EAT40005 Engineering Technology Projects A

Individual Work Log

PROJECT NAME:	OBD-II Based Predictive Maintenance System		
STUDENT NAME:	**Dang Khoa Le**		
STUDENT ID:	**103844421**	**WEEK # (& dates covered):**	**#12 (27–31 May 2025)**

TASKS	STATUS	TIME SPENT	ACTION ITEM/NOTE
Added naming support in dashboard for log sessions	Completed	1 hours	Allow logs to be named (or tagged) for easier reference and dev-team coordination
Investigated Raspberry Pi WiFi + serial dual-channel polling strategies	Completed	1 hour	Reviewed serial multiplexing and WiFi switching strategies to support simultaneous OBD and backend communication
Conducted literature review on unsupervised methods for driving style detection	Completed	1 hours	Reviewed clustering (K-Means, DBSCAN), rate-of-change metrics, and dimensionality reduction techniques in vehicle telemetry labelling.
Merged and cleaned all datasets collected up to Week 12	Completed	2 hours	Combined previous CSVs into one standardized dataset. Ran updated EDA for insight tracking and consistency
Communicated with client on slowed progress due to final-week exams and major unit deadlines	Completed	0 hour	Briefed client on current workload and project balance; acknowledged and accepted by client.
TOTAL WEEKLY TIME SPENT		**5 hours**	

TASKS PLANNED FOR NEXT WEEK	EXPECTED COMPLETION
Deploy dashboard session naming input from frontend	Week 13
Explore unsupervised clustering for backup drive_style label	Week 13
Explore unsupervised clustering for maintenance need label	Week 13 – Sprint 4

Summary/weekly reflection for Week 12:

- **Key Tasks Done:**

- This week was mainly reflective and exploratory. The dashboard was updated to support **session naming**, making it easier for developers and testers to reference each log batch. We explored Raspberry Pi network limitations and identified that **true parallel WiFi + OBD-II access** would likely require timed toggling or use of a second interface.
- We **reviewed clustering and unsupervised ML methods** for driving style labeling, and found they can support—but not replace—manual tagging. As such, the hybrid method remains our target.
- A full **merge and standardization of all drive trial CSVs** was completed to ensure feature consistency and facilitate downstream model training.
- Due to final assignments and exams across multiple units, we communicated openly with the client regarding time constraints. The feedback was understanding, and expectations were adjusted for the week.

- **Key Learning:**

- Even basic UX improvements (like naming sessions) improve team coordination and data traceability.
- Raspberry Pi's limitation in simultaneous WiFi/serial access needs a realistic workaround like **5s batch polling and switching**.
- Unsupervised labeling methods like clustering require careful interpretation and cannot fully substitute human oversight.

- **Literature/Resources Reviewed:**

- Raspberry Pi dual-interface networking guides.
- K-Means and DBSCAN clustering in vehicle sensor analysis.
- Research papers on autonomous driving datasets and labeling strategies.
- Streamlit vs Flask/Dash for data dashboarding.

- **Issues Faced:**

- Team availability limited by university-wide exam week.
- Raspberry Pi network constraint unresolved but mitigated via batching concept.
- Synchronizing updated EDA with prior inconsistent formats required standardization.