HAND GLOVE USING PROSTHETIC HAND

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***Abstract*—In order to determine the function of autonomic nervous system using non-invasive sensor will provide information about emotional, sensorial and physiological state of a person. The smart glove with non-invasive sensor will detect the activity of autonomic nervous system. Modern advanced artificial hand is able to replicate the human hand-like sensory perception which receives external stimuli by sensory feedback from the flex sensor and servo motors. The flex sensor and servo motor works in co-ordination with ARDUINO being a mediator to achieve this. It replace the missing limbs lost due to disease or accident. One of the major challenge in this field is to provide a tactile feedback to amputees. Our system is proposed in order to overcome these difficulties by using EMG signal to control prosthetic hand.**

Keywords—*non-invasive sensor, autonomic nervous system activity, smart glove, flex sensor.*

INTRODUCTION

The population is getting increased and hence the need for efficient and quality health care at home and hospital for a continuous monitoring is also getting higher.

The prosthetic arm is a type of mechanical arm, with similar activity of a human arm. This arm is connected by joints to allow rotational motion or translatory displacement. The arm includes a glove with sensor which once worn, will now detect the activity of autonomic nervous system and replicates the same in prosthetic arm.

PROSTHETIC ARM

In certain situations like working in canyons, caves, mining, etc. humans can't just involve themselves directly.

The prosthetic arm has huge applications in large scale industries, in which manpower is required. In recent decades the research of artificial hand has grown rapidly in the development of prosthetic hand. This research is to develop a cost efficient prosthetic hand which is easy to manufacture and to maintain.

SMART GLOVE

Smart gloves are made using smart clothes that enables the development in the field of ambulatory measurement and monitoring devices. The textiles that can be interfaced with the skin are flexible, and are cheap and disposable. Sensors are also integrated with the textile frame. Smart clothes thus play a vital role in monitoring as a device.

LITERATURE SURVEY

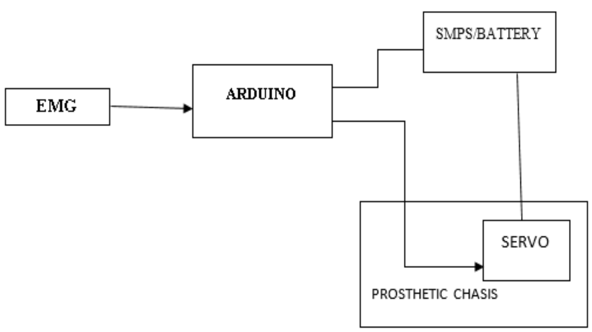
*A. C.W. Oliver et al.., proposed a method about b*ionic prosthetic hand which is emerging quickly. Currently only small number of individuals require knowledge on this field of medicine. But a wider understanding is required since it is a improving technology and the application is also increasing. Discussion on major function of the human hand is done, as the bionic hand replicates the same artificially. The key areas of the research is also discussed such that it would lead to the improvement in functionality of bionic hands which in future will fully replicate the functions of biological hand.

B. F. Axisa, et al.., proposed a method that has become important to improve the quality and efficiency of health in medicine both at home and in hospital. Therefore a smart glove is designed to fit well for patient use and health monitoring. The smart glove is used to detect the activity of autonomic nervous system.

C. Aimee Cloutier et al.., proposed a method to determine the quality of prosthesis for the patient with limb amputations is improved. EMG signal is used to control and to provide little sensory feedback. The advantage and limitation of signal classification and sensory feedback is reviewed. Discussion is made on interface with CNS and potential future development for control method is done. The prosthetic hand have far limited control strategies than actual human hand.

D. Hussein H, et al.., The techonolgy used in this paper was about the movements of fingers. It consist of 43 pecies weight about nearly 0.64 g. The whole process takes time about 40 hrs for the artifical prosthetic arm to manufacture. After completing the assembly of all parts of the artifical arm a clever glove is connected to the arm to avoid volt output from weinstein bridge. 3D printing technique is very simple and easy to assemble all minute parts of the arms.

METHODOLOGY



Initially the EMG is placed inside the glove and is fixed to healthy hand. The EMG signals are acquired and is fed to Arduino unoR3. The servo motor is connected to the Arduino unoR3 and results in the movement of fingers in the prosthetic hand. Since the rotation of servo motor is limited to 180 degree, the finger can be moved only front and back by moving the finger of normal hand fixed with glove.

A prosthetic hand was designed by using 3D printing. Here we use arduino board instead of flexible board to avoid false signal acquisition. And also EMG sensor is to detect the muscular activities and helps us to get the accurate signals for the movement purpose.

These signals can be analysed in order to detect medical abnormalities as well as activation level, or recruitment order, and also to analyse the biomechanics of human movement.

Electromyography (EMG) will detect the muscle activity in response to a nerve's stimulation. This test will be helpful to detect neuromuscular abnormalities. This test is conducted by inserting one or more needles into the muscle through the skin.

The total weight of our project is approximately about 350g. In that the hands weight is 80 g, a servo motor weight about 50 g. The major advantage of our project Is cost effective.

FINGERS	DISTAL/ MEDIAL(mm)	PROXIMAL(mm)
Thumb	61	40
Index	41	42
Middle	41	44
Ring	41	42
Little	34	34

Figure 2 Prosthetic arm

CONCLUSION

The artificial hand prostheses gives much better functionality, to more patients. These are durable and comfortable. But these prostheses still have to overcome considerable hurdles. The advancements made during this field of drugs are exponential and it's likely that within years there'll be commercially available limbs that provide both sensation and accurate motor control from day one.

FUTURESCOPE

Prosthetic hands are getting closer to replicate the function of human limbs. "Myoelectric" hands consists of movable fingers that grip naturally, and will move in two dozen ways in response to muscular movements. From ancient times, injuries have forced doctors and inventors to create replacements for missing body parts. In future continuous monitoring for precise movements and in grasping objects, etc.

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