
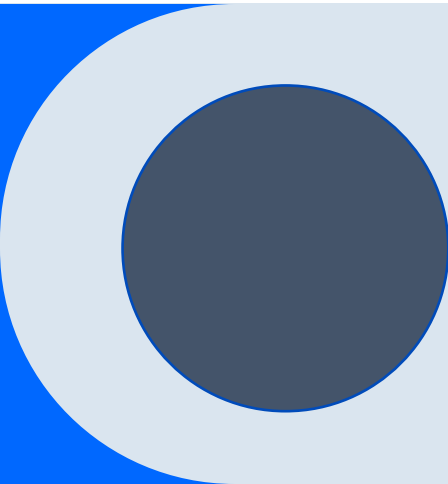


TIAGo Picasso

Final Presentation

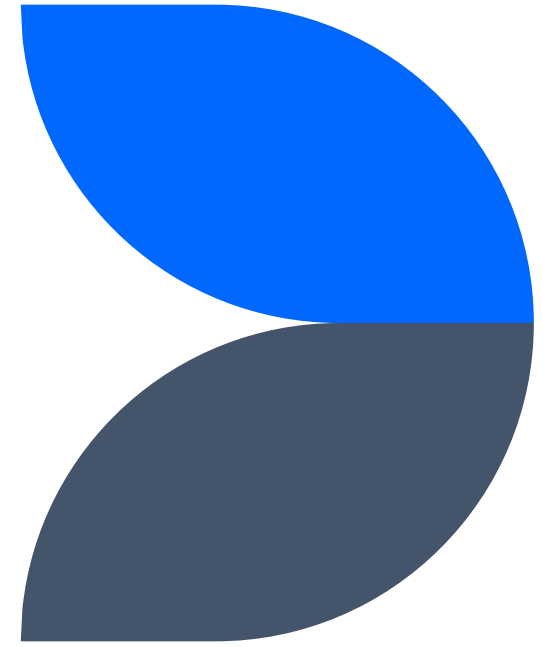
Sebastian Käslin, Aditya Deshpande



Agenda

- ☐ Global Project
- ☐ Prototype
- ☐ System Architecture & Logic
- ☐ 3D printing
- ☐ Demo
- ☐ Limitations and Future Challenges

Global Project

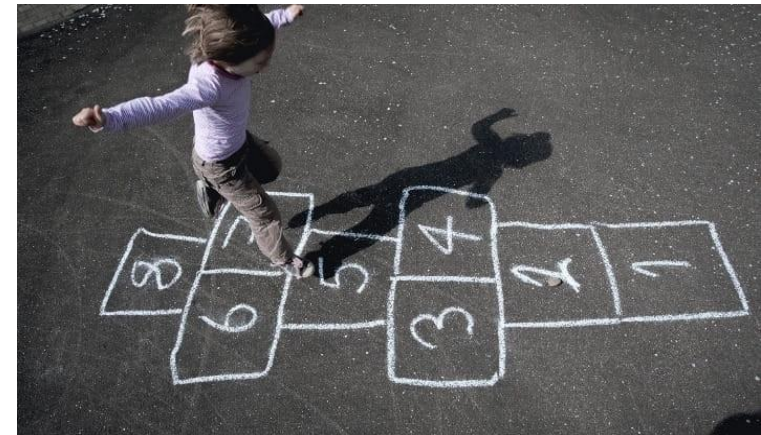


Project Objective

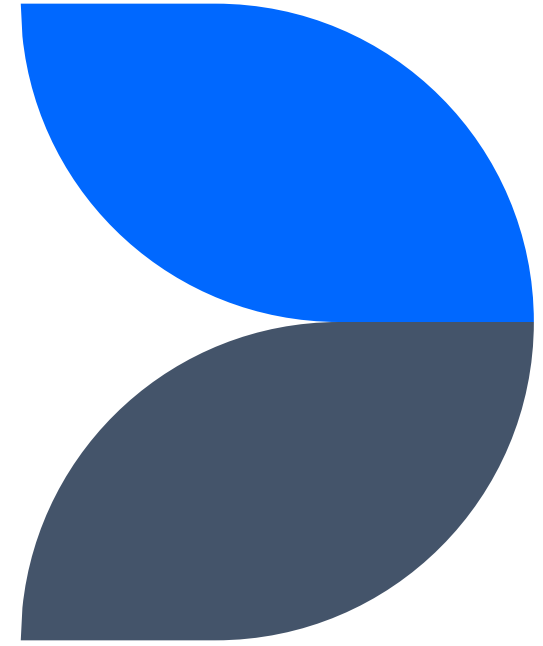
- ❑ Take as reference a user produced drawing
- ❑ Enhance TIAGo base robot to autonomously draw it on the floor

Use cases

- ☐ Paint floor games on the schoolyard
 - ☐ Hopscotch
 - ☐ Twister
 - ☐ Maze or Obstacle paths
- ☐ Field Markings for Sports
 - ☐ Mini-tennis
 - ☐ Badminton
- ☐ Interactive storytelling
- ☐ Exhibition purpose



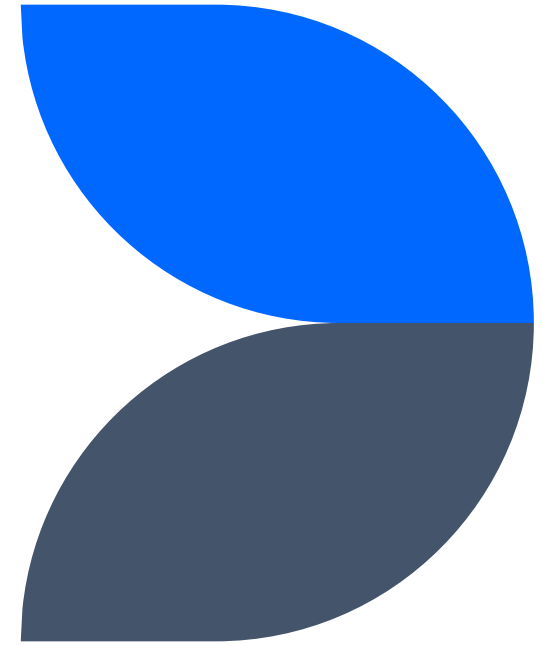
Prototype

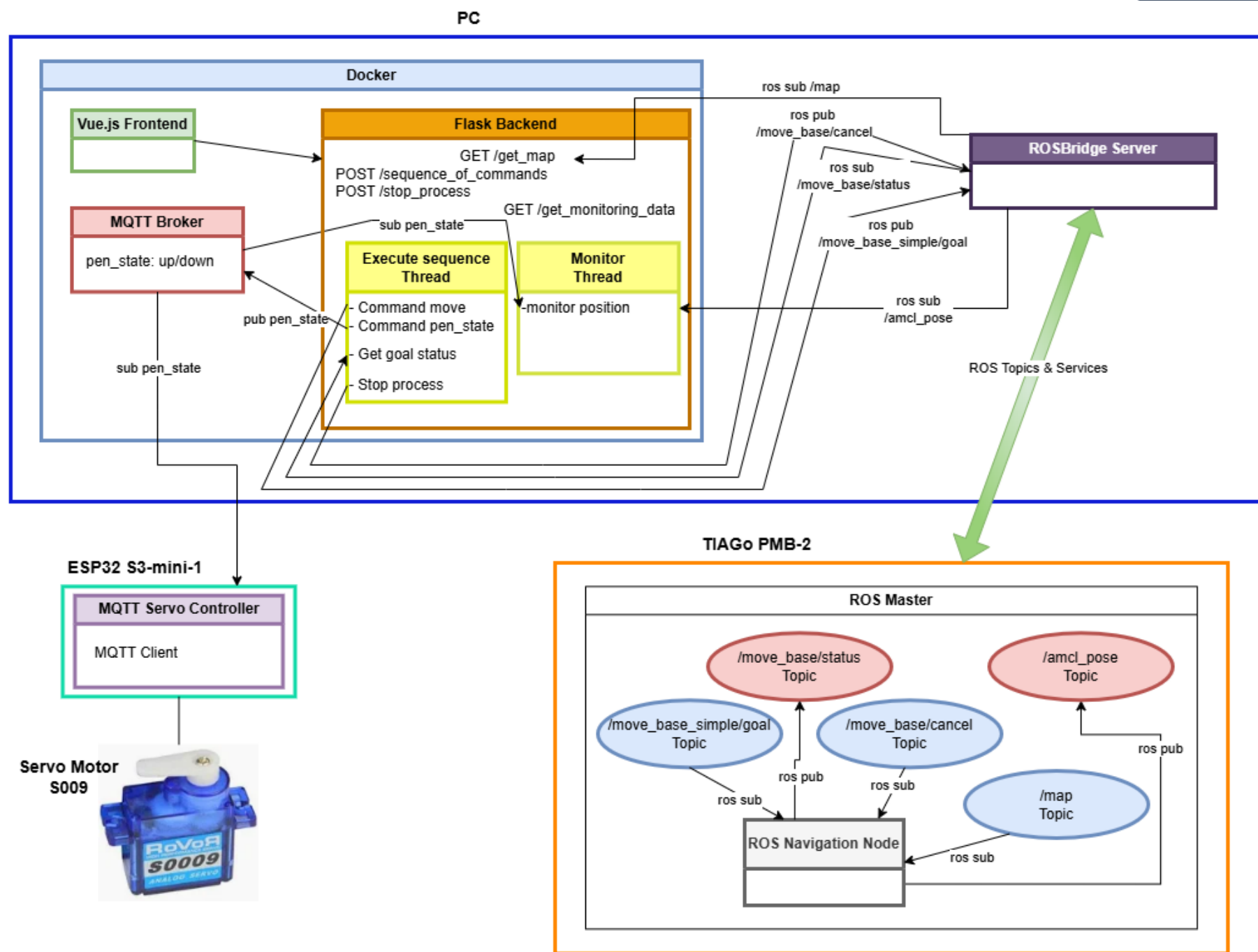


Prototype

- ☐ Drawing Input
 - ☐ Draw simple shapes or upload an SVG image
 - ☐ Supported SVG elements: path, line, rect, ellipse
- ☐ Drawing Customization
 - ☐ Position and scale the drawing on the map
 - ☐ Choose the drawing's discretization
- ☐ Command Generation
 - ☐ Commands: goals (movement) and pen states (up/down)
- ☐ Real-Time Visualization

System Architecture & Logic

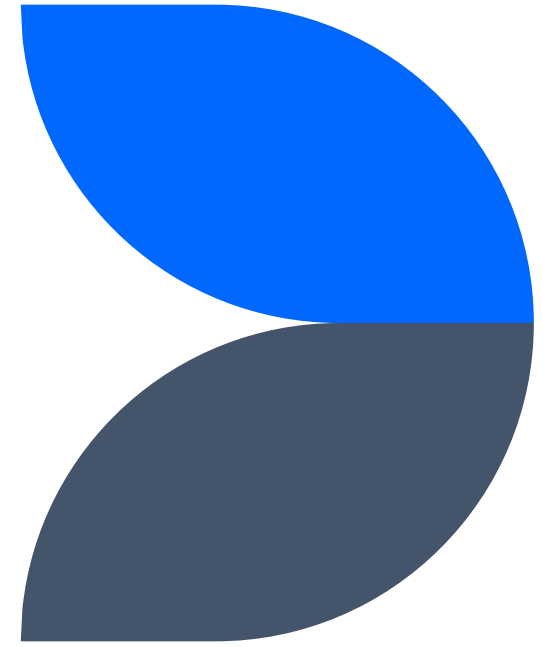




Command Generation Logic

- ☐ Init
 - ☐ Pen Up
 - ☐ Reach start goal and orient toward the second goal
 - ☐ Pen Down
- ☐ Loop (for each goal i)
 - ☐ Reach i -th goal with orientation based on the $(i-1)$ -th goal (straight line)
 - ☐ Pen Up
 - ☐ Orient toward the $(i+1)$ -th goal
 - ☐ Pen Down

3D Printing



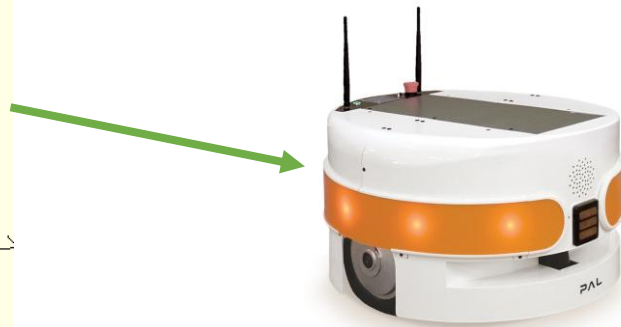
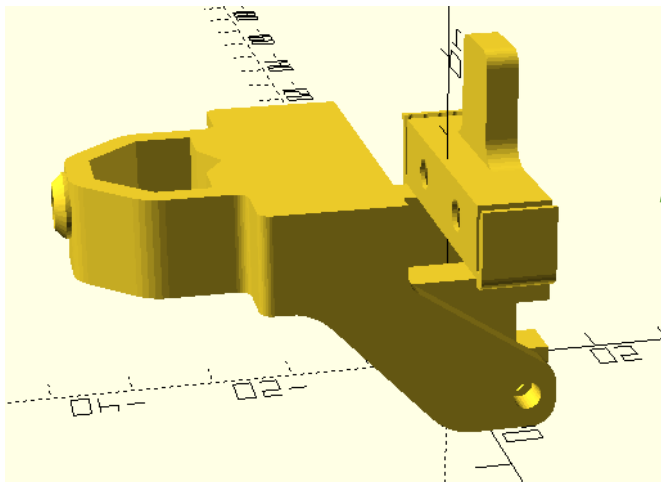
Pen Up/Down Mechanism

- ❑ 3D printed

- ❑ Model found online

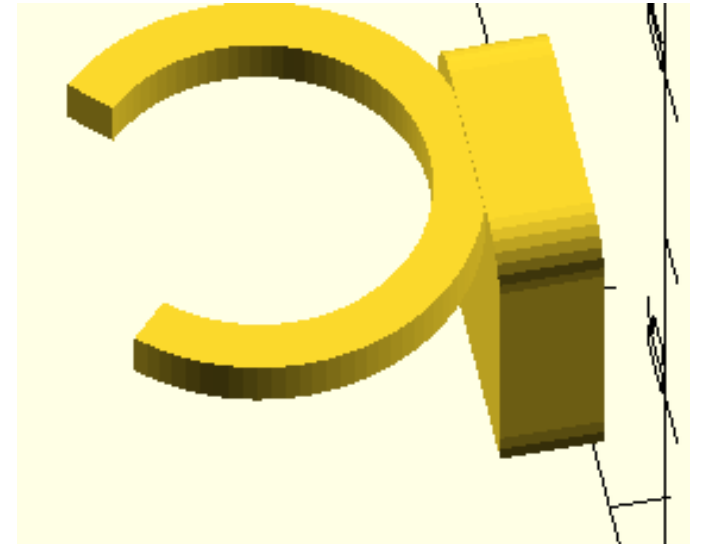
- https://github.com/bdring/midTbot_esp32/blob/master/README.md

- ❑ Attach it on the back (charging port connector)

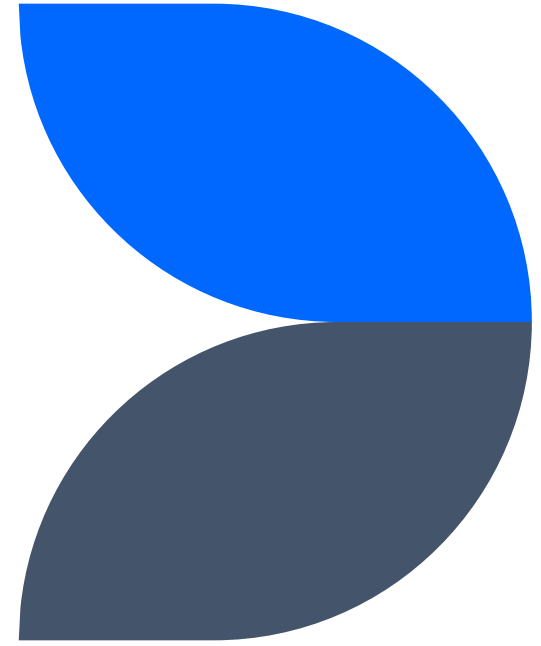


3D printed support

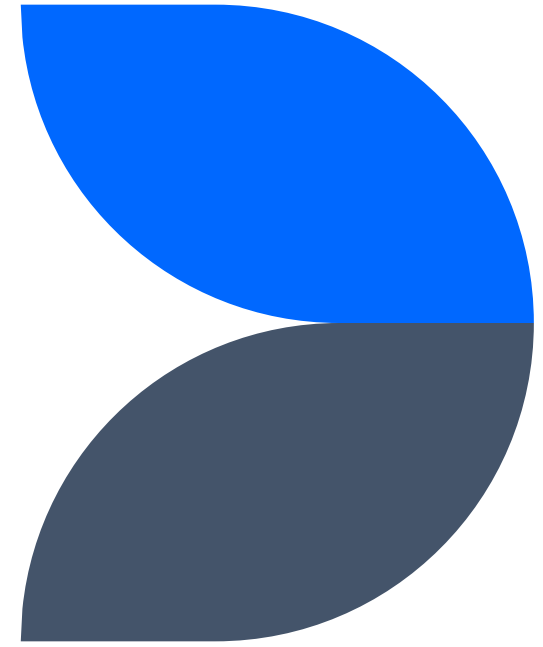
- ❑ It will attach the pen arm to the power plug of the robot.



Demo



Limitations and Future Challenges



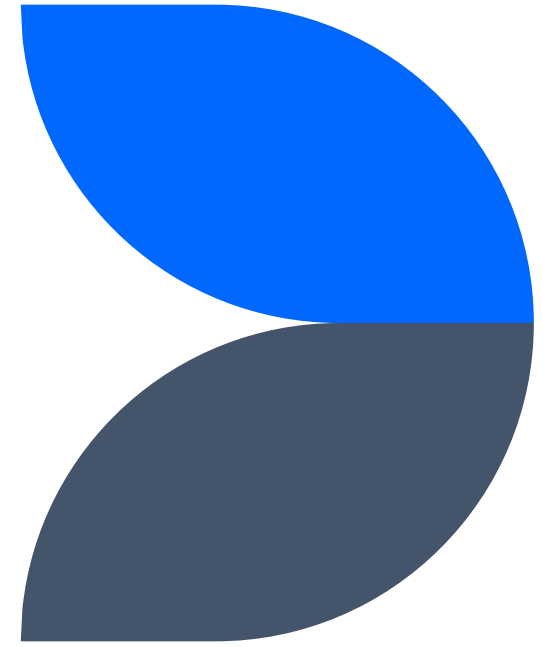
Limitations

- ☐ Pen up/down mechanism rotates around the charging port connector
- ☐ Mounting point at the center
- ☐ Sequence of commands generation
 - ☐ The simulation does not fully replicate real-world drift
 - ☐ Orientation adjusted when the goal position has been reached
 - ☐ Unexpected rotation with pen down

Future Challenges

- ☐ Drawing Input
 - ☐ Allow other formats other than SVG
- ☐ Drawing Customization
 - ☐ Different drawing's discretization for different SVG elements
 - ☐ E.g., rectangle can be discretized to 4 points, not true for an ellipse
- ☐ Command Generation
 - ☐ Take into account pen mounting position
 - ☐ Develop a more sophisticated algorithm
- ☐ Avoid obstacles and keep drawing

Questions





Thank you

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