

**Project Team**

*Zilong Li*

*Major: Computer Engineering*

Zilong has an internship with JP Morgan Chase, and will begin work as a Software Engineer with Harris Corporation upon his graduation. He has strong interest in embedded system programming and Algorithm solution. He also had done robotic design, Mobile phone application, imaging processing and testing methodologies in the past work experience.

*Dingfeng Shao*

*Major: Computer Engineering*

*Minor: Mathematics*

Dingfeng has one summer research experience in Syracuse University to work on a parallel neuromorphic text recognition system. He has strong interests in computer graphics, artificial intelligence and robotics.

*Ho Yin Wong,*

*Major: Electrical Engineering*

Ho Yin has an internship with Beijing Electric Power Transmission and Transformation Company (China). Ho Yin’s academic and professional interests include digital and analog circuit design, power system, smart grid, renewable energy industry, wireless technologies and artificial intelligence. He is considering applying his skills and interests to a project that incorporates power system with software development.

*Junfeng Que*

*Major: Computer Engineering*

Junfeng has an internship with Beijing CHN-Drive Electric Technologies Company. He has strong interests in software development, mobile phone app development, embedded system, artificial intelligence and robotics.

System Description

Animatronic Hand is a robotic hand with flexible joints, so it could be the substitution of human hand to operate the experiments. The robotic hand is wirelessly (Wi-Fi) controlled by a customized glove, which is connected with flex sensors. These sensors are used to monitor the movement of human fingers. Therefore, after putting on the glove, the hand movement will be immediately performed on the robotic hand.

**System Architecture**

The Animatronic Hand system consists of hardware, software, and firmware. The following key components of the system reside within the malleable logarithmic casing:

* Smooth rods, bearings, step motors, servos
* Beaglebone Black, Arduino
* 3D – printed robotic hand
* Customized glove with flex sensors
* Camera, leap motion
* Pulleys, timing belts

Project Objectives

The Animatronic Hand contains flexible joints, and it also can be remotely controlled through Wi-Fi, which would be a great substitute for people to perform in dangerous circumstances, such as defusing a bomb or doing risky chemical experiments. There are two criteria for this system. First, the animatronic hands need to be controlled from a long distance. The second one is that the hand should be both nimble and powerful to do movements like human hands.

Engineering Challenges

The Animatronic Hand is designed under the concept of animatronic, so the robotic hand should be able to provide sufficient agility and power. Also, the control system requires the feedback from flex sensors and leap motion, because the large amount of data transmission uses wireless transmission, the speed of data communication is also a major concern.

Quality Assurance

The Animatronic Hand Project was tested in Syracuse University Engineering Laboratory. Verification and validation testing occurred throughout the design process. The testing for each sub-system was conducted repeatedly during development. Complete integration testing was conducted repeatedly to ensure the performance.

Animatronic Hand Project Encapsulator