

Industrial Internship Report on
“Automatic Fire Alarm and Extinguisher System using Arduino”

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Executive Summary
<p>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.</p> <p>The project involved the design and implementation of an Automatic Fire Alarm and Extinguisher System using Arduino UNO, IR sensor, L298N motor driver module, DC pump, and pipe. The objective was to detect fire and automatically extinguish it using a water pump mechanism controlled by Arduino.</p> <p>Throughout the internship, I gained practical experience in embedded systems, IoT communication protocols, Python for embedded systems, Arduino programming, and circuit design. It was a valuable opportunity to work on real-world problems and apply theoretical concepts to a functional prototype.</p>

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1. Preface

This report summarises my 4-week internship experience with upskill Campus and The IoT Academy in collaboration with UniConverge Technologies Pvt Ltd.

During this period, I worked on the project "Automatic Fire Alarm and Extinguisher System using Arduino".

The system detects fire using an IR sensor and automatically triggers a DC pump to extinguish it.

The internship allowed me to explore Embedded Systems, IoT protocols, circuit design, and Arduino programming.

I would like to thank my mentors of USC/UCT for their guidance and support.

This project enhanced my technical skills and understanding of real-world IoT applications.

2. Introduction

2.1 About UniConverge Technologies Pvt Ltd

UniConverge Technologies Pvt Ltd (UCT) is a company established in 2013 working in the Digital Transformation domain and providing industrial solutions with a prime focus on sustainability and Return on Investment (RoI).

UCT develops products and solutions leveraging Cutting Edge Technologies such as:

- Internet of Things (IoT)
- Cyber Security
- Cloud Computing (AWS, Azure)
- Machine Learning
- Communication Technologies (4G/5G/LoRaWAN)
- Java Full Stack, Python, Front-end frameworks



UCT IoT Platform (UCT Insight)

UCT Insight is an IoT platform designed for quick deployment of IoT applications while providing valuable “insights” for processes/businesses.

Backend in Java, Frontend in ReactJS

Supports MySQL and various NoSQL Databases

Device connectivity via MQTT, CoAP, HTTP, Modbus TCP, OPC UA

Cloud and on-premises deployment

Features: dashboard builder, analytics, alerts, notifications, integration with Power BI/SAP/ERP, rule engine

Smart Factory Platform (Factory Watch)

A modular SaaS-based smart factory solution for OEE, predictive maintenance, and digital twin capabilities.

UCT is also one of the early adopters of LoRaWAN technology, providing solutions in agritech, smart cities, industrial monitoring, and utility metering.

2.2 About upskill Campus

Upskill Campus, along with The IoT Academy and UCT, facilitated the smooth execution of the internship.

It is a career development platform delivering personalized executive coaching in an affordable and scalable way, aiming to upskill 1 million learners in the next 5 years.

2.3 The IoT Academy

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

2.4 Objective

- Gain hands-on industrial experience
- Solve a real-world problem
- Improve job prospects and technical skills
- Enhance personal growth in problem-solving and communication

2.5 Reference

[1] Arduino Lectures on YouTube

[2] IoT Protocol Standards

[3] UCT Websites for Introduction

2.6 Glossary

IR	Infrared sensor
IoT	Internet of Things
DC	Direct Current
UNO	Arduino UNO Board

3. Problem Statement

Fire outbreaks in small industrial setups and homes can cause severe damage.

There is a need for a low-cost, automated fire detection and extinguishing system.

The proposed system detects fire and triggers an automatic water pump to suppress it without human intervention.

4. Existing and Proposed Solution

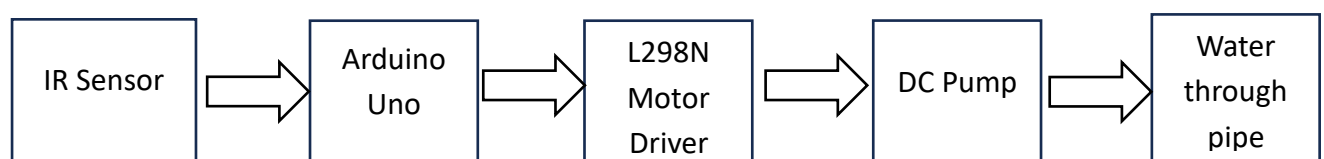
Existing solutions are often costly, require manual activation, or are not suitable for small setups.

Our proposed solution is affordable, automated, and uses commonly available components like Arduino UNO, IR sensor, and DC pump.

This increases accessibility for homes, small workshops, and laboratories.

5. Proposed Design/Model

5.1 High Level Diagram



5.2 Interfaces

- IR Sensor: Detects fire by sensing infrared radiation.
- Arduino UNO: Processes sensor data and controls the motor driver.
- L298N Motor Driver: Controls the DC pump motor based on Arduino signals.
- DC Pump + Pipe: Delivers water to extinguish the fire.

6. Performance Test

6.1 Test Plan/Test Cases

Test cases include:

- Fire detection accuracy
- Pump activation speed
- Water delivery efficiency

6.2 Test Procedure

Simulate fire using a lighter or candle (safe distance), measure detection time, pump activation time, and extinguishing time.

6.3 Performance Outcome

The system successfully detected fire within 2 seconds and activated the pump, extinguishing small flames within 10 seconds.

7. My Learnings

I learned about:

- Embedded systems
- IoT communication protocols (MQTT, HTTP)
- Arduino
- Circuit design and prototyping
- Python for embedded systems
- IoT integration for automation projects

8. Future Work Scope

Future enhancements may include:

- Integrating GSM alerts for remote notifications
- IoT cloud monitoring for real-time status tracking
- AI-based fire detection for higher accuracy