

**Title of Project:** Edge Artificial Intelligence for Marine Monitoring

**Names of supervisors:**

Name	Affiliation (AIMS or JCU)
Paul Rigby*	AIMS
Dr. Dmitry Konovalov	JCU
A/Prof Hossein Ghodosi	JCU

**Contact:** Paul Rigby [p.rigby@aims.gov.au](mailto:p.rigby@aims.gov.au)

**Brief description of the project**

Artificial Intelligence (AI) and Machine Learning methods are emerging as valuable tools for processing and analysing the vast datasets which are often acquired during marine monitoring. Within the marine science domain, these techniques have revealed insights into time series data, imagery, and acoustic samples.

Typically, data is acquired by a field team, and then data analysis and knowledge production are conducted over the subsequent weeks and months, often using high performance computing equipment. The goal of this project is to investigate how initial processing of large datasets can be completed in near real time in the field to allow science missions to be adaptively changed, and information more readily provided to stakeholders. By conducting processing closer to the data acquisition component in the data acquisition & processing chain, there is reduced overheads in data management & handling at the system level. This results in quicker decisions and streamlined processing.

The project will be achieved using 'Edge Artificial Intelligence' (Edge AI), where AI algorithms are executed locally on an embedded computing device close to the source of the data. Over the past few years, a new generation of hardware architectures optimized for AI workloads have made it feasible to deploy trained AI models on low cost hardware suitable for embedding into field systems. By providing information and identifying unusual features in near real-time, such a system could enable scientists to adaptively optimise the sampling design whilst still in the field, thereby obtaining more scientific information for a given resource use. It would also enable decision makers to react whilst in the field and collect targeted datasets as a result of the Edge AI driven information sets.

**This project would suit someone who:**

The PhD project proposal revolves around development and implementation of algorithms to run in near-real-time on small embedded computing hardware in the marine environment. The candidate is expected to possess and be willing to further develop high-level quantitative analysis and machine learning techniques to progress this project. Demonstrated strong skills in programming and data science will be required. The candidate should have an interest in understanding and working with large collections of scientific marine imagery and other data. Some previous exposure to GPU-accelerated computing, FPGAs, or embedded AI computing devices e.g. NVIDIA Jetson, would be highly regarded.

**Key words:** Machine Learning, artificial intelligence, artificial neural networks, algorithm development, computer vision, automated quality control, embedded computing, Edge AI