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Department of Information Science and Engineering



Project Report on

“SMART ROBOTIC ARM”

Sponsored By KSCST

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ABSTRACT

In today's world there is an increasing need to create artificial arms for different inhuman situations where human interaction is difficult or impossible. They may involve taking readings from an active volcano to diffusing a bomb. Here we propose to build a robotic arm controlled by natural human arm movements whose data is acquired through the use of accelerometers. For proper control mechanism and to reduce the amount of noise coming in from the sensors, proper averaging algorithm is used for smoothening the output of the accelerometer. The development of this arm is based on ATmega32 and ATmega640 platform along with a personal computer for signal processing, which will all be interfaced with each other using serial communication. Finally, this prototype of the arm may be expected to overcome the problem such as placing or picking hazardous objects or non-hazardous objects that are far away from the user.

An ethnographic video was filmed to study the constraints, the applications of Tele-Operations and the viability of our own design. To add more credibility, the team has set certain criteria and benchmarked five other gloves to compare them with our own sensor glove. In addition, a functional modeling diagram was developed to display the transitions among the modules of our different subsystems. For our design, the functional modeling diagram depicts the transitions among the sensor glove, the wireless communication and the robotic hand. For the concept generation each team member developed a concept and the entire team scored and screened out the concepts. The team has decided on the concept to implement and the detailed system design.

Finally, the sensor glove was designed to wirelessly control the 5 fingers on the robotic hand. The robotic hand was modified to introduce the haptic feedback by adding pressure sensors on the fingertips of the robotic hand. Once pressure was detected, the vibration motors on the glove vibrated to deliver the sensation of touch, which ended our senior design project with success.