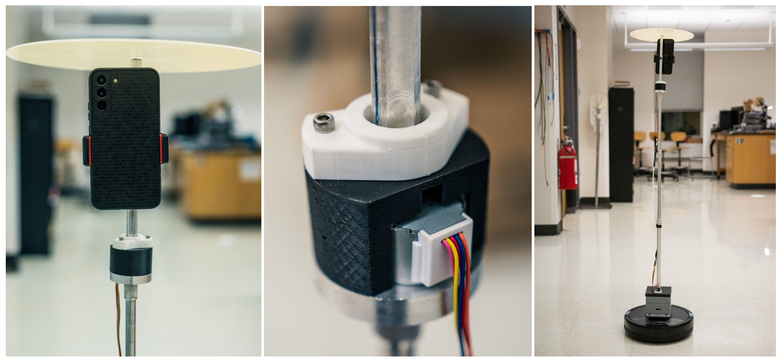
SharkCam: Autonomous Photography Accessory for Shark Vacuum Robot

Overview

- SharkCam: ordinary vacuum robot transformed into photographer for events and parties
- Captures photos with smartphone and mobile app
- Media database for easy photo sharing
- Nondestructive, user-installable hardware accessory
- Autonomous operation including obstacle avoidance



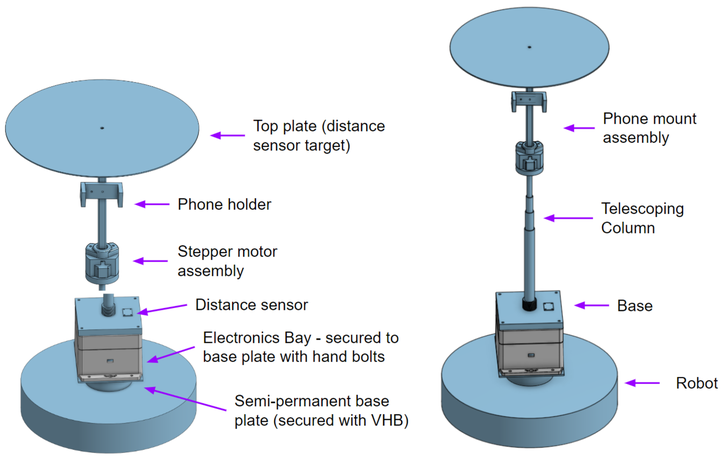
Purpose

- Proof of concept for customer SharkNinja
  - Demonstrate vacuum robot as viable platform for accessories to enable new applications
- Meet demand for novel and “in the moment” photo capture
  - Popularity of disposable cameras, Polaroids, BeReal etc.

Methods

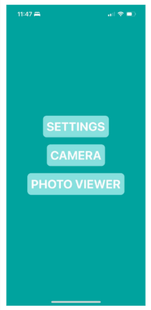
Mechanical

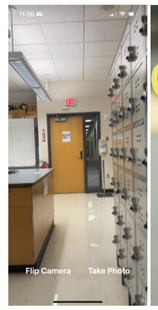
- Aluminum **telescoping column**
- **Motor**: 360 photo coverage
- **3M VHB adhesive**: non-destructive attachment to robot

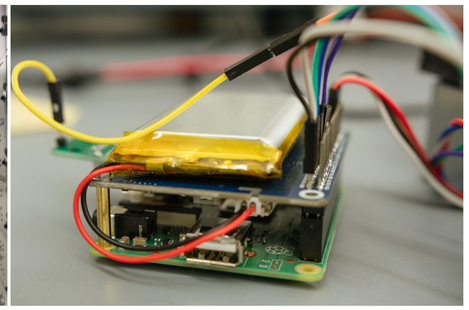


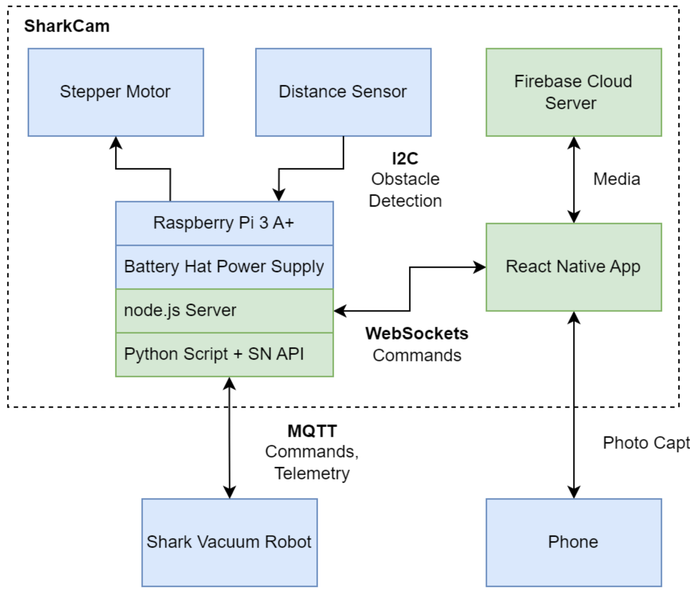
Electrical & Networking

- **Mobile app**: trigger photo capture, enter settings, view photos
- **Raspberry Pi**: communicate with app and robot

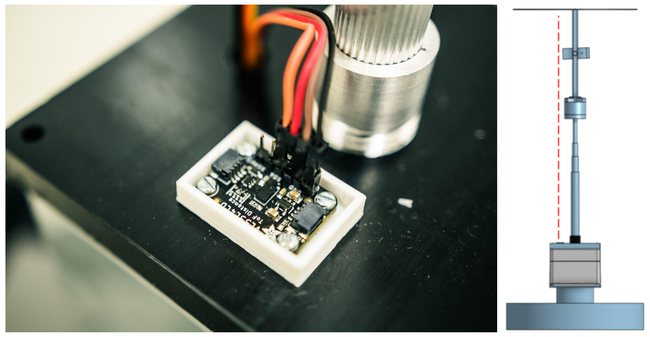








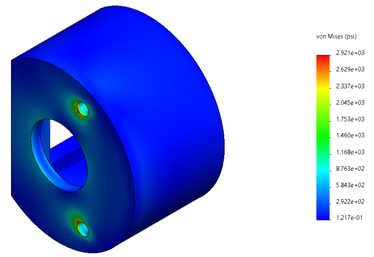
- **Firebase Server**: Photo storage & sharing
- **Time of flight sensor**: light curtain for obstacle avoidance



Tools

- **Expo**: React Native app development & deployment
- **Onshape**: CAD Assembly
- **Solidworks**: FEA

- Lathe, Manual & CNC Mills, 3D Printing



Results & Conclusions

- **Photo capture:** Autonomous capture triggered from app
- Autonomous pictures uploaded to online database
- **Obstacle avoidance**: Detects and avoids obstructions in front of column
- **Nondestructive & user-installable:** Base connected with removable adhesive; screwdriver & allen key for installation

- SharkNinja: has access to lower-level firmware
  - Remove redundant hardware (Pi)
  - Improve traversal and obstacle avoidance

Future Work

- Integrate features into official SharkClean app
- Video capture
- Computer vision to track subjects
- Floorplan view to see photo locations
- Expand to other applications (water plants, street art, etc.)

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GitHub

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