0.1 Project Description

The project is being completed for Professor Karl Tuyls in the department of Computer Science, University of Liverpool. The Project is also applicable for anyone wishing to build an area in which to conduct simulations that utilise the E-Puck platform[1]

Project Aims include building the testing grounds for the robotic simulations as well as showing a demonstration of the arena through the use of the e-Puck hardware platform. With the completion of this project, researchers have the capability of producing a testing ground for their experiments with the e-Puck hardware platform. The demonstrative section aims to show that the arena is capable and performs it's required task.

The initial solution for the project involves using standalone posts, rope and two large pieces of cloth. By using the ropes in a similar manner to a boxing ring, the solution provides flexibility in terms of arena size yet still contains the e-puck robots. The posts will hold up the large pieces of cloth — a darker throw for the internal ceiling of the arena, and a lighter cloth for the theoretical 'roof' of the structure. The paler cloth reflects most external light which would otherwise cover the sectioned area; the darker colour absorbs light within the structure.

With this solution the size of the area can be modified thanks to the rope. The dual-layered cover prevents most light from entering the area. Openings that may be made within the lower layer of fabric would allow visual monitoring with little compromise.

There are multiple research papers on decentralised robots — for patrolling, there is the Edge Ant Walk (EAW) algorithm, which V. Yanovski has worked on [5]. Due to memory limitations, the demonstration will be similar to StiCo[3] as well as the work on HybaCo [2].

0.2 Statement of Deliverables

- Blueprints and Manual for constructing the Robotic Dark Room
- Source code for the program/s used to demonstrate the Dark Room using

the e-Puck Hardware Platform

Experiments include making sure program/s run successfully on the target platform, the robots sense light trails left in the dark room and that the robots have behaviour based on the light trails. The experiments can only work once the arena is built.

The main evaluation method will be the programs written to familiarise with the hardware platform. By utilising a program with basic behaviour patterns, improvements to the structure, and algorithms for the main software, can be made.

0.3 Conduct of Project and Plan

Research into Robotic implementations of pheromone-using insects will be the main area of research[5, 3, 2]. Tangentially relevant information includes looking into Auction-based methods of sharing tasks[4].

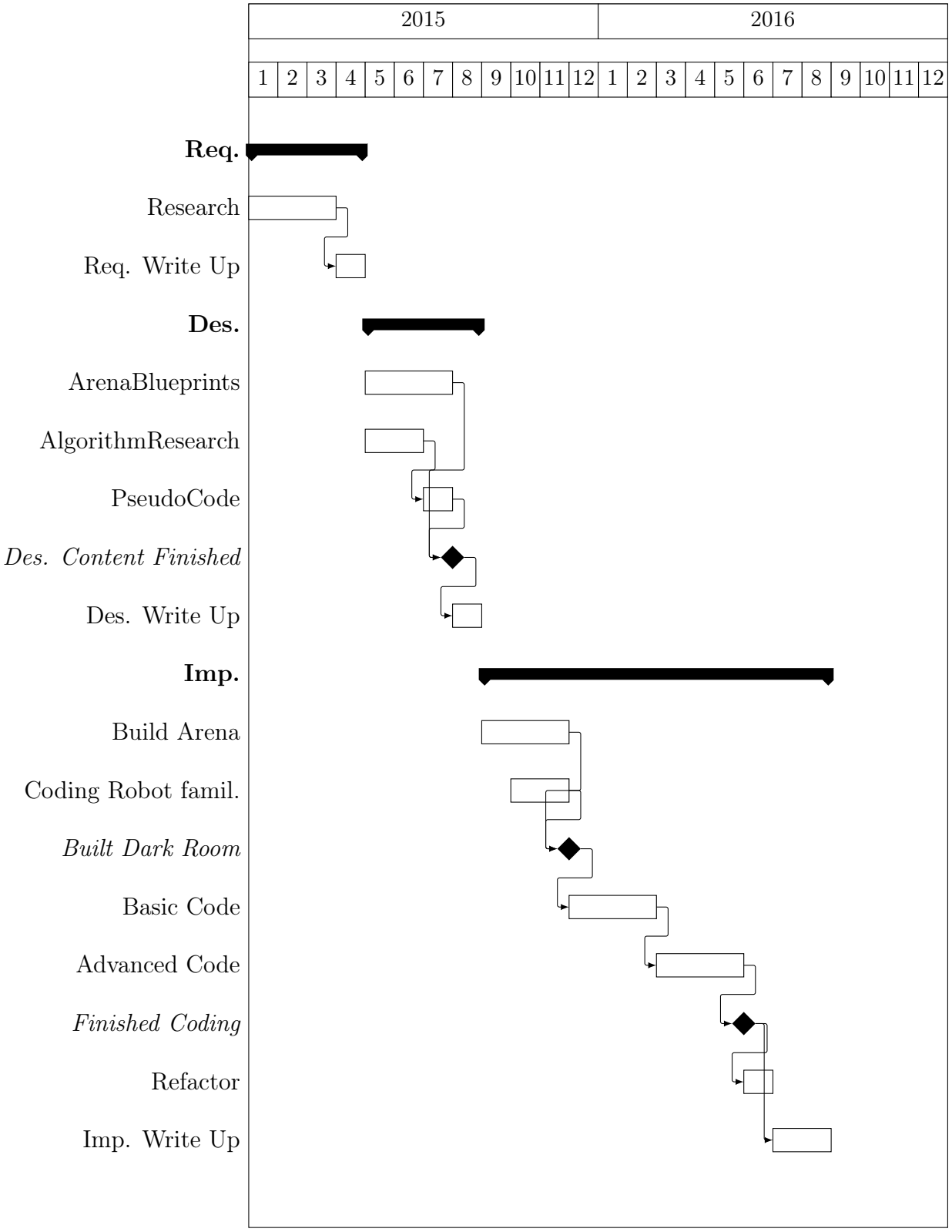
Information on the hardware and it's usage will be part of the required data, so that software can be created for the platform. Currently, there will not be any real data, both human and non-human, involved within this project.

The design stage will include potential blueprints for the construction of the dark room, including materials used, dimensions and functional criteria. This phase will also have a basic outline of the program in pseudo-code that will be written for the implementation stage.

The code will be written in C, and will be compiled for the e-Puck hardware platform. Basic testing will include making sure that the robots can successfully interact with the light trails on the floor. Later testing will include the benefits of adding more robots into the area at the same time.

The main challenge will be creating the dark room - the entire project fails otherwise. Coding an algorithm mimicking an insect's pheromone usage may bring a time constraint.

Skills developed include physical handiwork, coding for a platform that is not a workstation as well as a greater understanding of artificial intelligence and it's implementation in a language which is not logic-based, such as Prolog.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Basic Code
Advanced Code
Finished Coding
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