School of Computing  
CA326 Year 3 Project Proposal Form

**SECTION A**

Project Title H.A.R.O.L.D\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Student 2 Name Sean Moloney\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID Number 17477122

Student 3 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID Number \_\_\_\_\_\_\_\_\_\_\_

*(A third team member is exceptional and requires detailed justification.)*

Staff Member Consulted Alistair Sutherland\_\_\_\_\_\_\_\_\_\_\_

Project Description (1-2 pages):

H.A.R.O.L.D (Harold - Accurately - Repositions - Optically - Located – Doohickeys) is a robotic arm which is designed to pick up and reposition objects with the aid of a Convolutional Neural Network (CNN). We plan on buying a robot arm, probably an Arduino Braccio, and using multiple HIMAX cameras to help the arm orientate itself and locate the object as well as Piezoelectric sensors on the fingers to help to arm detect if it is grasping something and how well it is grasping said object. We will use a Movidius Neural Compute Stick to accelerate the network

Division of Work:

The majority of the work will be in training the network, due to the limited timescale we feel we should both work on training, using seperate pcs.

We also plan on using pair programming to develop a simulator so that we can train the network simultaneously without needing access to the arm itself.

we will also work together to overcome any mechanical issues we encounter.

Programming Languages:

The majority of this project will be using C++.

We will also use python to create the simulator, since we need it to be functional as soon as possible to maximise training time.

Programming Tools:

We will Gcc to compile any C++ that is outside the Arduino IDE.

We will use pytorch framework for training and developing the network

We will use the default python interpreter for any python scripts

Learning Challenges:

Due to the nature of this project we forsee that there will be numerous mechanical issues, which we plan to solve together since neither of us have extensive experience with robotics or mechatronics.

We will both be learning C++ for this project which will be a challenge in and of itself.

Learning to apply the simulated data to the actual network and get it to function with the arm.

Learning to train the network, and to do so efficiently, since our timeframe for the project is limited.

Hardware/Software Requirements:

We will be using an Arduino as the main controller

we will also be using a Neural Compute Stick to accelerate the inference, and to allow us to use that we will be using OpenVINO API

Special hardware / Software Requirements:

We will need to purchase a robot arm which is controlled by an Arduino, Neural Compute Stick, a number of HIMAX cameras, and 2 piezoelectric sensors.