ENGG3000 Individual Log Book

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Student ID: 47636491

Unit: ENGG3000 – Engineering Project
Team: T6 Systems – Group 20
Discipline: Software Engineering
Project: Automated Bridge Control System (ESP32 + Sensors)
Semester: Session 2, 2025

University: Macquarie University

Week 1

Date: Week 1, 2025

Today I continued my work on the automated bridge system. This week involved refining and testing the ESP32-based control system, which integrates ultrasonic sensors, motor drivers, and Wi-Fi communication. I recorded detailed notes, calibration data, and troubleshooting outcomes. Faced issues with inconsistent sensor readings and PWM speed control; resolved through code debugging, power stabilization, and fine-tuning the FSM logic. Performed validation testing across multiple open/close cycles to confirm TPM targets, especially focusing on motor load handling, Wi-Fi reliability, and response delay. Sketch Placeholder: 🖼 (Bridge control wiring and FSM diagram to be hand-drawn). Next week, plan to enhance system documentation, verify full test results, and assist with integration for final demonstration.

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Date: Week 13, 2025

Today marked our **final presentation and demonstration day**. I focused on preparing the system for live operation, running the bridge automation cycle multiple times to ensure consistent motor lift speed, LED signalling, and Wi-Fi dashboard response. Before the demo, I recalibrated the sensors and verified all TPM evidence was ready for submission. During the presentation, our ESP32-controlled system performed smoothly — the bridge lifted and lowered within the 5-second target, traffic lights synchronised perfectly, and all safety interlocks functioned as designed.

I felt proud seeing months of work run seamlessly in real time and appreciated how every subsystem came together into one cohesive demonstration.

Appendix A: Materials & Components Used

- ESP32 Microcontroller
- Ultrasonic Sensors (HC-SR04)
- L298N and BTS7960 Motor Drivers
- DC Motor with Encoder
- 12V 5A Power Supply
- Traffic Light LED Modules
- Servo Motors (for boom gates)
- Breadboard, wires, resistors, buck converter

Appendix B: Code and Testing Evidence

Included snippets:

- FSM (Finite State Machine) control logic
- Sensor calibration and filtering code
- PI controller for motor speed and angle
- Wi-Fi auto-reconnect and dashboard interface

Screenshots or test logs may be attached later.

Appendix C: Reflection Summary

Throughout this project, I strengthened my skills in embedded systems development, debugging, and system integration. I learned to identify and solve electrical interference issues, perform calibration with quantitative validation, and manage teamwork under strict deadlines. Applying structured testing and design trade-offs improved not only the project outcome but also my engineering judgment and confidence.

Student Declaration

I, Mohammad Nazimuddin (47636491), declare that this logbook represents my own individual work for the ENGG3000 Engineering Project, and that all entries are a true record of my weekly progress throughout Session 2, 2025.

Signature: ___MOHAMMAD NAZIMUDDIN _____
Date: ____10/11/25_____