RoboChart: Practical 1
Software Engineering for Robotics

Alvaro Miyazawa
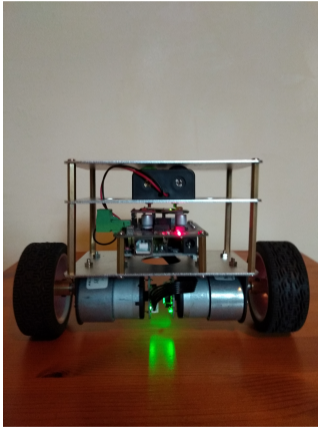

robostar.cs.york.ac.uk

Royal Academy of Engineering

EPSRC
Engineering and Physical Sciences
Research Council

RoboTool Installation

- ► Zip file; or
- ► **RoboTool Manual**:
    - ► Eclipse 2021-12: modelling tool package
    - ► Update site: https://robostar.cs.york.ac.uk/robotool/update
    - ► Suggested plugin categories: RoboChart, RoboChart Generator (CSP generator).

Practical 1: Segway

- ▶ Sensors:
  - ▶ Inertial Measurement Unit
  - ▶ Left and Right Hall Effect Sensors
- ▶ Actuators:
  - ▶ Left and Right Motors
  - ▶ Timer and Interrupt Handler

DEMO

Exercise 1: Alpha Algorithm

The basic alpha algorithm is very simple:

- ▶ The default behaviour of a robot is forward motion.
- ▶ While moving each robot periodically sends an "Are you there?" message. It will receive "Yes, I am here" messages only from those robots that are in range, namely its neighbours.
- ▶ If the number of a robot's neighbours should fall below the threshold α then it assumes it is moving *out* of the swarm and will execute a 180° turn.
- ▶ When the number of neighbours rises above α (when the swarm is regained) the robot then executes a random turn. This is to avoid the swarm simply collapsing in of itself.

Exercise 1: Alpha Algorithm

Tasks:

1. Define the robotic platform.
2. Define the module: controller(s) and connections to platform.
3. Define a state machine to model movement control.
4. Define a state machine to model neighbour detection.
5. Connect state machines to controllers.