

Individual Weekly Report

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Team: Bray IIoT Smart Solution

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Current Status

1. What did you **personally** work on this past week?

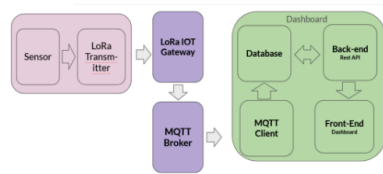
Task	Status	Time Spent
MQTT Configuration	In Progress	~1 hour
Report: Implementation Details	Done	~3 hours
Report: User Manual	Done	~1 hour

Include **screenshots/graphics** to illustrate what you did this past week:

```
135     @staticmethod
136     def _on_message(client: mqtt.Client, userdata: Any, msg: MQTTMessage):
137         sensor_events: Dict[str, Dict[str, SensorEvent]] = userdata.get("sensor_events")
138         on_heartbeat_packet: Callable | None = userdata.get("on_heartbeat_packet")
139         on_data_packet: Callable | None = userdata.get("on_data_packet")
140         on_event_summary_packet: Callable | None = userdata.get("on_event_summary_packet")
141         on_co2_packet: Callable | None = userdata.get("on_co2_packet")
142
143         payload: bytes = msg.payload
144         topic: str = msg.topic
145
146         _, devEUI, _, port, *_ = topic.strip().split("/")
147         logging.info(f">>> RECEIVED MESSAGE ON PORT {port}")
148
149         # Add a new sensor event if it doesn't exist or get the existing one. Start with an empty current event
150         if sensor_events.get(devEUI) is None:
151             sensor_events[devEUI] = {
152                 "old_event": None,
153                 "current_event": SensorEvent()
154             }
155
156         # Parse data for the current event
157         event = sensor_events[devEUI]
158         event["current_event"].parse_from_data(topic, payload)
159         # Execute callbacks
160         if port == "12":
161             logging.info(">>> Executing on_heartbeat_packet")
162             on_heartbeat_packet(event["current_event"]) if on_heartbeat_packet is not None else None
163         elif port == "13":
164             logging.info(">>> Executing on_data_packet")
165             on_data_packet(event["current_event"]) if on_data_packet is not None else None
166         elif port == "14":
167             logging.info(">>> Executing on_event_summary_packet")
168             on_event_summary_packet(event["current_event"], event["old_event"]) if on_event_summary_packet is not None else None
```

Appendix B: Implementation Details

A detailed description of your implementation goes here (e.g., engineer's notes).



System Overview

The Bray IoT valve monitoring system can be broadly described with four primary layers:

1. Sensor Layer – Collects real-time data using a fugitive emission sensor.
2. Transmission Layer – Sends data wirelessly via LoRaWAN to the backend.
3. Backend Layer – Receives, stores, and processes data using a Flask API and PostgreSQL database.
4. Frontend Layer – Displays sensor data through a React-based web dashboard.

Sensor Layer

For the project's fugitive emission sensor, we used the ExplorIR®-M CO₂ sensor, a compact and low-power device well-suited for space-constrained and energy-efficient applications. The ExplorIR®-M can measure CO₂ concentrations with a typical accuracy of 70 ppm and supports a measurement range of up to 100k CO₂. In this project, the sensor is connected to the integrated

Appendix C: User's Manual

Installation and operation instructions go here.

Hardware:

- CO₂ sensor
- LoRa transmitter board
- LoRa Gateway
- Server for hosting the dashboard/MQTT
- Computer to be used as a server
- Battery/Benchtop Power supply

Powering up the system:

1. Ensure that the LoRa transmitter board is connected to the battery/power supply
2. Ensure that the CO₂ sensor is connected to LoRa transmitter board
3. Connect the LoRa gateway to power
4. Connect the server to the gateway using an ethernet cable
5. Connect power to the air compressor, attach the hose to the smart valve assembly, and power it on.

Connecting the LoRa transmitter to the gateway:

1. On the server, open a web browser
 - a. Navigate to "192.168.2.1" as the website link
2. Log in using the provided credentials
3. Navigate to the Packets tab
4. Disconnect the battery/power from the LoRa transmitter board and reconnect it

2. What problems did you run into? What is your plan for them?

Our conduit factory reset for unknown reasons. We received the configuration files from Bray to fix this problem. Also, I got sick last week, but I'm doing better and making up for the lost time.

3. What is the current overall project status from your perspective?

The project is on track for completion, but we had a setback with our conduit's factory reset.

4. How is your team functioning from your perspective?

Our team didn't communicate very well last week and forgot to account for the report requirements until later in the week. Overall, the team is functioning well.

5. What new ideas did you have or skills did you develop this week?

I gained experience in working with and configuring MQTT clients and working with LoRaWAN transmission data.

6. Who was your most awesome team member this week and why?

Aysen finished development of the transmitter firmware, making him this week's most awesome team member.

Plans for Next Week

What are you going to work on this next week?

- Modify and update the Project Report
- Make the draft for the project poster
- MQTT Configuration: ensure proper translation of transmitted sensor data