Deliverable G: Prototype II and Customer Feedback

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Abstract

The Department of National Defense requires an automated, user-friendly and cost-efficient robotic arm that can provide the potential to assist crew members on ships to complete certain tasks with minimal supervision. The design criteria has been taken into account for the development of the second prototype. For this deliverable, we have put emphasis on the code, user interface and end effector fitment in order to complete the objectives.

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1. Introduction

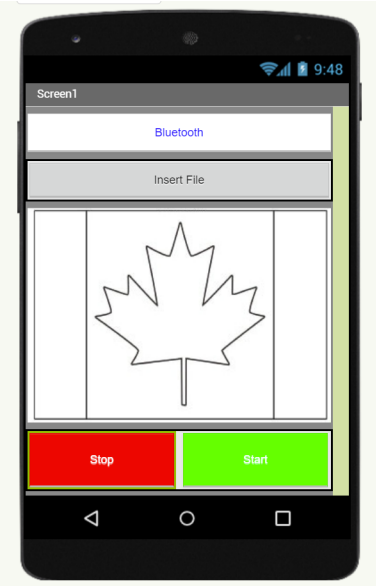
In this deliverable, the team has developed its second prototype and tested each subsystem's functionality. In terms of prototyping, there will be a display of the physical end effector, code and the user interface. Feedback will be sought after from users in order to implement improvements. The objectives achieved from this prototype will be described along with the test plan for the final version of the robotic arm.

2. Customer Feedback

- T.E: Anticipating of the autonomous aspect of the project
- L.A: Attempt to have end effector fit onto the robotic arm
- T.E: GUI implementation; what support will be available for boatswain?
- T.E.: Bridging between Arduino IDE and mobile app, how will Bluetooth be used?

3. Results

3.1. User Interface



- Main interaction point with the user
- "Bluetooth" button contains code to connect with arduino
- "Insert File" contains code to ask the user to insert a file
- Image preview to ensure proper display (Canadian flag used as example)
- "Start' and "Stop" are to be used as described, code still needs to be developed
- Purpose: To receive feedback from users and adjust accordingly

3.2. Code

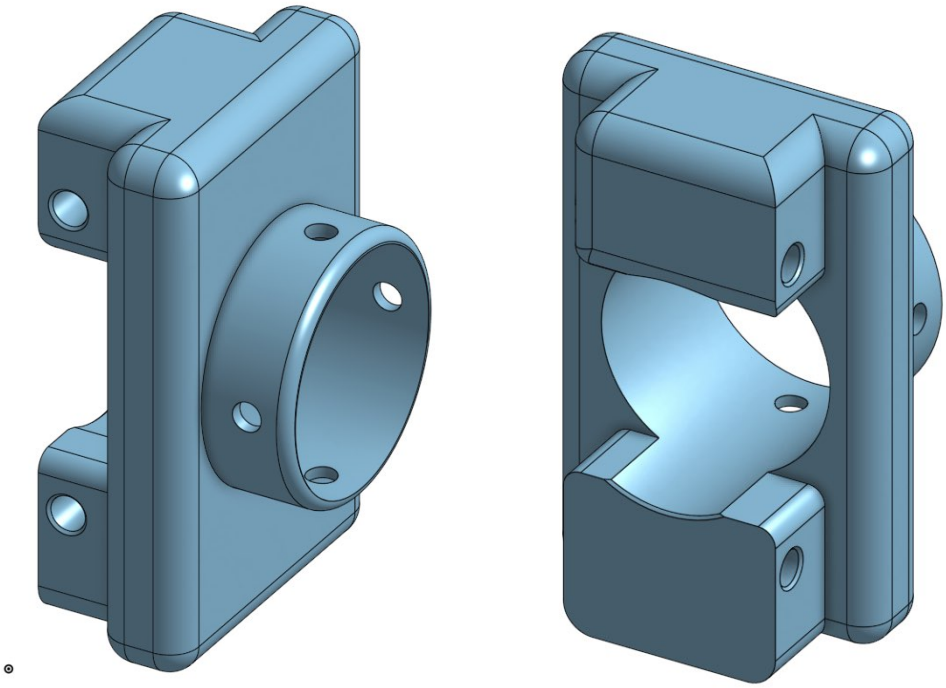
The code is currently in development, containing different components indicated below. The plan is to allow bluetooth connection with the mobile app and at various different points perform certain actions. These consist of after images are filed converting them to coordinates for the robot, when pressing the start button the robotic arm begins it;s drawing and stops when pressed stop.

- Replit used to code in C++
- Bluetooth connection component
- Image identification component
- Arm movement component

3.3. Objective Fulfillment

Objective	Status	Details
Acquire Further Feedback	Complete	Reached out to TA & client with prototype 1
End Effector Mounting System	Near completion	Modifications have been made based on the first prototype, waiting for test fit
Ensuring the arm and GUI work together	In progress	The mobile app has been tested for bluetooth discoverability, arduino connection pending
GUI prototype	In progress	Mockup created, contains main elements of the user interface
Image uploading	Near completion	The app supports image upload, SVG file support pending

4. Experimental Model



The new design is intended to be mounted with screws onto the robotic arm and the marker is supposed to be held with a screw mechanism similar to a pencil compass found in geometry sets.
Based on the fitment of prototype 1, measurements of the physical robotic arm were made and prototype 2 was generated. The modifications have led to the anticipation of proper fitment between the robotic arm and end effector design. Due to technical difficulties with 3D printing, the physical prototype was not able to be a part of this deliverable and as a result led the group to be slightly behind on the prototype test plan.

5. Prototype Test Plan

Test ID	Test	Description of	Description of	Estimated Test

	Objective(*why)*	Prototype used and of Basic Test Method*(what)*	Results to be Recorded and how these results will be used (*How)*	duration and planned start date (*when)*
1	Acquire further feedback in order to make improvements	Present the prototype to 5 users for testing purposes	Logged into a document; will be referred to during the development of prototype 3	~1 day
2	Ensuring the arm and GUI work together	Testing the app & bluetooth module together to confirm successful connection.	Checked off wrike; This will be an important subtask as it is the main control point	~1 day
4	Ensuring the end effector and arm work together with the code	The end effector will be mounted and the code will be run	Github will keep track of pull requests and we can use this to finalize our minimum viable product.	~2 weeks
5	Ensuring the minimum viable product is met	Full test runs from start to end as intended before design day	Document each image drawn, regardless of whether or not it worked, and modify the code so the image output is clear	~1 weeks

***********Please refer to wrike for project schedule/task plan***********