Graha Research

Research Internship · 18-Week Gantt Project Plan

Digital Twin Platform

Develop a Digital Twin platform that mirrors onboard vehicle systems in real time, fusing sensor telemetry with physics- and data-driven models for simulation, monitoring and what-if analysis.

18
Weeks

6
Planning Clusters

1
Thesis / Collaboration

Graha International GmbH · Herzogstandstr. 8 b, 85540 Haar, Germany · info@graha.de

Research Internship

Four 18-week Gantt Project Plans for thesis and research collaboration

Graha International GmbH offers four structured research internships, each delivered as an 18-week Gantt Project Plan organised into six best-practice planning clusters. This document details the internship highlighted below.

INTERNSHIP 01

Predictive Maintenance Platform

Design and prototype a predictive-maintenance platform for connected vehicles that combines multivariate time-series modelling, causal AI and explainable remaining-useful-life estimation.

INTERNSHIP 02

ESG Platform with GraphRAG

Build an Environmental, Social and Governance (ESG) analytics platform that uses a Knowledge Graph and Retrieval-Augmented Generation (GraphRAG) to turn fragmented sustainability data into explainable, auditable ESG insights.

INTERNSHIP 03

Digital Product Passport Platform

Implement a Digital Product Passport (DPP) platform for connected-vehicle components that captures lifecycle, material and circularity data in an interoperable, data-sovereign data-space architecture.

INTERNSHIP 04

Digital Twin Platform

Develop a Digital Twin platform that mirrors onboard vehicle systems in real time, fusing sensor telemetry with physics- and data-driven models for simulation, monitoring and what-if analysis.

This document, Digital Twin Platform

Develop a Digital Twin platform that mirrors onboard vehicle systems in real time, fusing sensor telemetry with physics- and data-driven models for simulation, monitoring and what-if analysis.

Our Research Plan

Digital Twin Platform · 18-Week Gantt Project Plan

Overview

This internship contributes to Graha International's research on onboard and offboard predictive applications for connected vehicles. The intern designs and prototypes a Digital Twin platform that maintains a live, synchronised virtual representation of a vehicle subsystem and supports simulation, monitoring and what-if analysis.

Structured as an 18-week Gantt Project Plan, the work is suitable as the practical basis for a Bachelor's or Master's thesis or a research collaboration. It emphasises real-time data fusion, model fidelity and the link between digital twins and predictive maintenance.

Objectives

- Define the scope and fidelity of a digital twin for a chosen vehicle subsystem.
- Build a real-time data-fusion pipeline linking sensor telemetry to the twin state.
- Combine physics-based and data-driven models to estimate the twin's behaviour.
- Enable simulation and what-if analysis on the digital twin.
- Evaluate twin fidelity, synchronisation latency and predictive usefulness.

Candidate Profile

- Studies in Computer Science, Mechatronics, Electrical/Mechanical Engineering or a related field.
- Solid Python skills; familiarity with modelling, simulation or control concepts.
- Basic understanding of sensor data, real-time systems and machine learning.
- Interest in digital twins, connected vehicles and predictive analytics.
- Independent, structured working style and good scientific-writing skills.

18-Week Gantt Project Plan

The plan is organised into six best-practice planning clusters spanning 18 weeks. Each cluster states its focus, key activities and a milestone that must be reached before the next cluster begins.

WEEKS 1-3

Cluster 1 - Onboarding & Foundations

Settle in, set up the working environment, and agree the detailed plan and success criteria with the academic and industrial supervisors.

KEY ACTIVITIES

- Onboarding at Graha International: tooling, data-governance and NDA briefing.
- Familiarisation with digital-twin concepts, vehicle subsystems and existing Graha assets.
- Set up a reproducible environment: version control, experiment tracking and a containerised workspace.
- Refine scope, success criteria and the detailed 18-week work plan with the supervisor.

Milestone, Approved internship work plan and a running, reproducible development environment.

WEEKS 4-6

Cluster 2 - Literature Review & Requirements

Build the scientific foundation through a structured literature review and a precise requirements and evaluation specification.

KEY ACTIVITIES

- Structured literature review on digital twins, data fusion and hybrid modelling.
- Survey of digital-twin reference architectures and simulation tooling.
- Stakeholder and requirements analysis; definition of the core use cases and KPIs.
- Draft the conceptual approach and the evaluation methodology with metrics and baselines.

Milestone, Literature-review report and an agreed requirements and evaluation plan.

WEEKS 7-9

Cluster 3 - Data Engineering & System Architecture

Prepare the data assets and design the digital-twin platform architecture.

KEY ACTIVITIES

- Acquire, profile and clean the sensor telemetry for the chosen subsystem.
- Select the twin scope and fidelity; define the state representation.
- Design the platform architecture: ingestion, twin state, modelling, simulation and view layers.

- Specify the synchronisation strategy and the interfaces between components.

Milestone, Architecture design document and a prepared, documented telemetry dataset.

WEEKS 10-13

Cluster 4 - Implementation & Modelling

Implement the platform and the physics- and data-driven twin models.

KEY ACTIVITIES

- Implement the real-time data-fusion pipeline that updates the twin state.
- Develop the physics-based and data-driven models and combine them into a hybrid twin.
- Implement the simulation and what-if analysis engine.
- Build a monitoring dashboard that visualises the twin and its predictions.

Milestone, Working Digital Twin prototype covering the core monitoring-and-simulation use case.

WEEKS 14-16

Cluster 5 - Evaluation, Validation & Hardening

Evaluate, validate and harden the prototype against measured behaviour.

KEY ACTIVITIES

- Define and run experiments on twin fidelity, synchronisation latency and prediction error.
- Validate simulated behaviour against measured telemetry.
- Assess robustness to missing or noisy data; check reproducibility of results.
- Iterate on the models and the synchronisation logic based on the findings.

Milestone, Evaluation report with quantitative results and a validated, hardened prototype.

WEEKS 17-18

Cluster 6 - Documentation, Thesis & Final Defence

Consolidate the documentation, draft the thesis material and present the results.

KEY ACTIVITIES

- Consolidate code, documentation and reproducibility instructions.
- Write the thesis-ready report covering method, results and limitations.

- Prepare and deliver the final presentation and a live demo.
- Hand over the platform, datasets and the backlog of future work to Graha.

Milestone, Final thesis-ready report, final presentation and a complete handover package.

Expected Outcomes

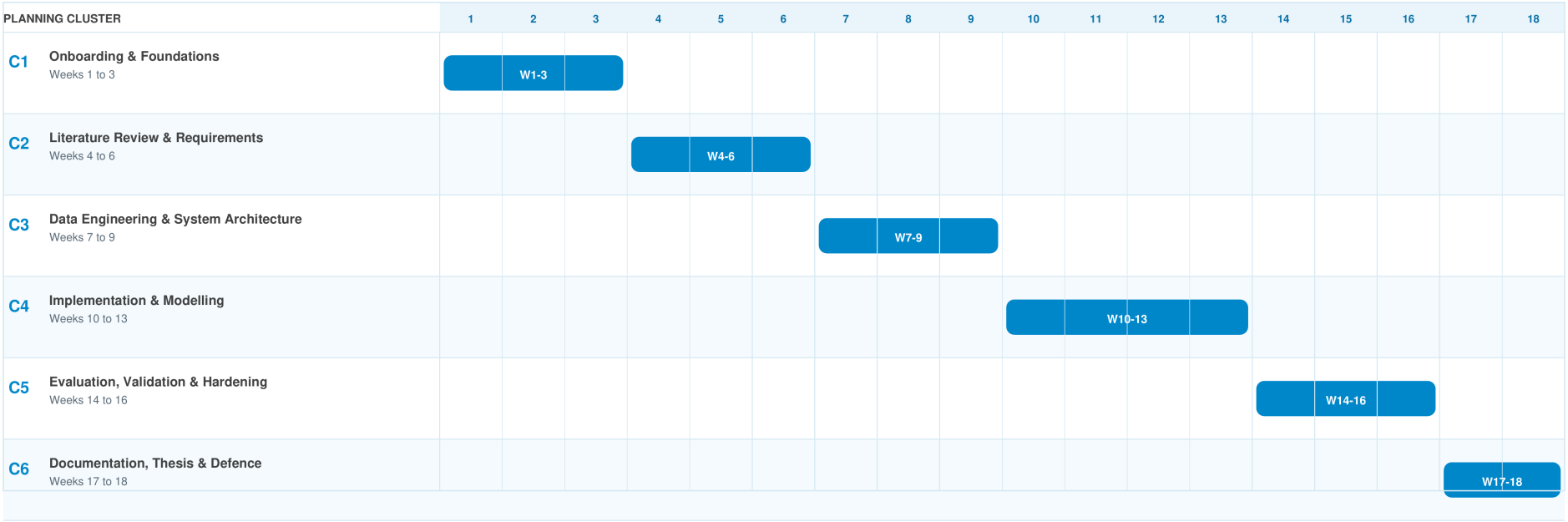
- A reproducible, documented Digital Twin platform prototype.
- A real-time data-fusion pipeline and a hybrid twin model.
- A simulation and what-if analysis capability for a vehicle subsystem.
- A thesis-ready scientific report on digital twins for predictive analytics.

Project Timeline (Gantt Chart)

The 18-week plan visualised as a Gantt chart across Week 1 to Week 18.

18-Week Project Timeline

Six best-practice planning clusters across Week 1 to Week 18



Graha International GmbH

Herzogstandstr. 8 b
85540 Haar
Germany

Contact

E-Mail: info@graha.de