1. System Implementation and Development

Introduction

This chapter explains the actual development and integration of the proposed IIoT-based monitoring and maintenance system. The development was divided into three main layers: PLC programming, edge data acquisition, and the Django-based web application. All components have a core role in enabling real-time monitoring, fault reporting, and maintenance management.

1.1. Web Application

1.2. Edge Communication

1.2.1. Python Script

A Python script running on an edge device was developed to:

- Connect to the S7-1200 via Ethernet using the Snap7 library.
- Read critical data points from the PLC.
- Convert binary/byte data into human-readable values (integers, strings).
- Send the data to the Django web server using HTTP POST requests.

1.2.2. Script Snippet:

```
import snap7
import requests

plc = snap7.client.Client()
plc.connect('192.168.0.1', 0, 1)  # Adjust IP, rack,
and slot

while True:
    part_count = plc.db_read(1, 0, 2)
    status = plc.db_read(1, 2, 2)

    data = {
        "machine_id": "sorter01",
        "part_count": int.from_bytes(part_count,
'big'),
        "status_code": int.from_bytes(status, 'big')
    }

    requests.post("http://your_web_app/api/machine-
data/", json=data)
```

1.2.3. Node-RED

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1.2.4. REST API Structure

Table 1: API structure

Endpoint	Method	Description
/api/machine-data/	POST	Receives machine data from PLC

1.2.5. Subsection 2.2

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Figure 1: Typst logo

Figure 1 shows the `Typst` logo.

Table 2: Some table

a	b	c
a	*b*	*c*

Table 2 displays some table.

Conclusion

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