WM9RW-15 Data-Driven Manufacturing and Industrial AI

27/28

Department
WMG
Level
Taught Postgraduate Level
Module leader
Manoj Babu
Credit value
15
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This module offers a practical, project-based exploration of how Artificial Intelligence (AI) can be applied to solve challenges in modern industrial settings. The core of the module involves training a machine learning model and deploying it on accessible edge computing hardware. The module will aim to cover the entire workflow from data collection with sensors to intelligent, real-time decision-making.
When this module is delivered on any overseas programme, it is delivered in a 2-week block rather than over 4 weeks.

Module aims

This module aims to provide a conceptual and practice-based exploration of how Artificial Intelligence can be applied to solve challenges in modern industrial settings. Specifically focusing on low powered edge devices. The module will aim to develop a functional Proof-of-Concept (PoC) for a given manufacturing problem, such as anomaly detection or automated product inspection. Students will work with representative sensing technologies and lab-based equipment to construct a basic data acquisition workflow.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

1. Sensing and Data Acquisition
2. Applied Machine Learning
3. Edge Computing (TinyML)
4. Integration and Evaluation

Learning outcomes

By the end of the module, students should be able to:

- Appraise appropriate sensors and communication methods to capture a representative dataset for demonstrating a solution to a defined manufacturing problem.
- Design data analysis techniques to develop and validate a machine learning model that addresses the core requirements of a chosen proof-of-concept.
- Evaluate the principles of edge computing and demonstrate the deployment of a trained AI model onto a target hardware platform to perform basic inference.
- Integrate the core components—sensing, data processing, and an embedded AI model—into a cohesive proof-of-concept that demonstrates a simplified, end-to-end intelligent workflow.
- Evaluate the functionality of the developed proof-of-concept, analysing its strengths, limitations, and the necessary steps required to scale it into a viable, real-world industrial system.

Indicative reading list

Reading lists can be found in Talis

Specific reading list for the module

Subject specific skills

Data Extraction; Data Analysis; ML Model Building and Deployment

Transferable skills

Team Work; Technical Communication; Problem Solving

Study

Study time

Type	Required
Lectures	16 sessions of 1 hour (32%)
Seminars	10 sessions of 1 hour (20%)
Tutorials	4 sessions of 1 hour (8%)
Online learning (independent)	20 sessions of 1 hour (40%)
Total	50 hours

Private study description

Researching of open source frameworks for Edge AI development and deployment; Exploring Edge AI hardware ecosystem;

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time	Eligible for self-certification
Assessment component			
Case Study/Proposal	30%	18 hours	No
A presentation describing the fundamental principles of design for an industrial AI application. Peer marking will be applied in accordance with WMG policy.			
Reassessment component			
Resit Case Study/Proposal			No
A written report incorporating the feedback from the first submission where applicable. It will describe the fundamental principles of design for an industrial AI application.			
Assessment component			
Final portfolio	70%	42 hours	Yes (extension)

	Weighting	Study time	Eligible for self-certification
As portfolio of code, report, video submitted for a specified problem or chosen case study.			

Reassessment component

Final portfolio	No

As portfolio of code, report, video submitted for a specified problem or chosen case study.

Feedback on assessment

Feedback given as appropriate to the assessment type:

- verbal feedback given during seminar/tutorial sessions.
- written individual feedback on the assignment report and code.

Availability

There is currently no information about the courses for which this module is core or optional.