BLOONS

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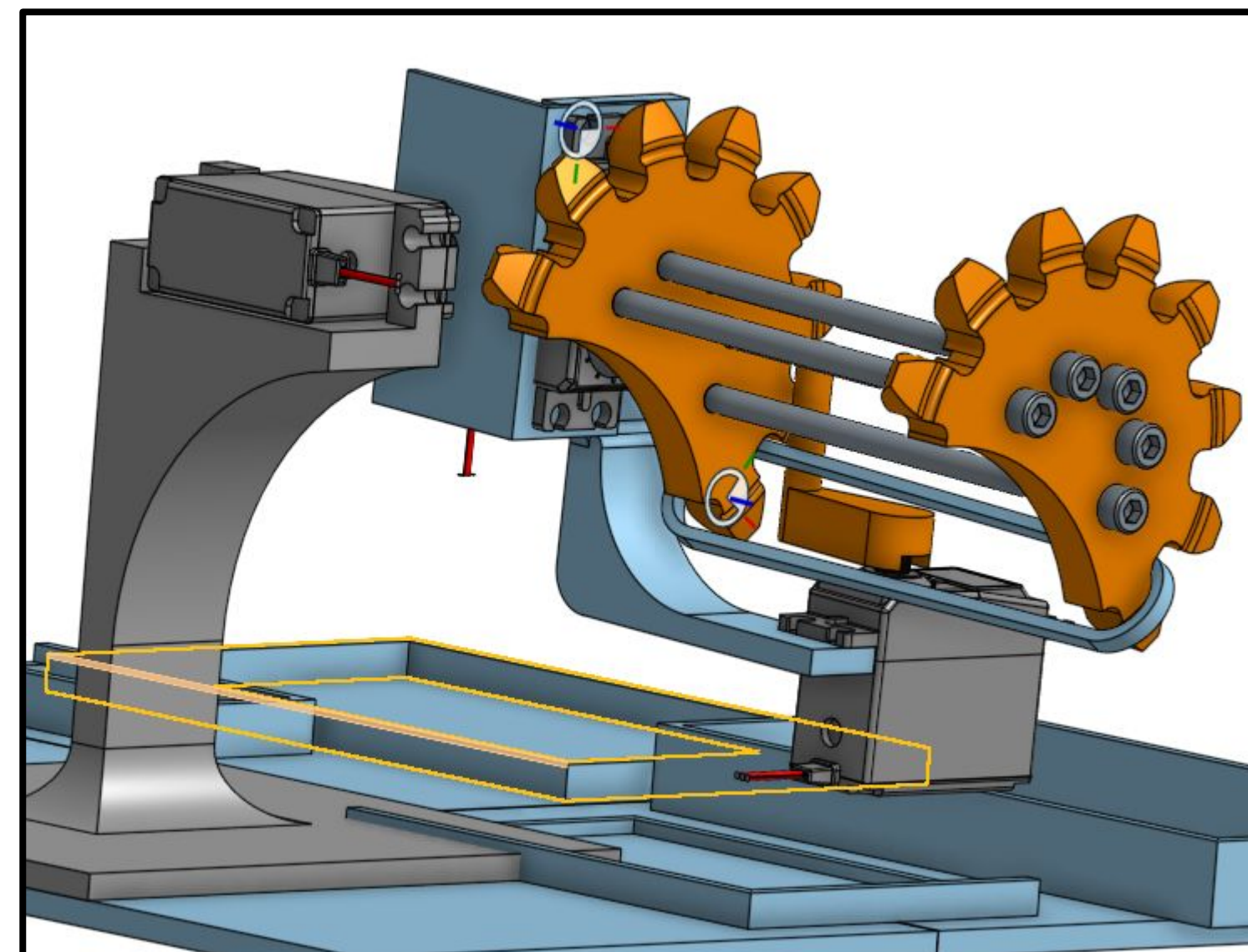## Introduction: Shooting Balloons: Autonomously and Manually

Idea:
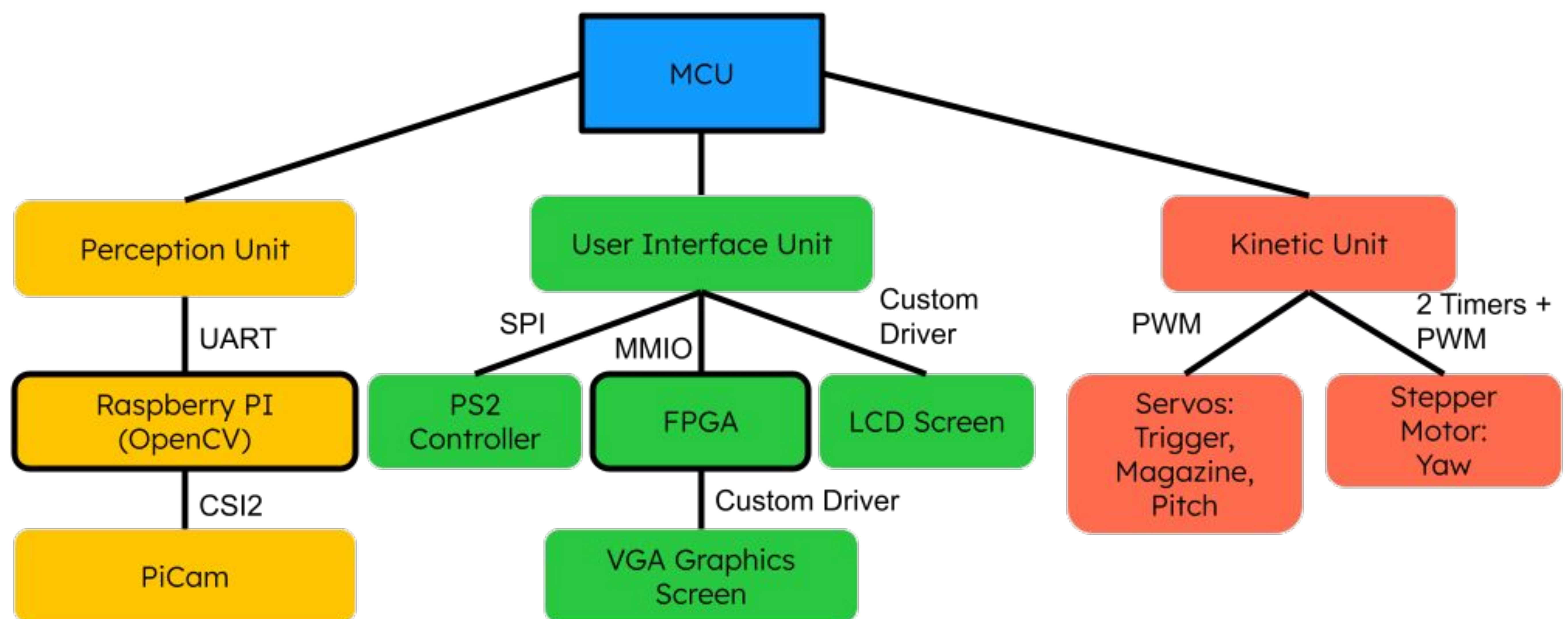- Bring Bloons Tower Defense 6 to life
- Automatically aim and shoot at balloons

Implementation:
- Raspberry Pi 3 running OpenCV to detect balloons and colors
- Servos and Stepper Motor aim the Turret from coordinate data and shoot rubber bands
- User inferface for manual control

Embedded Control Unit

Perception Unit:
- RPI runs CV algorithms on video data to identify balloons
- MCU requests coordinates via UART

User Interface Unit:
- PS2 Controller allows a user to enter Manual Mode
- VGA Graphics Displays where the device "Sees" targets.
- LCD Displays status information

Kinetic Unit:
- Pitch Servo and Stepper Motor are driven to aim at targets.
- Trigger and Magazine Servos coordinate to shoot and load rubber bands

Technical Challenges

- Setting up verilog driver for VGA display

- Initialising and driving 2 line LCD serial display

- OpenCV detects a lot of interference from other objects

- Raspberry Pi undervoltage and heat management

- Servo movement has to be coordinated with high precision

- Had to make CAD 3D models and prints.

https://github.com/AndreQuimper/EECS373-BLOONS