

## Final Project Proposal

**Year:** 2018    **Semester:** Fall  
**Creation Date:** 08-22-2018

**Project Name:** Handi-glove  
**Last Modified:** 8-29-2018

**Team Members (#1 is Team Leader):**

**Member 1:** Yaodong Shen  
**Member 2:** Jia En Chua  
**Member 3:** Yao Chen  
**Member 4:** Carol Lo

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### 1.0 Project Description:

Researchers and industry professionals are constantly exposed to hazardous environments in modern research, the project that our team aims to develop consists of using a glove to control a robotic hand that aids the experimental process while protecting the operators. We are aware that similar technology already exists in the modern world[1]; however, researchers are unable to receive real time feedback from the experiment's result. Interaction is important in certain experiments and the opportunity to physically interact with elements within the experiment is sometimes not easily realizable. With our project, scientists and researchers would be able to overcome this obstacle in a safe and efficient manner. Temperature and pressure feedback are crucial because the ability to detect changes of temperature or pressure can speed up experiments from time to time. Our project serves the purpose of improving experiment efficiency and preserving the safety standards within industrial and commercial environments.

### 2.0 Roles and Responsibilities:

1. Team leader(Yaodong Shen)- Yaodong has handled multiple projects involving different microcontrollers and was the team leader in ECE 362 mini project. As a team leader with a good understanding of this project and valuable technical skills, Yaodong can not only arrange the task of the project but also work with other three engineers to improve the efficiency of the entire team.
2. Systems engineer(Carol Lo) – Having taken a course in microprocessor system design and interfacing, Carol will be able to contribute both to the interfacing of the circuit as well as the hardware PCB design. Carol will be responsible for system interfacing and partial circuit design.
3. Hardware engineer (Yao Chen) – Yao will be responsible for the printed circuit board design. Yao has been involved on the design of PCB as well in ECE 362 mini project. Yao will also be responsible for various electrical schematics and layouts.
4. Software engineer(Jia En Chua) – Jia En has various experience in software development from both his academic background and the research opportunity at Purdue. He will be responsible for the implementation of the various software/firmware components of this project. He will also contribute to the web development since he has experience in that field.

## 2.1 Homework Assignment Responsibilities

<i>Design Component Homework</i>		<i>Professional Component Homework</i>	
3-Software Overview	JC	9-Legal Analysis	CL
5-Electrical Overview	CL	10-Reliability and Safety Analysis	JC
7-Mechanical Overview	YS	11-Ethical/Environmental Analysis	YC
8-Software Formalization	YC	12-User Manual	YS

JC: Jia En Chua

CL: Carol Lo

YS: Yaodong Shen

YC: Yao Chen

## 3.0 Estimated Budget

Item	Estimated Price
<i>Mechanical</i>	
Servo motors	\$130.00
Robotic hand components and DIY addons	\$250.00
Packaging material	\$30.00
Glove	\$10.00
DIY Touch feedback modules	\$20.00
Linear actuators	\$200.00
<i>Electrical</i>	
Microcontroller	\$50.00
Sensors	\$70.00
Peltier Cooler	\$30.00
PCB	\$50.00
PCB Component	\$70.00
<i>Miscellaneous</i>	
Shipping	\$300.00
<b>Total</b>	<b>\$1210.00</b>

After subtracting the reimbursement cost, the rest of the expenses will be split equally among all 4 team members.

#### **4.0 Project Specific Success Criteria**

- An ability to get user's fingers position information from position sensors on the glove
- An ability to communicate microcontroller with servos and through servos to control the movement of robotic fingers
- An ability to provide heating or cooling feedback based on the readings provided by temperature sensors on the robotic hand
- An ability to provide touch feedback based on the readings provided by pressure sensors on the robotic hand
- An ability to return robotic hand to standby posture after user taking off the control glove

#### **5.0 Sources Cited**

[1] NASA, Robo-Glove [Online]. Available at: <https://technology.nasa.gov/patent/MS-C-TOPS-37>