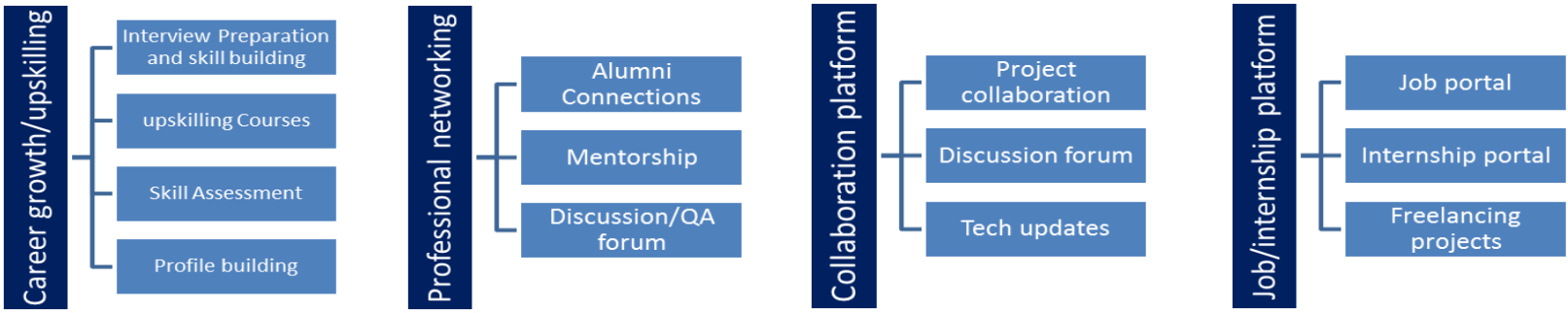
1.2 About upskill Campus (USC)

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



1.3 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.

1.4 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.

1.5 Reference

[1] https://www.slideshare.net/Aakashkumar276/project-report-on-home-automationusing-by-bluetooth

[2] https://create.arduino.cc/projecthub/kast-tech/bluetooth-controlled-home-light9447d8

[3] https://create.arduino.cc/projecthub/the-instrumentation-crustaceans/bluetoothcontrolled-light-switch-ff09bf?ref=similar&ref_id=166158&offset=0

1.6 Glossary

Terms	Acronym
Home Automation	-
Internet of Things	IoT
Arduino Uno	-
Sensors	-
Motion Detector	-

2 Problem Statement

In today's fast-paced world, the need for efficient, convenient, and energy-conscious living is paramount. Traditional homes often lack the automation and smart capabilities to adapt to modern lifestyles.

The problem at hand is to design and implement a comprehensive home automation system that integrates Internet of Things (IoT) technology, allowing homeowners to remotely control and monitor various household devices and systems.

This system should enable seamless communication between sensors, actuators, and a central control unit, allowing for real-time data collection, intelligent decision-making, and user-friendly interaction.

By addressing this problem, we aim to enhance comfort, energy efficiency, security, and convenience within households while providing a foundation for future smart home innovations.

3 Existing and Proposed solution

In this project we will make Bluetooth light switch. Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives real easy. Have you ever wondered about home automation which would give the facility of controlling tube lights, fans and other electrical appliances at home using a remote control?

Off-course, Yes! But, are the available options cost-effective? If the answer is No, we have found a solution to it. We have come up with a new system called Arduino based switching system using Bluetooth. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smartphone. Time is a very valuable thing. Everybody wants to save time as much as they can.

New technologies are being introduced to save our time. To save people's time we are introducing automatic system using Bluetooth and can be used along with the regular switch. With the help of this system you can control your home appliances from your mobile phone. You can turn on/off your home appliances within the range of Bluetooth.

The project is built on Arduino UNO and is used to control LED connected to the Arduino through relay. The Arduino board is interfaced to an HC-05 Bluetooth module to pair with the smart phone.

4.1 Code submission (Github link)

https://github.com/DevisreeTiruveedi/Home_Automation

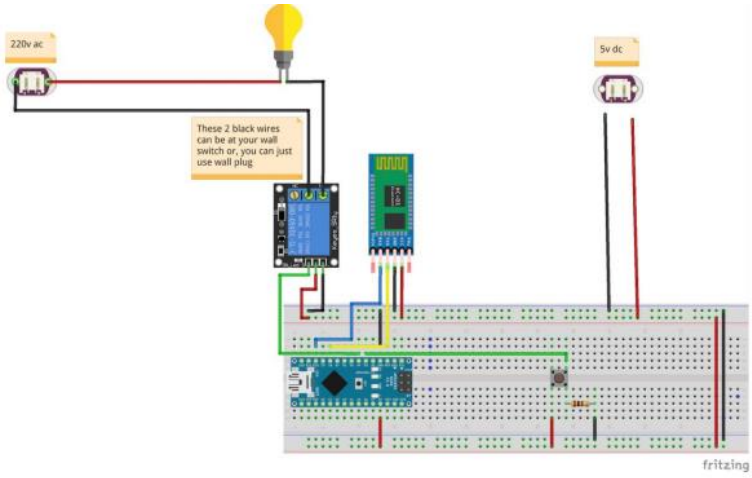
4.2 Report submission (Github link) :

https://github.com/DevisreeTiruveedi/Home_Automation

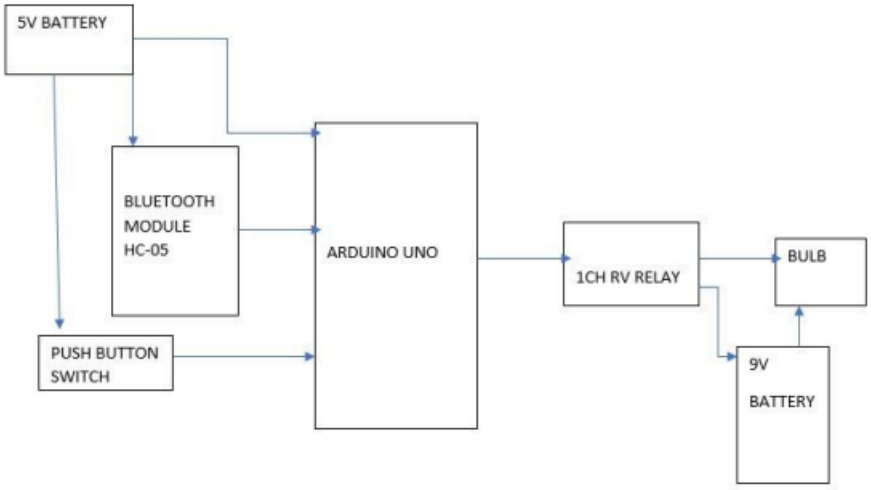
5 Proposed Design/ Model:

In this project we will make Bluetooth light switch. In each wall switch you will find two wires, once the two wires are connected the power will be sent to the light for it to turn on. we will connect the wires using a relay which is an automated switch. If the relay will get power the two wires will be connected, and if it will be off the two wires will not be connected

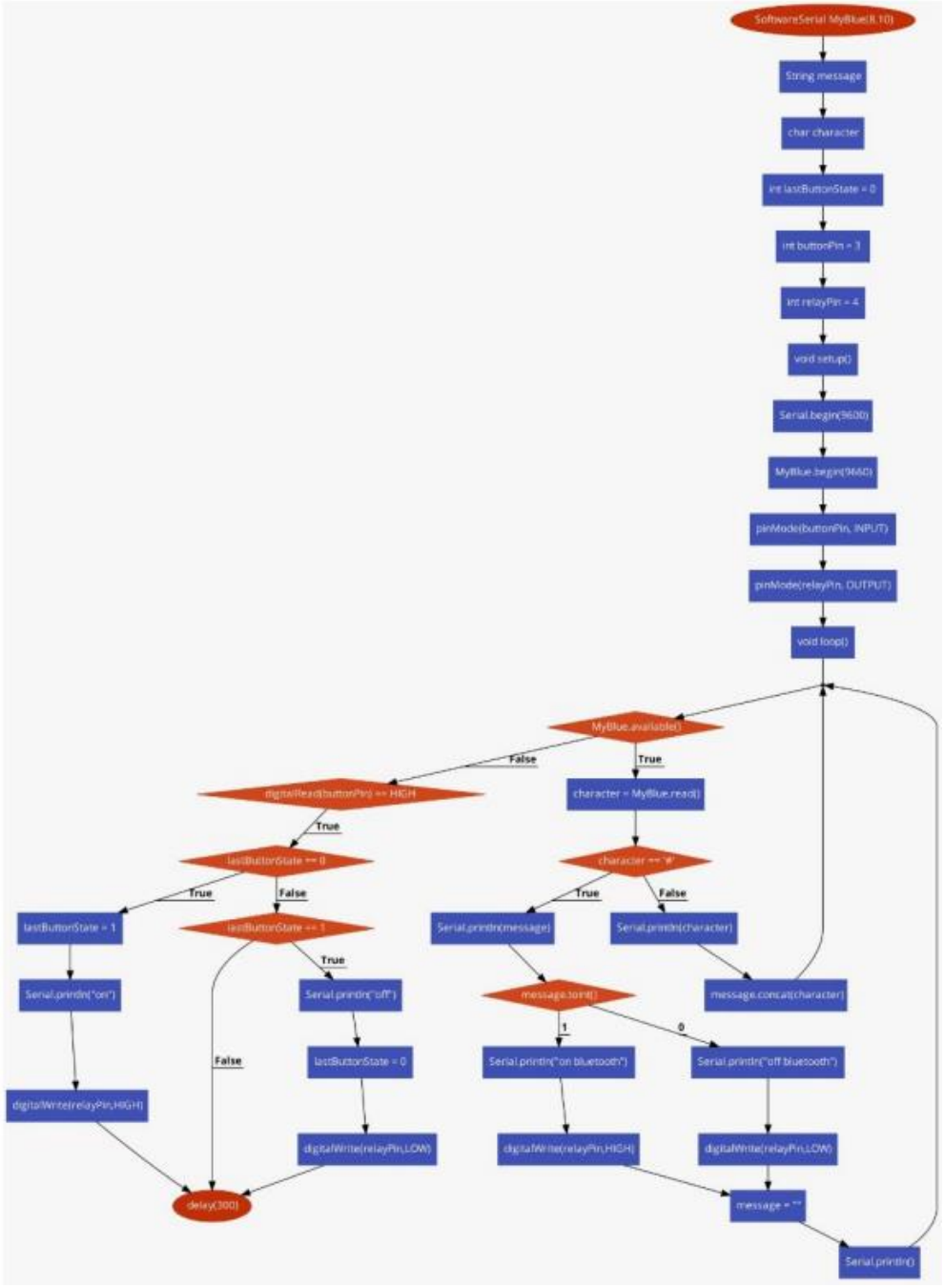
5.1High Level Diagram :



5.2Low Level Diagram (if applicable)



5.3Interfaces :



6. Performance Test

Bluetooth App (Bluetooth Terminal) :

Simple HC-05 / HC-06 Terminal to Sending and Monitoring data for embedded system

INTRODUCTION:

- One-of-a-kind App that gives you compatibility with all microcontrollers. All you need is a HC-05 serial adapter connection with serial ports of the controllers.

- Control any Micro-controller that uses a Bluetooth Module HC 05 or HC 06 through your smart phone. - This app can send and receive commands via Bluetooth so you can debug your hardware problems easily.

FEATURES: - Separate panels for sending and receiving data.

- Custom your own buttons for frequent sending of same data.

- Monitoring receiving data as HEX or ASCII.

- Sending Data as ASCII or HEX. - Selection for \r \n at the end of sending data.

- Simple copy option in sent data just long press on data.

- Send Log file of Received and Sent data.

- Keep Screen on/off option.

- Remove Ads and get uninterrupted access with an Ad - free version of Bluetooth Terminal.

6.1Test Plan/ Test Cases

The test plan for the home automation project involves a systematic approach to ensure the system's functionality and reliability. It encompasses unit testing to verify individual components like sensors and actuators, integration testing to ensure seamless interactions among these components, and validation of automation logic triggered by various conditions. The user interface will be thoroughly tested for intuitive remote control, and error handling mechanisms will be evaluated to ensure safety. Compatibility across different platforms, usability testing for

intuitive user experience, and final system testing will be conducted to ensure all components work seamlessly together. User acceptance testing will involve real-world scenarios to confirm the system meets user needs. Additionally, continuous documentation review and updates will ensure accurate instructions and explanations for the project.

In summary, the test plan covers a range of testing scenarios, including unit, integration, automation logic, user interface, error handling, compatibility, usability, and final system testing, all aimed at validating the system's performance and user satisfaction

6.2Test Procedure

HC 05/06 works on serial communication. Here the android app is designed to send serial data to the Bluetooth module when a certain button is pressed. The Bluetooth module at the other end receives the data and sends it to Arduino through the TX pin of the Bluetooth module (RX pin of Arduino). The Code fed to Arduino checks the received data and compares it based on which the relay works to perform the required task(on or off a signal). Simultaneously push button works depending on the condition of LED to change it

6.3Performance Outcome

The LED is successfully operated simultaneously by using both switch and Bluetooth. We controlled the glowing of LED by using relay and the relay is controlled by the signal from micro controller which inturn depends upon the signal from the push button and the Bluetooth application. By using this we can control other devices also by doing specific modification

7 My learnings

Engaging in the home automation project, I gained practical skills in electronics, coding, and sensor integration using Arduino Uno. Through circuit design, coding in languages like C/C++, and working with various components, I developed a solid technical foundation. Integrating sensors, controlling actuators, and implementing automation logic improved my problem-solving abilities. I honed my project management skills by planning, executing tasks, and meeting deadlines. Crafting user-friendly interfaces, exploring energy efficiency strategies, and documenting my work further enriched my learning. This interdisciplinary experience sparked creativity, enhanced my collaboration and communication skills, and instilled a sense of accomplishment as I successfully translated theoretical knowledge into practical outcomes.

8.Future work scope

The future of home automation involves integrating AI and machine learning for adaptable automation, optimizing energy use with predictive analytics, enhancing user interaction through voice and gesture controls, and bolstering security against cyber threats. It also includes monitoring user health, enabling remote control through mobile apps, and fostering an expandable ecosystem with third-party integrations. Integrating green technology, emergency response features, scalability, data insights, and comprehensive user support will further enrich the system's capabilities and user experience.