Industrial Internship Report on

''Banking Information 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 (15/06/23-30/07/23)
My project was **Automated speed control of Fan using Embedded system**
This internship gave me a very good opportunity to get exposure to Industrial problems and design/implement solutions 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:-

Week 1: Concise summaries of the successes and difficulties encountered throughout the internship week are provided in this week 1 . The highlights include learning about the background and core ideas of Embedded Systems, working on the "Automated Fan speed Control" project, adding features and a user interface, overcoming difficulties with logic implementation, and finishing the project successfully. This week I also recognised the growth of fundamental Java programming abilities, the usage of GitHub for version control, and the use of Internet resources for problem-solving and design improvements.

Week 2: The study includes a thorough grasp of the responsibilities and functions of Java developers as well as an inquiry of the advantages of a career in Java. Based on user needs, business goals for Embedded systems were established, and future system features and capabilities were imagined. Application designs were made in accordance with the project objectives, and technical concerns were resolved during software development and testing. For future use, complete design documentation was created. The study also looked at improving the effectiveness of Fan speed control.

Week 3: A thorough investigation of Embedded systems and IoT devices was done during the week. I looked at the key ideas, syntax, and fundamentals of Embedded Systems. I looked at the tasks that needed to be performed, including source code writing, testing the embedded systems connection with physical fan motor, and integration duties. I looked at a number of tools and technologies required for Embedded System Development, including Apache Spark, Eclipse, Jenkins, and Apache Maven. We looked at the distinctions between Java's StringBuilder and StringBuffer classes, their methods, and the benefits of manipulating changeable strings.

Week 4: A thorough investigation of Arduino Uno chip and DHT11 Temperature and Moisture sensor was done all during the week. We looked at the key ideas, syntax, and fundamentals of Embedded Systems and Arduino boards. We looked at the essential technologies and tools for Embedded systems.

Week 5: The week involved significant progress in career development and logical thinking skills. A PDF booklet called "Success Ladder to the Corporate World" provided insights into placement regulations, frequently asked questions, off-campus and on-campus placements, and employer expectations. The various stages of the placement process were explored, along with the demands expressed by companies. To support candidates, slides with commonly asked interview questions and appropriate answers were prepared. Additionally, efforts were made to enhance logical thinking abilities through practice in areas such as mensuration, permutation and combination, and pattern problems

Need of relevant Internship in career development:-

Because it provides real-world experience, improves professional abilities, creates a network, and makes it easier to make wise career decisions, a meaningful internship is essential for career growth. It enables people to apply their academic knowledge in practical contexts by bridging the gap between theory and practice. Through internships, people learn about the industry, hone necessary skills, and form important contacts that may lead to new opportunities. In the end, internships considerably improve employability in the chosen sector and personal development.

Project/problem statement:-

The task at hand was to use an Embedded System to create an Algorithm for Controlling the speed of a fan Automatically using Temperature sensors. Developing a user-friendly and effective system that includes necessary components like LED screen, Temperature data, and Fan speed data .

The primary objective of this project is to design, implement, and validate an automated fan speed control system that responds dynamically to the ambient temperature. Specific objectives include:

- Selection of an appropriate microcontroller capable of processing temperature data and controlling the fan's speed.
- Integration of a temperature sensor to accurately measure the ambient temperature.
- Developing an efficient fan control algorithm that adjusts the fan speed based on the temperature readings.
- Implementing IoT connectivity to enable remote control and monitoring of the fan speed through a mobile application or web interface.
- Evaluating the energy efficiency of the

The scope of this project encompasses the design and development of the automated speed control system for a single fan. The system will be scalable and can be extended to control multiple fans in different rooms or zones, thereby facilitating broader applications in residential and commercial spaces.

In conclusion, this project endeavors to showcase the power of Embedded Systems and IoT in automating everyday devices like fans, leading us towards a more sustainable, energy-efficient, and comfortable future. By integrating cutting-edge technologies, this automated fan speed control system promises to revolutionize the way we use fans and potentially serve as a blueprint for other smart home and industrial automation applications.

Opportunity given by USC/UCT:-

Opportunity is given by UCT

How Program was planned:
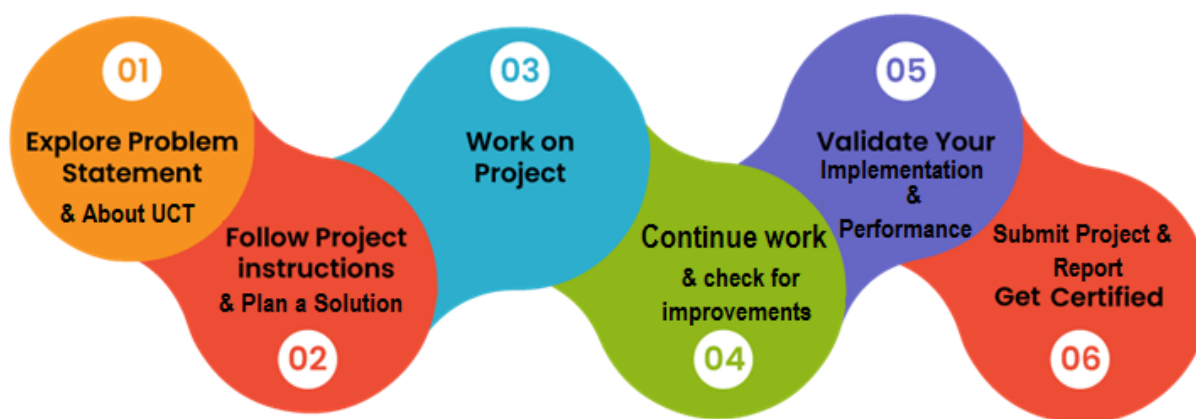
Learning and overall experience:-

I want to emphasize what a fantastic and engaging learning opportunity the internship program offered by Upskills Campus has been. The portal environment provided a user-friendly interface that made it simple to rowse the resources available. During the interview process, the instructional videos and wealth of placement and interview-related information offered were of great assistance. The program's live sessions were very useful because they offered insightful information about the corporate world. The PowerPoint presentations, PDFs, and e-books that were made available to me were incredibly instructive and significantly improved my learning process. Overall, I had a great time with the internship programme and valued the extensive learning and experience I received through Upskill Campus' unpaid internship programme.

Throughout the industrial internship project, I gained valuable learnings and had an enriching overall experience.

One of the important lessons was how to use Embedded Systems in a realistic way to create a thorough Embedded system. Through this project, I gained practical experience using a variety of Java principles, including user interface design, object-oriented programming, data management, and security measures. It improved my coding abilities and solidified my comprehension of Java programming concepts.

I developed an awareness of the nuances of the Embedded Systems and IoT, including the challenges and requirements of developing an automated system. I gained knowledge of crucial elements like sensors, in-built chips, and microcontrollers. This encounter improved my understanding of the IoT sector and sharpened my capacity to create solutions that adhere to certain industry standards.

I gained useful experience cooperating in a team setting by working on a real-world project in a professional setting.

Thanks to all Admins , Mentors who have helped me in every step where I haven't any clue what to do in those situations .

Your message to your juniors and peers:-

Keep learning..

2 Introduction

2.1 About UniConverge Technologies Pvt Ltd

A company established in 2013 and working in the 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
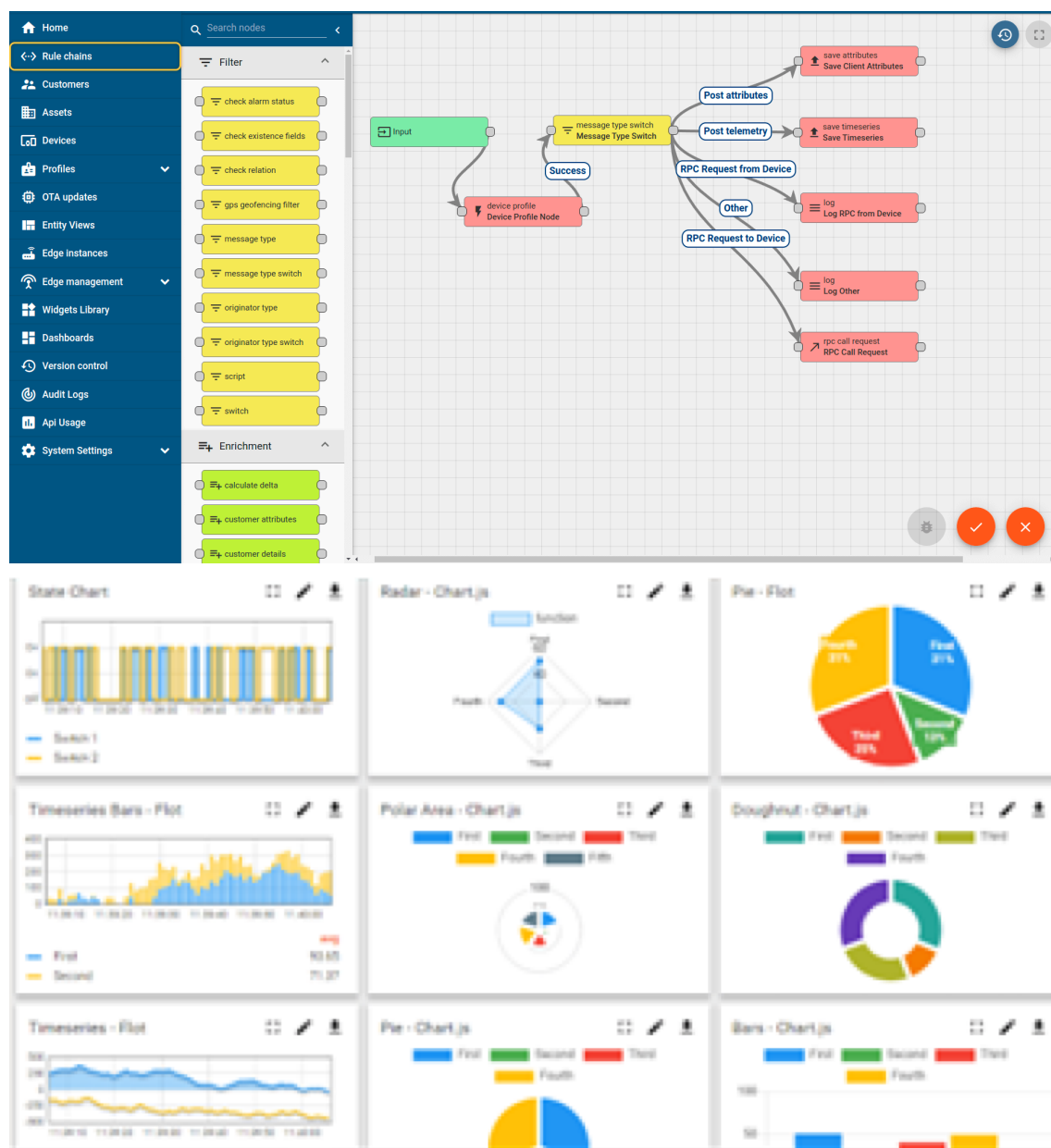
Smart Factory Platform ( )

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 t

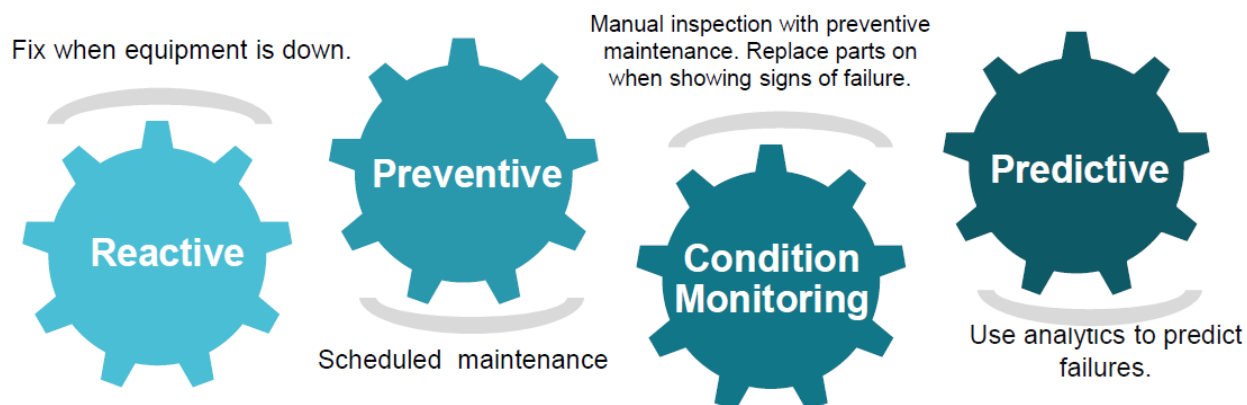| Machine	Operator	Work Order ID	Job ID	Job Performance	Job Progress		Output		Rejection	Time (mins)				Job Status	End Customer
					Start Time	End Time	Planned	Actual		Setup	Pred	Downtime	Idle		
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i
CNC_S7_81	Operator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

ime, cost and money.

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.
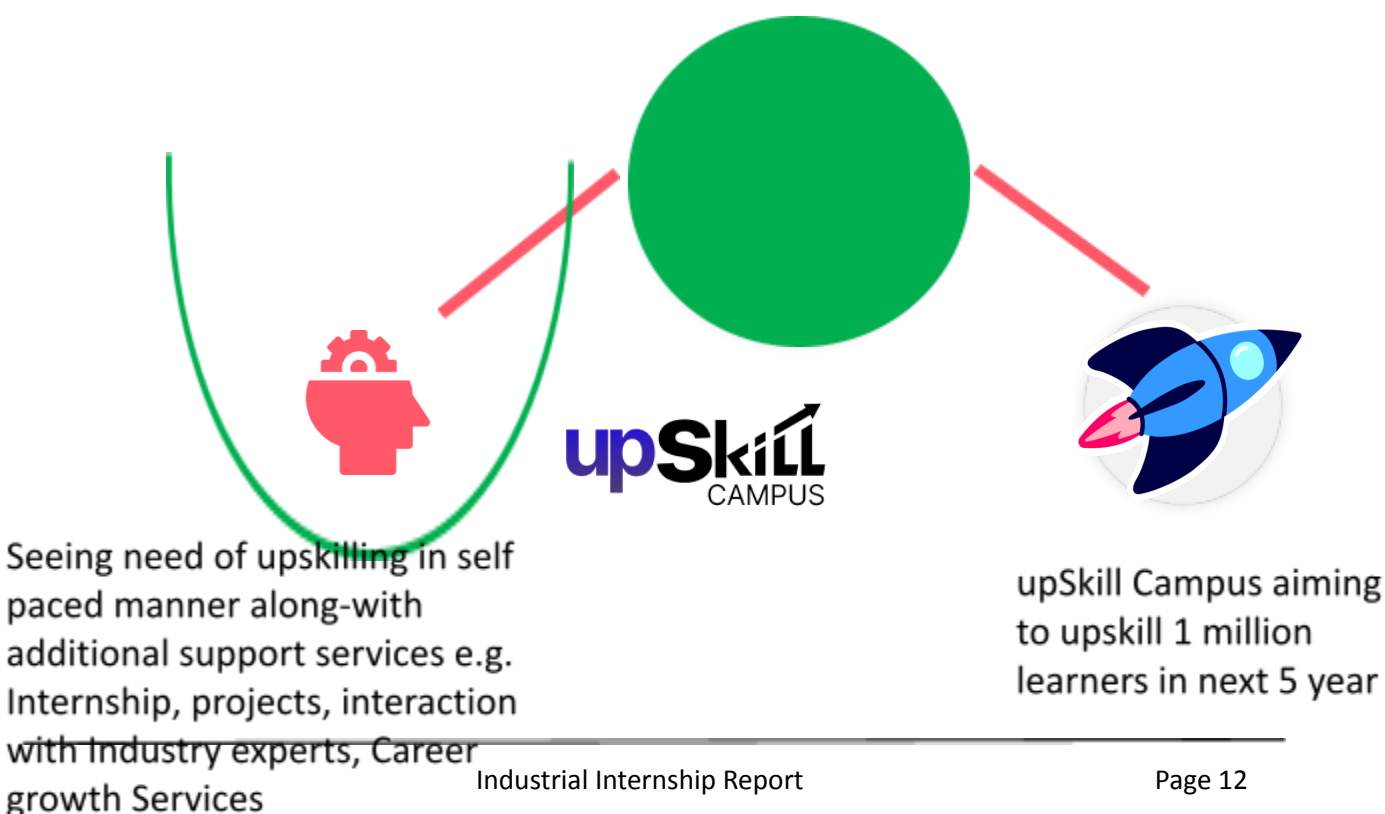
ii.   Predictive Maintenance

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.

Fix when equipment is down.

Manual inspection with preventive maintenance. Replace parts on when showing signs of failure.

Reactive

Preventive

Condition Monitoring

Predictive

Scheduled maintenance

Use analytics to predict failures.

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 Glossary

Terms	Acronym
Internet of things	IOT
Unicoverage Technologies	UCT
Upskill Campus	USC

3 Problem Statement

The problem statement was to use an Embedded System to create an Algorithm for Controlling the speed of a fan Automatically using Temperature sensors. Developing a user-friendly and effective system that includes necessary components like LED screen, Temperature data, and Fan speed data .

3.1 Code submission (Github link):-

Project Code Github Link:

https://github.com/BlazingJohnny016/Upskill-Campus/blob/main/Automated%20Fan%20speed%20control.java

Report Github Link:

https://github.com/BlazingJohnny016/Upskill-Campus

3.3 Performance Test

A. Preparation of Test Data

This project consists of three sections. One senses the temperature by using a humidity and temperature sensor namely DHT11. The second section reads the dht11 sensor module's output and extracts temperature value into a suitable number in Celsius scale and controls the fan speed by using PWM. And the last part of the system shows humidity and temperature on the LCD and Fan driver.

Here in this project, we have used a sensor module namely DHT11. Here we have only used this DHT sensor for sensing temperature, and then programmed our arduino according to the requirements.

Working on this project is very simple. A PWM has been created at the pwm pin of the arduino and applied at the base terminal of the transistor. Then the transistor creates a voltage according to the PWM input.
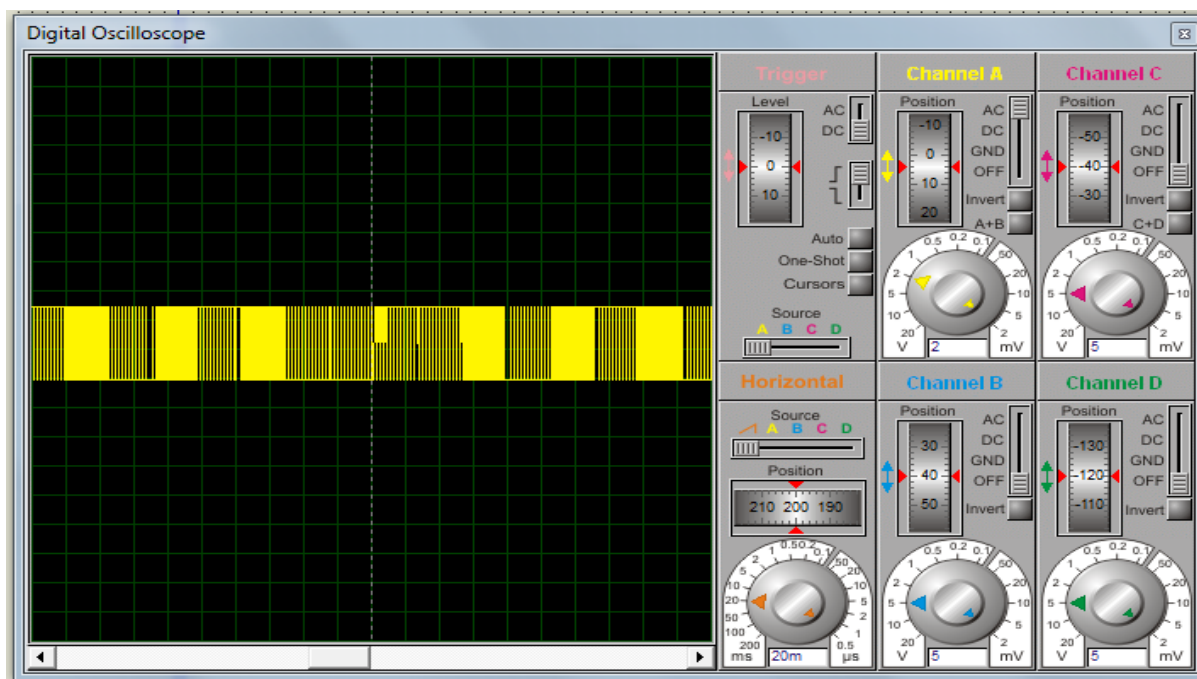
B. Testing with Live data

Fan speed and PWM values and duty cycles values are showing in given table:

| Temperature	Duty Cycle	PWM Value	Fan Speed
Less 26	0%	0	Off
26	20 %	51	20%
27	40%	102	40%
28	60%	153	60%
29	80%	204	80%
Greater than 29	100%	255	100%

What is PWM? PWM is a technique by which we can control the voltage or power. To understand it more simply, if you are applying 5 volts for driving a motor then the motor will move with some speed. Now if we reduce applied voltage by 2 means we apply 3 volts to the motor then motor speed also decreases. This concept is used in the project to control the voltage using PWM.

3.2 Test Cases & Test Procedure

Screen Design

The user interface for the automated fan speed control system includes the following screens:

1. **Main Control Screen:** This screen displays the current temperature reading, the corresponding fan speed level, and options for manual fan speed adjustments.
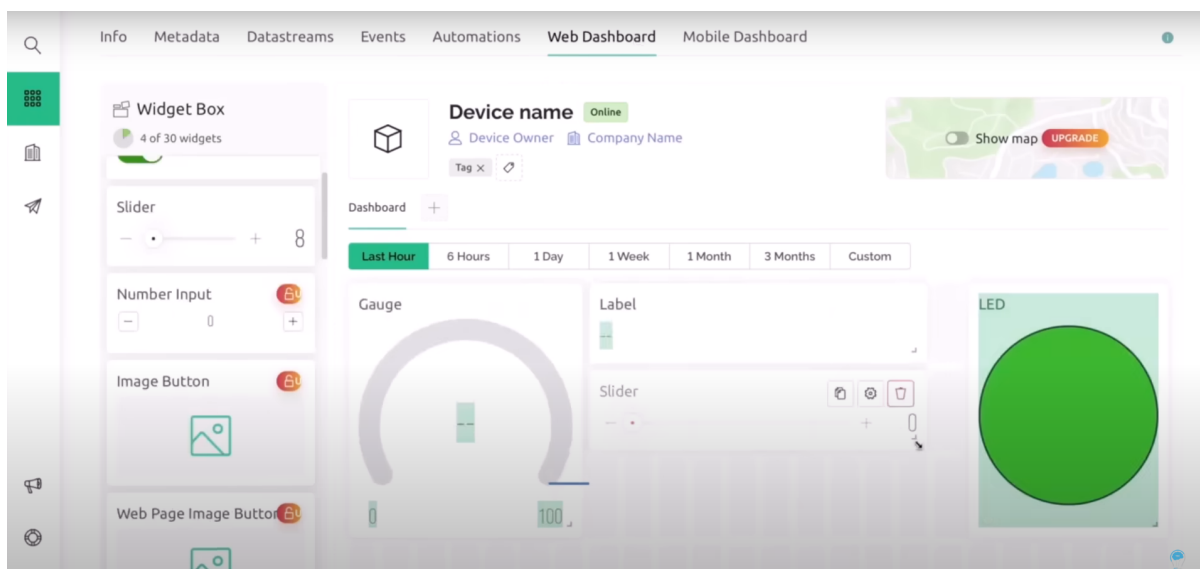
2. **Temperature Log Screen:** This screen presents a log of temperature readings along with timestamps.
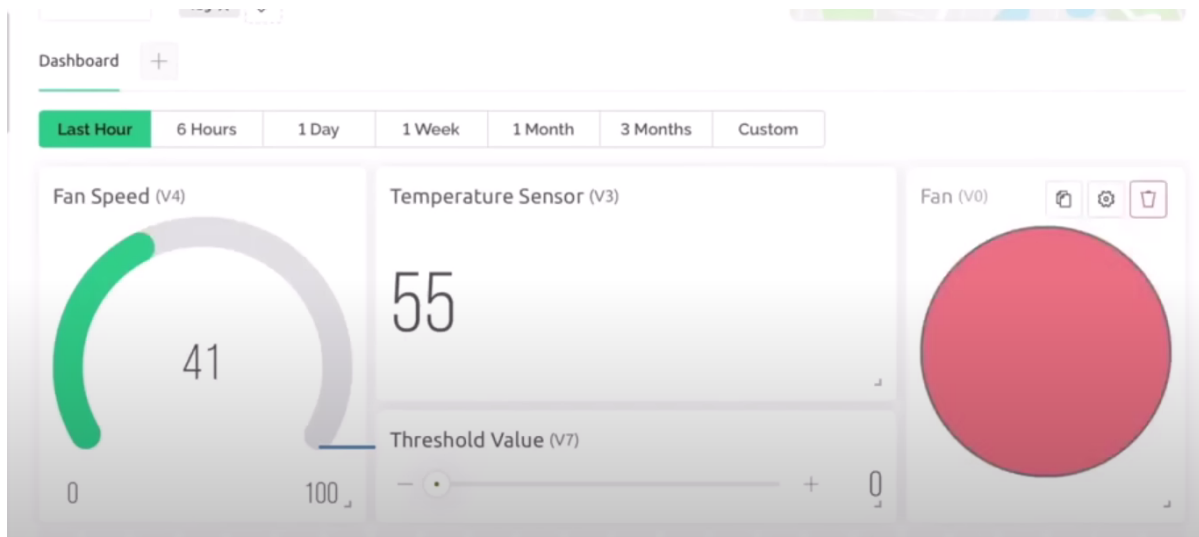
3. **Fan Speed Settings Screen:** This screen shows the fan speed settings based on different temperature ranges.

3.3 Performance Outcome:-

"The objective of this study is to assess the performance outcome of an Automated Fan Speed Controller (AFSC) system, designed to optimize the cooling efficiency of electronic devices and improve energy consumption in various applications. The AFSC system incorporates advanced sensors and algorithms to dynamically adjust fan speeds based on real-time temperature and load conditions, aiming to strike a balance between effective cooling and power consumption."

The automated fan speed controller is designed to regulate the speed of a fan based on various input parameters, such as ambient temperature, user preferences, and system requirements. The main objective of this controller is to optimize energy consumption, maintain a comfortable environment, and extend the fan's lifespan while ensuring effective cooling. Here are the key performance outcomes of the automated fan speed controller:

1. Energy Efficiency: The controller aims to reduce energy consumption by operating the fan at the minimum required speed to achieve the desired cooling effect. By dynamically adjusting the fan speed according to the prevailing conditions, the system can avoid unnecessary high-speed operation, leading to energy savings.
2. Temperature Regulation: The fan speed controller monitors the ambient temperature and adjusts the fan speed accordingly. It strives to maintain a stable and comfortable temperature range within the defined limits, preventing temperature spikes and ensuring consistent cooling performance.
3. Noise Reduction: With the ability to adjust fan speed based on the cooling demand, the controller can reduce noise levels when the cooling requirement is low. This leads to a quieter and more pleasant environment for users.

4 My learnings

My internship was a worthwhile learning experience for me, and it will advance my career. I developed a solid understanding of Embedded Systems and IoT and Java's foundations.I gained knowledge on how to create effective systems. I was able to put my knowledge to practice and hone my practical skills in user interface, algorithm writing, and numerous data procedures by working on the "Automated control of fan speed" project. I also looked at the value of logical reasoning and problem-solving abilities.

I had the chance to learn about a variety of technologies and tools related toEmbedded Systems and IoT during my internship, including Eclipse,Atmega328, Arduino and Assemblers. I gained a deeper understanding of Embedded systems and Arduino UNO.

The internship also gave me a useful perspective on business and the hiring process. I learned more about hiring policies, typical interview queries, and company expectations. I improved my communication abilities by making slides with appropriate responses to interview questions.

A user-friendly webpage, instructive videos, and a wealth of information regarding interviews and placements were all included in the internship programme given by Upskill Campus, which created a supportive learning environment. Live sessions offered insightful perspectives into the business world. The resources, which included PPTs, PDFs, and e-books, were incredibly helpful and improved my experience overall.

Overall, the internship helped me gain knowledge, practical skills, and a deeper grasp of Java development and the business world. These encounters and lessons will surely aid in the development of my career and prepare me for upcoming possibilities in the sector.

5. Future work scope

Due to time constraints, I was unable to implement some concepts and functionalities. However, these suggestions have the potential to improve the project's user experience in the future. I want to investigate the following concepts in the future:

Enhanced Visual Design: Although the user interface is already functional, I would like to spend more time making it more aesthetically pleasing. This can entail adding contemporary UI components, picking suitable color palettes, and enhancing the application's overall looks.

IoT Implementation: I want to make the Fan speed controller integrated with IoT so that it can be controlled through applications on smartphones or web applications