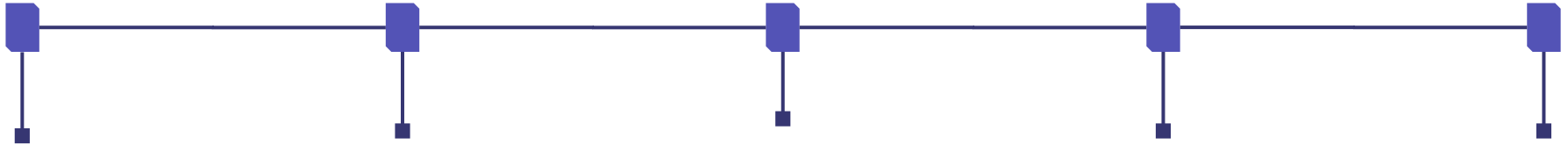
The “Bob Ross” Robot

BRAAZC Enterprises

Project Timeline



15-01-2025: Group decided on the rough concept of the design after the first client meeting

01-03-2025: Created prototype 1 with basic materials and code instructions

02-03-2025: Received feedback from the client to incorporate in our future design

03-08-2025: Created 3d-printed attachment and developed prototype 2

Currently: Refining the modification and code instructions to effectively create the video

The Design Process - Empathize

Ask the questions...

How have people been negatively affected from the use of **AWS**?

What is clients current **opinion** of AWS?

What **design aspects** would the client like the product to possess?

Take action...

Using **client meetings** effectively

Researching the issue, **educating** ourselves

Using our knowledge to **define** what the client needs

The Design Process - Define

What does the client need?

Problem Statement: The client requires a 90-second video advocating against autonomous weapon systems using the RoboMaster S1 robot. The video must convey a subversive anti-war message, addressing key ethical concerns emphasized by the client. It should not glorify violence, target specific individuals or groups, or imply harm. The RoboMaster S1 must not be modified permanently, and the video should be accompanied by a one-page manifesto written from the robot's perspective objecting to being used for autonomous weapons education.

The Design Process - Ethical Concerns

- Digital Dehumanization → Digital Rehumanization
    - Symbol of creativity and peace
- Impacts on Our Relationship to Technology → A Shift in Perspective
    - By repurposing technology for creative and peaceful purposes, we can reclaim agency over its role in society.
- Loss of Meaningful Human Control → Delegating for Good
    - Designed for a safe and meaningful purpose

The Design Process - Ideate

Brainstorming process:

Chosen concept

Initial 'Artist Robot' Concept

- We chose to proceed with the artist concept

- A basic design criteria was created to help determine how to create the design

Need	Design Criteria
1. Displays a use that promotes the idea of alternative uses for autonomous weapons systems	-Uses no firing/shooting/launching mechanisms (programming)
2. Move in all directions, with adequate speed and accuracy	-Adequate programming -Proper setup -Weight -speed
3. Has the ability to be used creatively and artistically	-Robot dimensions -Speed -Accuracy
4. Maintain RoboMaster S1 in its original form	-No permanent modifications
5. Video must appeal to a broad audience	-Inclusive and widely understandable visuals/messaging (video)

The Design Process - Prototyping

Prototype 1: Wooden arm with taped marker

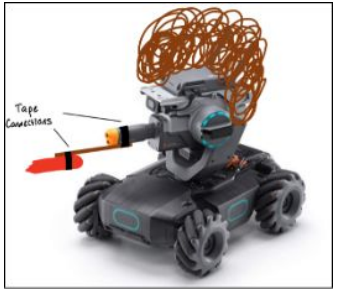
- Low-Cost materials
- Little/no research
- “Function vs Fashion”
- Basic code

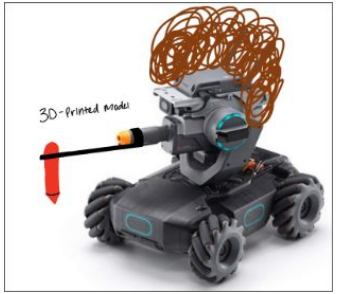
Prototype 2: 3D printed arm and marker attachment

- Initial test prints
- Improved code
- Accurate dimensions
- Improved aesthetic

Prototype 3: 3D printed arm integrated with marker attachment

- Refined, more detailed 3D prints
- Improved durability and structural integrity
- Marker stabilization finalized





Prototyping Process

The different marker holders...

Initial

Nozzle fit #1

Nozzle fit #2

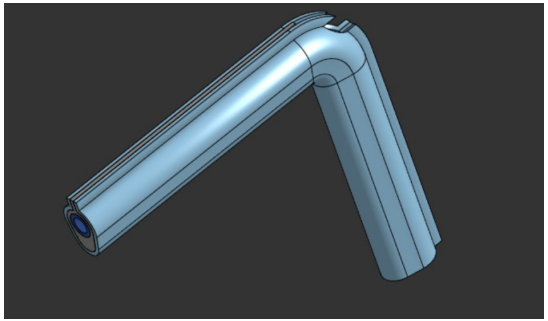
Prototyping Process

Initial Design – A rough idea to get started from. This design would accommodate smaller makers.

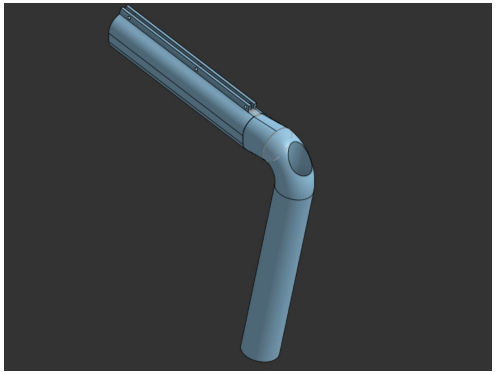
Second Design – It was discovered that the marker would retract through the holding arm, making proper drawing only possible if there was pressure on the top of the marker.

Final Design – After printing a turret test piece for the second design, we confirmed that friction/pressure would securely hold the marker in place. With this insight, our group decided to create a full sweep of the turret fit test piece. It was split into two pieces and super glued together due to 3D-printer limitations.

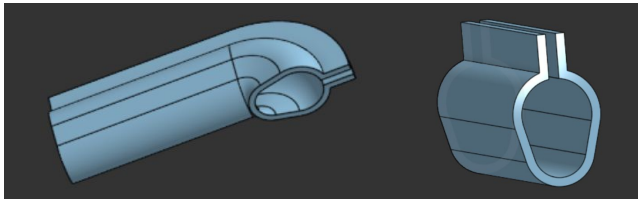
Design #1



Design #2



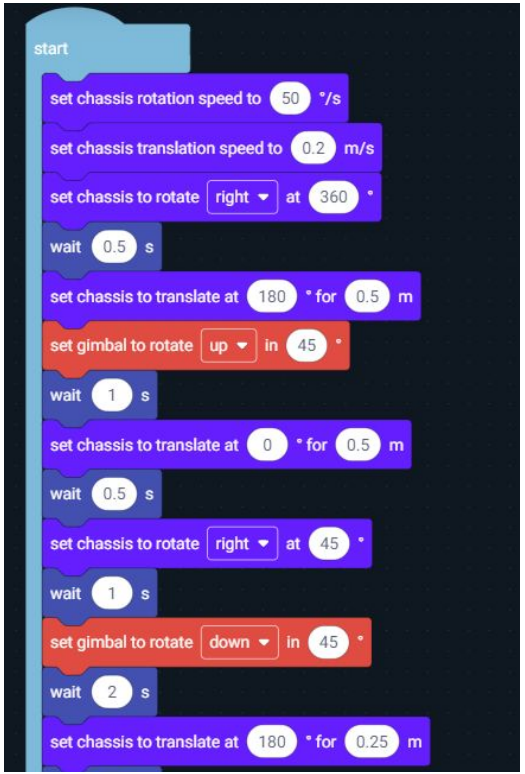
Design #3

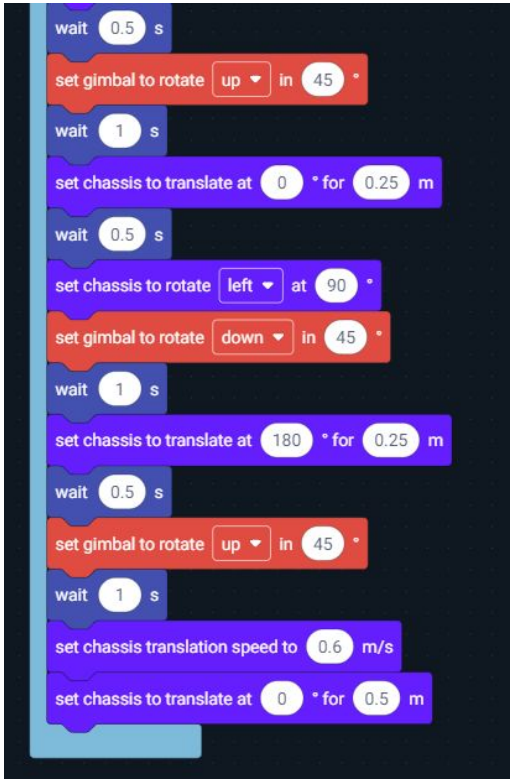


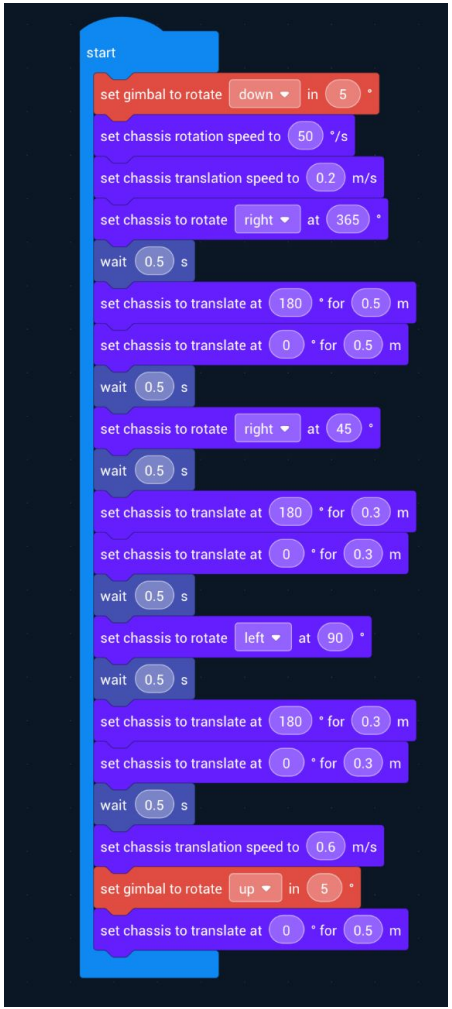
The design Process - Testing

Testing included:

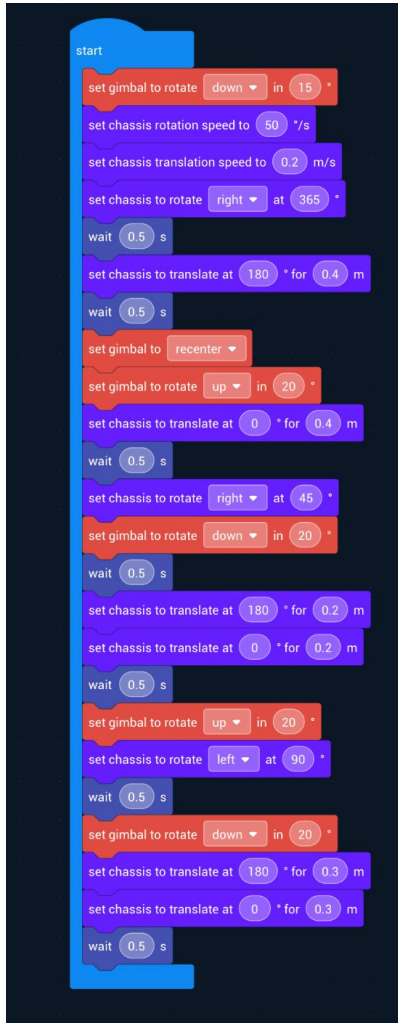
- The code, which was adjusted to perform the desired task, specifically drawing a peace symbol with smooth lines
- The marker holder / nozzle attachment, which is used to keep the marker in place and easily accessible by the robot







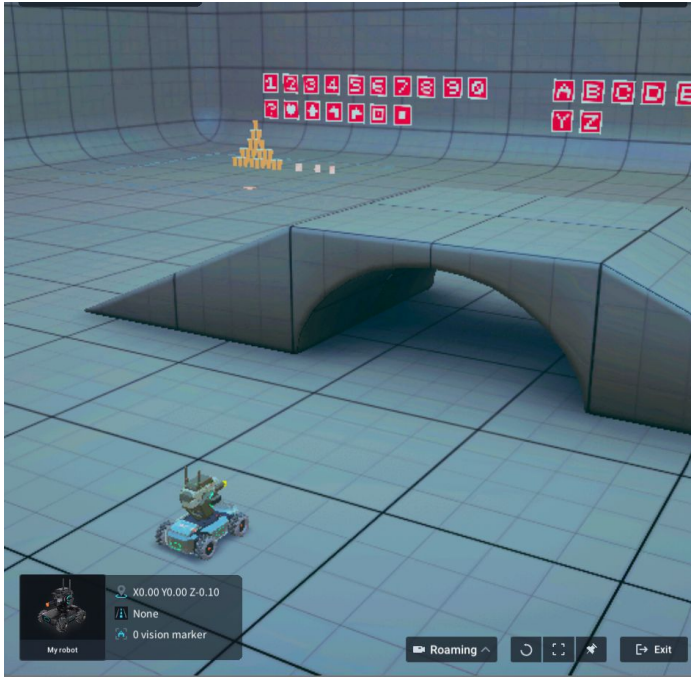
Prototype 1/2



Prototype 3

Testing Cont.

- Values were incrementally adjusted and tested to ensure smooth movements and correct line dimensions
- The code was refined to balance simplicity with functionality
- Additionally, it was important to have several “wait” functions to ensure the robot is not moving too fast and making unwanted marks



The DJI Education Hub Simulator was used to do more testing when the robot was unavailable.

For the future

- Allocate more time for hands on testing
- More proactive
- Spend more time refining code
- Improve organization in group-related activities
- More creative with second prototype idea, make larger leaps in development

Thank You For Listening!

Questions?