



## Nelson Mandela University-Marine Robotics Unit



eNtsa - Nelson Mandela University

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Nelson Mandela University-Marine Robotics Unit

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INNOVATION THROUGH ENGINEERING

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# Nelson Mandela University-Marine Robotics Unit



Technology Station Programme (TSP)

Friction Process Development, Large Engineering Projects, Materials Research and Controls Engineering



Research



Supplier Development



Training Academy

Teaching, Interns, Student projects, Masters and PhD

Internships & training



Component and material testing



Battery Systems, Electric Drive Trains and Charging Infrastructure

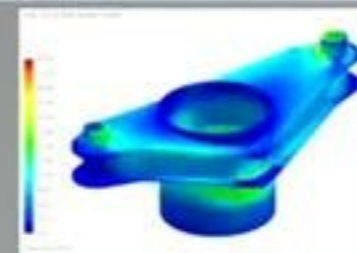
Thought leadership



Composites Innovation Centre



Advanced Engineering modeling



Engineering Innovation and Technology Transfer

Marine Robotics Unit (MRU)



# MRU –History

September 2017  
Launch :Ocean  
Sciences Campus

May 2018  
Visit: National  
Oceanographic  
Centre (NOC)

Southampton, UK  
Trondheim  
Norway

July 2018  
MerSETA support  
for Autonomous  
vehicles:  
Ocean Glider  
Project

March 2019  
Establishment of the  
Marine Robotics Unit  
(MRU) at the Nelson  
Mandela University

November 2019  
SAIMI : Funding  
application for the  
Establishment of the  
Marine Robotics  
Center

June 2020  
SAIMI : Funding  
approved for the  
Establishment of  
the Marine  
Robotics Center

# MRU – Provide platform to develop skills (Surface Autonomous

Vess



# MRU – Provide platform to develop skills (Surface Autonomous

Vessel)



## MRU – Platform Testing (Surface Autonomous Vessel)





# MRU – Platform Design



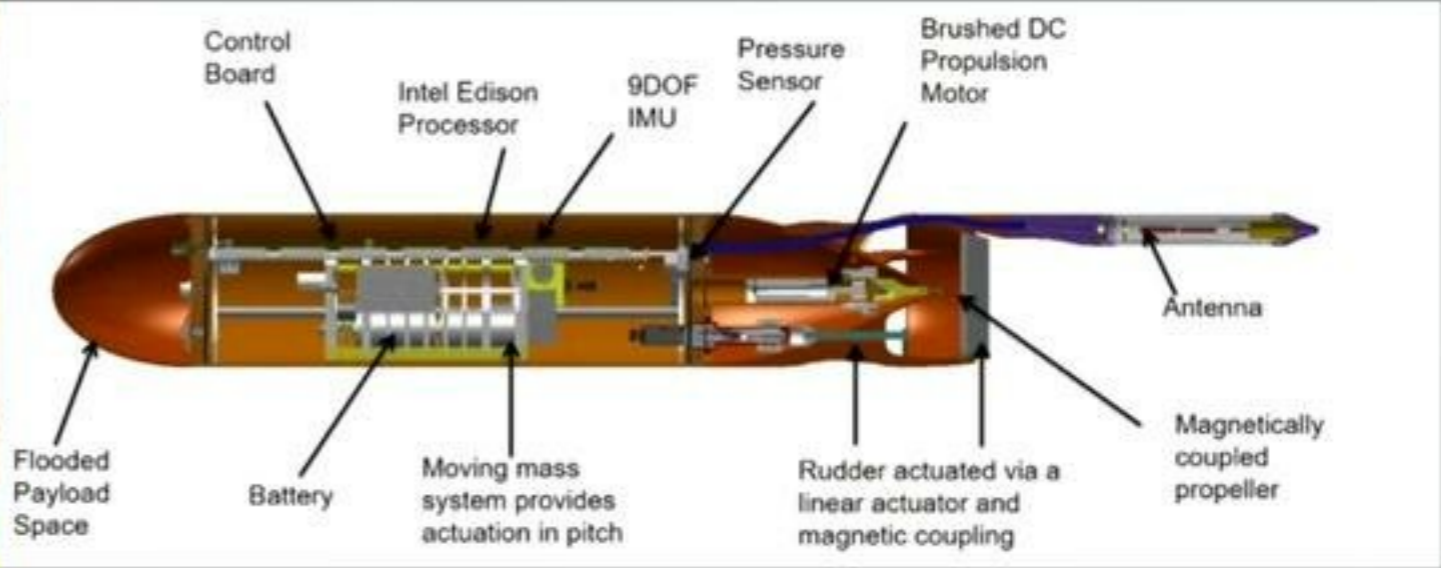
## MRU – New Platform Build (Surface Autonomous Vessel)



## MRU – New Platform Build (Surface Autonomous Vessel)



# MRU – New Equipment Advanced Training (ECOSUB)



## MRU – New Equipment Advanced Training (ECOSUB)



ecoSUB μ

ecoSUB m

[www.ecosub.uk](http://www.ecosub.uk)

ecoSUB  
robotics

Planet  
Ocean Ltd

National  
Oceanography Centre  
NATURAL ENVIRONMENT RESEARCH COUNCIL



## MRU – Plymouth University (Autonomous Boat)



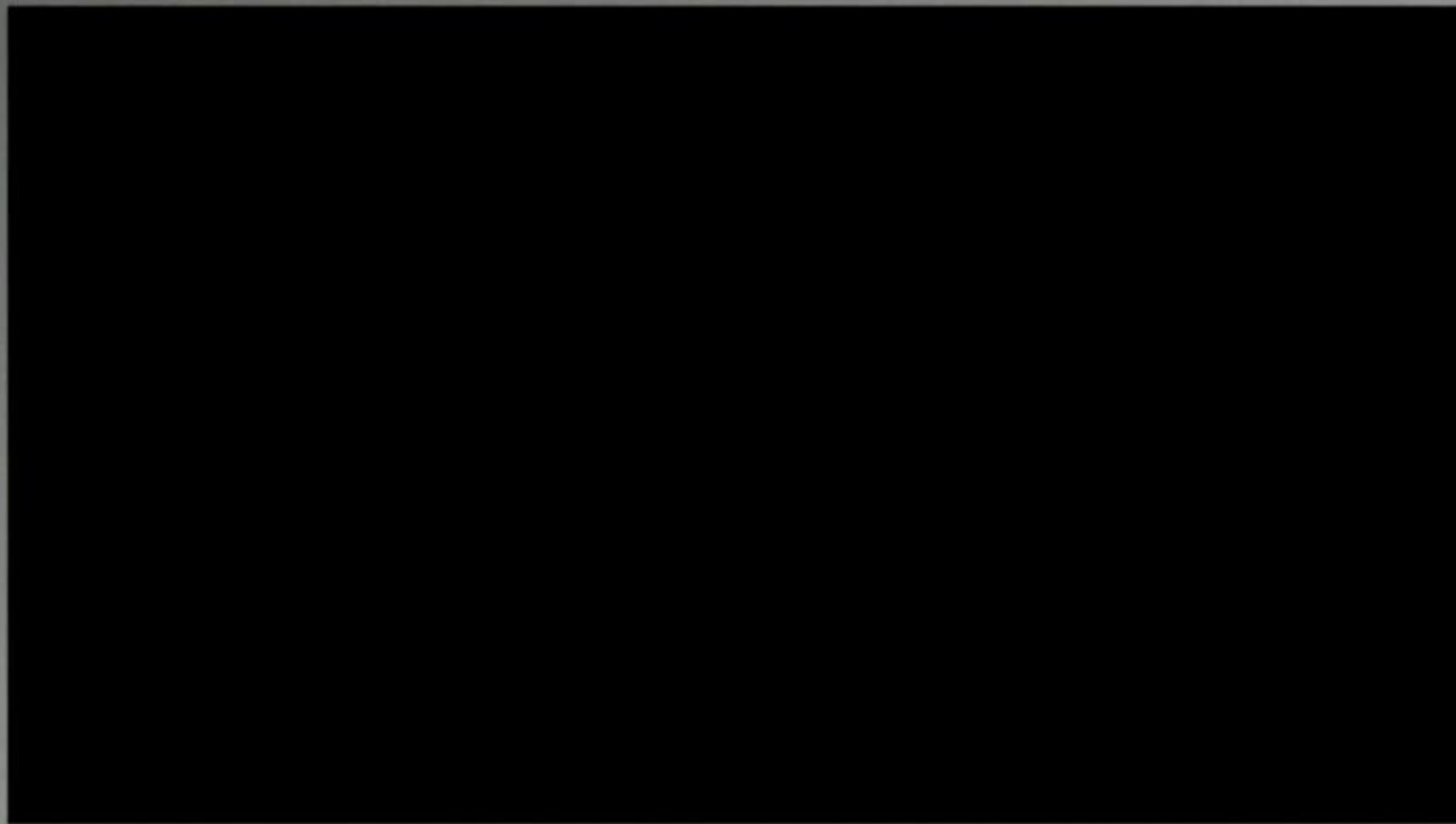
# MRU – Port Based Autonomous Drone - Prototype



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## MRU – Port Based Autonomous Drone - Prototype





# MRU – Airborne Drone - Prototype



## MRU – Testing and Training (last 3 months)

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## Notes on Maritime 4iR

### What is 4iR

The 4th Industrial Revolution (4iR) is a fusion of advances in artificial intelligence (AI), robotics, the Internet of Things (IoT), genetic engineering, quantum computing, etc.

### Why should we pay attention

The Fourth Industrial Revolution is transforming the way we live and can radically disrupt every business sector starting from finance, to transportation to healthcare or media.

### What is Automation

Automation is the application of technologies to produce and deliver goods or services with little human intervention.

### Skills required

- Complex Problem Solving
- Critical Thinking
- Creativity
- People Management and Coordinating
- Judgement and decision making
- Service Orientation
- Cognitive Flexibility

*According to the World Economic Forum*

*Although the fourth technology revolution is said to fast replace human beings with machines, it also creates new job positions aligning the scales!*

*People will continue to play a pivotal role in shipping regardless of machine learning or unmanned, autonomous vessels*



# Jobs that will be in demand in Maritime Industry

## 1. Ship Automation Specialist

Engineers, software developers and mechanics who can work on the new technology are already increasingly in demand.

## 2. Cyber Security Specialist

The cyber security crisis is more rampant than ever, especially when it comes to maritime.

## 3. 3d Printing Technician

Potential of using 3D printing techniques to produce vessel components

## 4. Energy Efficiency Specialist

Regulations requiring continuous actions and created positions such as environmental managers and personnel for the construction of new type of engines, new types of fuels and other related initiatives.

## 5. Data Protection Specialist

Personal data protection requirements are among the latest developments in the shipping industry.

## Notes on Maritime 4iR and Automation



### What are the Policy Enabling Requirements

#### **1. Create and Enabling environment for Automation**

Automation leads to improved Efficiency, Increased Production, Enhanced Safety and Job Creation

#### **2. Skills**

Start facilitating upskilling and retooling

#### **3. Invest in 4iR**

Allow for competitive technology development

# MRU – Research Projects



Student	Qualification	Description	Supervisor
Winston Dyason	PhD	Machine-learning based approach for controlling VTOL aircraft around moving platforms/targets at sea for BVLOS (beyond visual line of sight) operation	Prof Shengzhi Du, Prof Barend van Wyk
Shaaista Gaffoor	PhD	An artificial intelligence solution that enables accurate and precise identification of organisms, assessments of abundances and measurement of size	Prof Theo van Niekerk,
Elbert Liebenberg	PhD	TBD- Control System	Prof Theo van Niekerk,
Alpheus Nkoana	M.Eng	Underwater wireless power transfer	Prof Peter Freere
Emmanuel Jegede	M.Eng.	MRU006- Beamforming for Marine Robotics	Prof. Tim Gibbon, Prof Theo van Niekerk