**Title: Advanced prosthetic actuation system**

**Objective:**

The primary objective is to design a “visually select and actuate” subsystem.

(This will be used in future within a larger prosthetic system).

**Scope of work:**

The subsystem consists of the following components:

1. A moving platform, that comprises the following:
2. A camera connected to a first gimball
3. An actuator connected to a second gimball. In the first case, the actuator is a laser light source, wherein “actuation” refers to switching on the laser when it has focused on the target object.
4. A touch screen User Interface.
5. A programmable controller.

**Stage 1 of project:**

The camera connected to the first gimbal provides a live feed to the touch screen user interface. The user must be able to select multiple objects on the UI. The actuator then needs to exactly point at the selected objects and then actuate. As a simplified case, the actuator, i.e. in this case a laser, will focus light on the selected objects one after another. Hence, we can visually verify that the actuator precisely aims at the selected objects one after another. Note that all the above activities are performed on a moving platform that houses the camera, gimbal, actuator, UI and controller, wherein the objects are stationary.

**Stage 2 of project:**

The objects are automatically selected by image recognition.(rest of the activities same as in above detailed stage 1 of project).

**Example:**

For example, a Pi Cam housed on a first gimbal, connected to a Raspberry Pi controller (programmable controller). The Pi Cam outputs to a Touch screen or HDMI Monitor. The laser is housed on the second gimbal. All these components are housed on a small moving trolley platform (e.g hand pulled) on wheels. The objects will be three different colored cubes of size 10cm x 10cm x 10cm that is stationary and located at a distance of 10 ft from the camera. In the first stage of the project, the user will select these cubes on the monitor sequentially in a certain order, and the laser will point those cubes correspondingly in the same above mentioned order. In the second stage of the project, the software will automatically detect the cubes by image recognition, and the laser will then automatically focus on them sequentially.

A detailed documentation of the solution and software must be provided, and independent reproducibility will determine completeness of the project.

**Utility of the above subsystem system that will be used within a larger prosthetic system:**

A prosthetically disabled person will select activities to be performed using a touch screen UI, and the actuator, which may be a prosthetic device will point and directionally act at the selected objects in the UI.