FABRICATION OF LOWER LIMB POWERED EXOSKELETON FOR PARAPLEGIC PEOPLE ASSISTING IN THEIR WALKING

(Augmentation Using Flex Sensor And Accelerometer)

ABSTRACT

The integration of medical science and engineering has made the task like complicated surgery by robotic arm simpler. To capture the motion of human limbs, sensors can be used. These units can be worn for video game character modeling, virtual reality, and activity recognition. The arm moment is reciprocated almost exactly by the robotic arm. Data capture is achieved with the special motion capture sensor called "Shape Tape" that is worn by the human operator. Any human arm or even leg, neck or spine moment can be mapped on to any of the robotic arm manipulator.

Flex sensor robotic arm deals with controlling a bionic/robotic arm with the help of motion sensing technology by Flex Sensors. The system is basically a master-slave system wherein the master motion sensing glove sits on hosts' arm sensing motions of the finger and then using this data to control the servos which control the finger movement of the slave bionic/robotic arm. And a 3-axis sensor or tilt sensor is used for the movement of the arm to move upwards and down.

INTRODUCTION

A powered exoskeleton, also known as powered armor, exoframe, or exosuit, is a mobile machine consisting primarily of an outer framework (akin to an insect's exoskeleton) worn by a person, and powered by a system of motors, hydraulics, pneumatics or levers that delivers at least part of the energy for limb movement. The main function of a powered exoskeleton is to assist the wearer by boosting their strength and endurance. They are commonly designed for military use, to help soldiers carry heavy loads both in and out of combat. In civilian areas, similar exoskeletons could be used to help firefighters and other rescue workers survive dangerous environments. The medical field is another prime area for exoskeleton technology, where it can be used for enhanced precision during surgery, or as an assist to allow nurses to move heavy patients.

An electric power leg exoskeleton reduces the metabolic energy used when walking and carrying a load. The exoskeleton augments human walking by providing mechanical power to the ankle

joints. These powered exoskeleton bionic devices that can be strapped on as wearable robots to enhance the strength, mobility, and endurance of soldiers and paraplegics. The most daunting being the creation of a compact power supply powerful enough to allow an exoskeleton to operate for extended periods without being plugged into external power and the exoskeleton not limiting the user's flexibility and mobility.

Working prototypes of powered exoskeletons, including XOS by Sarcos and HULC by Lockheed Martin have been constructed but have not yet been deployed in the field. Several companies have also created exosuits for medical use including the HAL 5 by Cyberdyne Inc.

ADVANTAGES:

1) Medical robotics is a growing field and regulatory approval has been granted for the use of robots in minimally invasive procedures.
2) Robotic arms are being used in performing highly delicate, accurate surgery, or to allow a surgeon who is located remotely from their patient to perform a procedure using a robotic arm, controlled remotely.
3) More recently, robotic arms can be used autonomously in surgery.