[Robot Resurrection]

4850-3 Red

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Overview

Design and develop a REST API server to control the UXA-90 by interfacing through the Robot Operating System protocol.

Project Team

Roles	Name	Major responsibilities	Contact (Email and/or Phone)
Project owner	Sharon Perry	-	Sperry46 in D2L
Team leader	Jack Young	Planning, Organization, Robot Trainer, R.O.S. code implementation	jyoun205@students.kennesaw.edu
Team members	Derek Comella	Rest API Client	derek@comella.net
	Andrew Loveless	Websites/Documentation Backend	andrew@andrewloveless.net
	Sarah Thomas	Documentation/Report	sthom317@students.kennesaw.edu
Advisor / Instructor	Sharon Perry	Facilitate project progress; advise on project planning and management.	Sperry46 in D2L

Project website

Our project website and documentation will be hosted at http://studentweb.kennesaw.edu/~alovele1/. Our API server will be hosted privately.

Final Deliverables - Specific To Your Project

1. Robot Documentation
2. Robot Operator Certification
3. API Documentation
4. API Server Source Code
   o REST API for sending commands to robot
     ▪ Command types: move motor, execute motion, motor position information
   o Stream webcam (Phase 2)

5. Raspberry Pi R.O.S. 2 system source code
   o Robot serial port connection management
   o Robot command formulation (for serial transmission)
   o Webcam control (Phase 2)
6. App/UI to call API (Phase 2)

7. Poster Presentation

8. Final Report

Milestone Events (Prototypes, Research, Code Reviews, etc)

#1 - By Oct 22nd

- Robot Documentation for all teams
- API Prototype
- Robot Control over Serial from Laptop
- Website Setup

#2 - By Nov 8th

- API Controlling Robot

- Robot REST API Server

- App (Phase 2)

- Webcam Streaming (Phase 2)

Meeting Schedule Date/Time

Tuesdays and Thursdays at 5:30 on campus. Other meetings as needed.

Collaboration and Communication Plan

Discord will be used for remote communication. Response time is expected within 24 hours.

Github for source control and documentation sites

Project Schedule and Task Planning

See the Project Work Plan (Gantt chart) file attached.

Risk Assessment (if applicable)

- Risk: The robots can be controlled to using many different methods, and the robots are not aware of their safe operating range, making it easy for an operator to damage the robots
- Mitigation: All operators were trained in the risks of operating the robots. The robots will be tethered to prevent them from falling on the ground.
- Risk: The robots could harm a person by moving into or hitting them.
- Mitigation: There must be a clear area around the robot for operating. The robot will be tethered to prevent them from falling on the ground.

See Home - UXA90-Light Documentation (4850-robots.github.io) for documentation full details regarding operating protocols and risk mitigation.

Version Control Plan

A series of GitHub repositories will be used for version control.

Test Plan

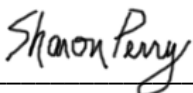| Test	Severity	Pass	Fail
Robot documentation is accessible	Minor		
API documentation is accessible	Minor		
Raspberry Pi properly loads ROS2	Major		
Raspberry Pi can communicate with robot via serial connection	Major		
R.O.S. 2 control code formats serial messages correctly	Major		
All motors can be controlled by Raspberry Pi	Major		
API server can receive requests	Major		
API server can communicate with Raspberry Pi	Major		
Raspberry Pi can execute API calls	Major		
Moving motors via API is functional	Major		
Executing motions via API is functional	Major		
Receiving motor positions via API is functional	Minor		
Receiving camera feed via API is functional	Minor		
App can communicate with API server	Minor		

Software will be deployed remotely to the Raspberry Pi. The Pi will then interface with the robot through the serial port to test the software on the robot. Results will be written in our documentation.

Phase 2
Optionally/If we have time:

- UI App to make calling REST API easier. Would have a 3D Render of the Robot
- API and client capabilities to stream the webcam feed and control it

Signed by:

Sharon Perry

_____   _____9/24/2022_____
Project Owner   Date