# Group Project Systems Approach

# Introduction

Aim: Utilise integrated autonomous technologies to enhance and develop waste management in coastal areas

Objectives:

* Integration of several individual systems to produce a more complex system of systems, capable of delivering user specified tasks
* Automation of whole system to minimise human interactions
* Effective and comprehensive movement of different materials to specified areas

# Requirements Specification

## Navigation and mapping

Description

The system will map objects’ locations and the position of the tide. This information will be used to task sub-systems and determine routes for them to travel.

Stimulus/Response Sequences

Objects on the surface will be detected and their coordinates noted. A sub system will then receive these coordinates and move to that position, avoiding any potential hazards. This process will be utilized again when the type of material has been determined and the sub system will move to its designated bin.

Functional Requirements

NM\_REQ\_1: System must detect all objects within the designated area

NM\_REQ\_2: System must build database of all objects’ coordinate locations

NM\_REQ\_3: System should send coordinates to specific sub system

NM\_REQ\_4: Sub system should path find to designated coordinates without interfering with other hazards or objects

## Identification and sorting

Description

The system should be able to differentiate between types of materials and tag them appropriately.

Stimulus/Response Sequences

A series of LEDs will be identified by the system and bin type deciphered. Objects found within the designated area will have their type determined and this be tagged for further processing.

Functional Requirements

IS\_REQ\_1: System must decode series of lights

IS\_REQ\_2: System must determine types of objects due to material made of

## Wildlife mitigation

Description

The system should be able to detect different wildlife in the locale and react appropriately.

Stimulus/Response Sequences

Crabs will be detected by the system and their paths tracked. Seagull noises will be acoustically recognised, prompting an appropriate response.

Functional Requirements

WM\_REQ\_1: System will identify when in presence of wildlife

WM\_REQ\_2: System should track movements of wildlife when appropriate

WM\_REQ\_3: System will conduct mitigation procedure when wildlife detected

## Collection and delivery

Description

The system will pick up and collect various objects from the designated area and deposit them to a pre-determined location.

Stimulus/Response Sequences

Upon arrival at an objects location, the system will attempt to pick up said object before moving to the coordinates of its corresponding bin. Here the system will release the object before waiting for new tasking.

Functional Requirements

CD\_REQ\_1: System will acquire and pick up an object from a specified location

CD\_REQ\_2: System will deposit object after arrival at specified location.