**Practical Robotics and Smart Things 2020 Course Project**

**Project Name: Cine-Bot (CB-A1)**

**Project Author:**

**Description:**

**Cine-Bot α (CB-A1 for short) is a small camera controlling robot intended to be used for scale stop-motion animation/movie making.**

**CB-A1 aims to utilize the newest technologies in the IoT & robotics world.   
CB-A1 is comprised of 2 parts, the robotic cine arm (RCA) and motion capture controller (MCC). Although the RCA itself will have a screen, the MCC is used as a way to interface with the RCA remotely via a wireless connection. Via the MCC the operator can control every aspect of the RCA from the camera to motion programming. In the following section both components are discussed in more detail.**

**The RCA**

**The RCA is based on the Raspberry PI 4 4GB.**

***Sensors:***

* **Accelerometer**
* **Gyroscope**
* **Ultrasonic distance sensor for collision prediction**
* **IR distance sensor for collision prediction**
* **Light sensor**

***Image/Video capture & lighting:***

* **Raspberry Pi Camera v2**
* **LED Array for scene lighting**
* **Stepper/Servo motors for motion**

***User controls:***

* **LCD Touch screen for user interaction**
* **Buttons for motor jogging mode**
* **On/Off button**

***Movement:***

* ***Servo/stepper motors***

**The MCC**

**The MCC is also based on the Raspberry PI 4 4GB.**

***Sensors:***

* **Accelerometer**
* **Gyroscope**
* **Light sensor**

***User controls:***

* **LCD Touch screen for user interaction**
* **On/Off button**
* **Servo for collision warning system**

**Modes of operation**

1. **Full manual – control comes directly from MCC.**
2. **Manual Stabilized – control comes from the MCC but is filtered to remove shaking from the operator.**
3. **Learn & repeat – control comes from MCC once and then the path is remembered and can be executed again.**
4. **Tracking semi-auto – can lock onto object but is controlled by MCC.**
5. **Tracking auto – tracks object without ability for MCC control.**
6. **FrameX (auto after initial programming) – aka stop-motion mode. Follows path divided into frames, ideal for making a stop-motion sequence.**

**Use cases**

* **Move via MCC**
* **Program Robot to execute path**
* **Select object to be tracked**
* **Jog (Maintenance mode)**