

Exploring & Self Learning Robots

...

November 2nd 2017

The Team



Gareth Pulham

MEng Software Engineering

Background in embedded
and GPGPU



Sam Dixon

MEng Software Engineering

Background in distribution
and machine-learning

The Project

- Exploring and learning robots
- Why is this important?
 - Increasing robotic exposure to unfamiliar environments
 - Increasing robotic exposure to novel tasks
 - Combination of the two in a mutable world

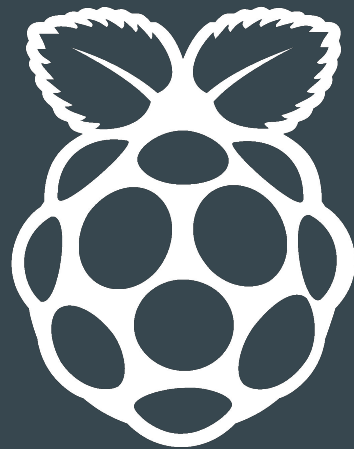
Previous work - Where we're coming from

MSc student working on robotic capture-the-flag

MEng student implementing computer vision

Self-driving cars

Autonomous exploration



Our Proposal - What we want to do

Arrival & SLAM

The robot arrives at the mission destination.

- Begin to map the mission area - SLAM
- Identify resources, goals, hazards, etc

Self Training

Once mission objectives have been identified, simulate strategies to complete the mission.

- Jetson accelerated GA and learning

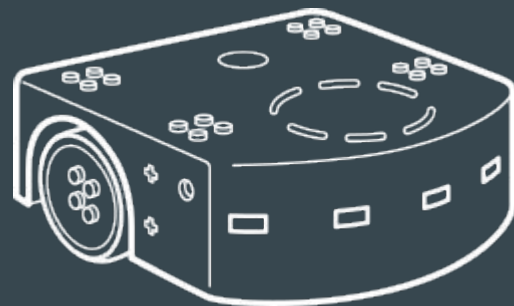
Execution

Carry out the mission according to surroundings and learning controllers.

Incorporate real world execution fitness to the learned model.

Our Proposal - Technology

- Thymio II
 - Cheap, simple robot with a multitude of sensors
- Nvidia Jetson
 - Tegra SoC development boards
 - Accelerated training and robot control
 - TX1 and TX2 models
 - 256 CUDA cores



Our Proposal - Results and Deliverables

Deliverable 1

- Porting robot simulator to Jetson

Deliverable 2

- Implementing SLAM on Jetson-robot

Deliverable 3

- Optimise tooling and systems

Deliverable 4

- Documentation and Report

Our Proposal - Potential Problems

- Jetson weight
- Jetson/Robot power consumption
- Robot maneuverability
- Reality gap
- Scope of project

Questions

