

Final Project Review

Team 5: Helping Hand SDP '18

Team Members: Corey Ruderman, Dan Travis,
Jacob Wyner, Joshua Girard

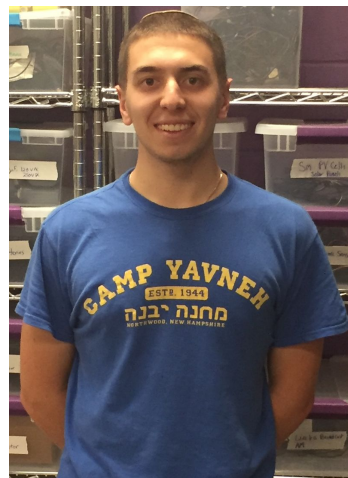
The Team:



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CSE



Daniel Travis
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Jacob Wyner
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Joshua Girard
CSE, CS

Introduction

- Robotic arms are used in everything from medical research to construction



- Remote control of robotic arms is complicated and unintuitive

Arm Requirements and Specifications

- Arm will have a minimum range of motion defined by a rectangular prism 1.5'x1.5' horizontally and 1' vertically directly in front of the robot in 4 DOF
- Arm should mimic the user's arm position with <0.25 second latency
- Arm will be able to move at least 5 inches per second in any direction
- Robot will move towards the user's current hand position as fast as possible rather than mimic all movements exactly
- Evaluation metric: Arm will perform the task of moving 5 rocks (approx. size of a ping pong ball) placed randomly within the workspace of the arm into a ~3" tall bowl of diameter ~8" within 5 min

User Interface Requirements and Specifications

- Hand tracking -- Intuitive and easy to use
- Fast tracking rate (>20 FPS)
- Accurate tracking (within 1" of actual hand position)
- Adequate range of motion ($> 2' \times 2' \times 1'$ tracking area)
- User Control Board should implement: on/off, emergency stop, pause/resume

CDR Deliverables

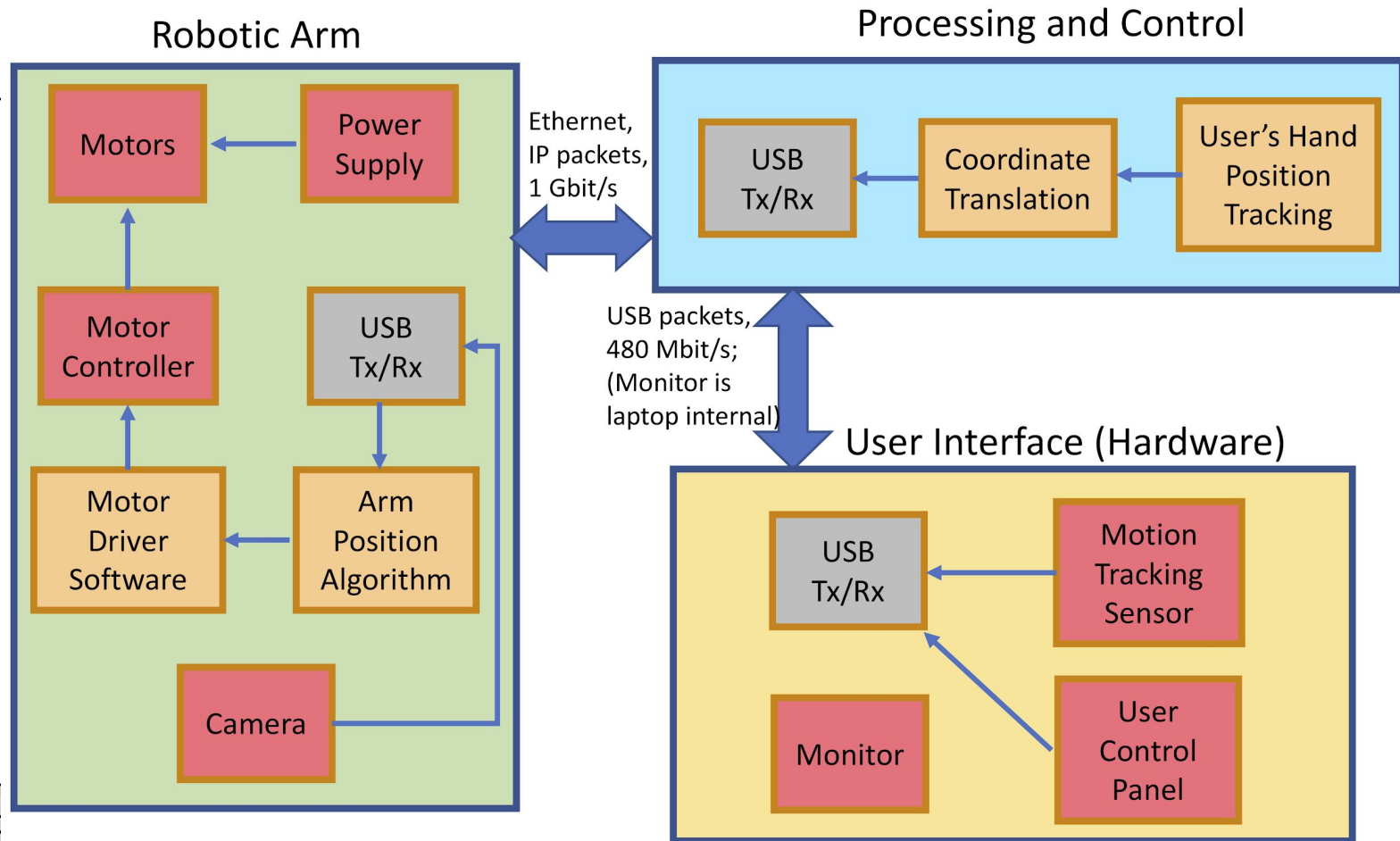
- ✓ Integration of base motor into control algorithms to provide positioning in 3DOF
- ✓ Integration of gripper into system: Gripper state (open/closed) will be controlled by the user opening and closing their hand
- ✓ Implementation of live video feed from arm to user allowing them to use the arm remotely
- ✓ Arm will perform task as described in specifications slide within the 5 min timeframe

FPR Deliverables

- Fully integrate PCB into motor controller circuit (Dan)
- Fully integrate user control board (Joshua)
- Address Leap motion tracking volume issue (Joshua)
- Improve grip tracking accuracy (Joshua)
- Address depth perception issue on video feed (Corey)
- All specs described in slide 4 will be met (Jacob+Corey)
- Improve tracking accuracy/precision (Jacob)
- Wire management (Jacob)

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Cost of Materials

	For One	For 1000
● 8020 Aluminum (10ft)	\$35	\$10
● Gripper System	\$50	\$20
● Stepper Motor	\$158	\$100
● Linear Actuator (2)	\$260	\$150
● Servo Motor	\$5	\$2
● Raspberry Pi	\$35	\$20
● Custom PCB (2)	\$60	\$10
● Motor Driver	\$28	\$12
● Leap Motion	\$60	\$40
● Webcam	\$35	\$15
● Power Supply	\$30	\$10
● Mounting Hardware	\$30	\$5

Demo