

# Timesheet Report

IP-25: Dissolved Oxygen Sensor | WS 2025/26

Mohamed Karim — Matrikelnr. 32603 — Focus: Hardware, Firmware & Power Design

Date	Context	Task	Duration [h]
02.10.2025	Lecture	Kick-off meeting and introduction of the topic	3.0
09.10.2025	Lecture	Practical introduction to ESP32 and Arduino	3.0
10.10.2025	Research	Self-study: researching optical DO sensors and fluorescence quenching principle	2.0
16.10.2025	Lecture	Brainstorming in small groups; creating concept drafts for the enclosure and hardware	3.0
17.10.2025	Research	Researching ESP32 deep sleep modes and low-power design strategies	3.0
19.10.2025	Research	Concept refinement; researching voltage regulators and buck converters for dual-rail system	4.0
23.10.2025	Lecture	Presentation of drafts	3.0
24.10.2025	Research	Designing high-side switching circuit; comparing P-Channel MOSFET vs relay for sensor power gating	5.0
27.10.2025	Research	Finishing IP draft and uploading it to Moodle	2.0
30.10.2025	Lecture	Organizing into subgroups; initial research on power supply methods	3.0
31.10.2025	Research	Research on battery chemistry (Li-SOCl <sub>2</sub> vs LiPo); current budget estimation	2.0
06.11.2025	Excursion	Excursion to LINEG; discussion of requirements and maintenance constraints	3.0
07.11.2025	Research	Studying RS485 Modbus RTU protocol; reviewing DFRobot SEN0680 datasheet	3.0
13.11.2025	Lecture	Working in subgroups; MQTT introduction and LoRaWAN overview	3.0
14.11.2025	Research	Researching LoRaWAN protocol; setting up TTN application and device registration	3.0
15.11.2025	Research	Voltage divider calculations for pressure sensor interface; designing 1k/1.8k resistor network	1.0
20.11.2025	Research	Full power budget calculations; estimating weekly energy consumption per phase (sleep, measure, transmit)	6.0
21.11.2025	Hardware	Perfboard layout planning; dry-run component placement	3.0
28.11.2025	Hardware	Started soldering perfboard: female headers for ESP32	4.0
29.11.2025	Hardware	Continued soldering: voltage divider resistors, 3-pin sensor terminals	4.0
01.12.2025	Hardware	Soldering switching circuit: relay, BC547 NPN transistor	5.0

02.12.2025	Hardware	Wiring power rails and ground plane on perfboard bottom	4.0
03.12.2025	Hardware	Integration: connecting power zones to sensor zones; first continuity test with multimeter	5.0
04.12.2025	Lecture	Consulting with IoT lab staff about battery technology; decided to switch to LiPo with Adafruit charger	3.0
05.12.2025	Hardware	Full board power-on test; discovered short circuit	5.0
06.12.2025	Hardware	Debugging the short circuit	8.0
07.12.2025	Hardware	RS485 adapter wiring to perfboard	2.0
10.12.2025	Firmware	Firmware development	4.0
12.12.2025	Firmware	Debugging GPIO pin conflict: pins 16/17 crash loop; moved to pins 26/27	4.0
14.12.2025	Firmware	LoRaWAN module config via AT commands; programming AppEUI and AppKey into Grove E5	4.0
15.12.2025	Firmware	LoRa join attempts failed (gateway offline); decision to pivot to WiFi MQTT transmission	4.0
17.12.2025	Firmware	Full system integration test: sensors + WiFi + MQTT broker + dashboard working end-to-end	5.0
18.12.2025	Lecture	Beginning report work; discussing structure with group members	3.0
06.01.2026	Hardware	Post-break hardware check; verifying solder joints; sensor recalibration	3.0
07.01.2026	Research	Detailed power consumption analysis; calculating weekly energy budget with worst-case values	3.0
08.01.2026	Lecture	Poster discussion; presenting hardware progress; assigning poster sections	3.0
09.01.2026	Poster	Designing system block diagram and schematic for the poster	6.0
15.01.2026	Lecture	Received and integrated the DO sensor, then debugged the firmware to successfully retrieve data readings	8.0
21.01.2026	Report	Writing hardware architecture section; pressure sensor and DO sensor interface descriptions	5.0
22.01.2026	Test	Tested copper mesh designs with Yannick and worked on connecting sensor readings to the dashboard	7.0
23.01.2026	Report	Writing power system design section; relay vs MOSFET discussion; energy calculations	5.0
30.01.2026	Report	Writing testing results, connectivity section (WiFi pivot), discussion and future work	5.0
31.01.2026	Report	Report finalization and proofreading	6.0
11.02.2026	Report	Final submission of report and contribution summary	7.0
12.02.2026	Test	WiFi dashboard test	7.0

**TOTAL HOURS 184.0**