Flex Sensor Based Robotic Arm with Pick and Place Operation

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Abstract— The development of wireless sensing control unit operation is base on wearable inertial sensors. Inertial sensors are of tri axial accelerometer and MEMS(Micro Electro Mechanical System). It extends to the control of an anthropomorphic robotic arm. Accelerometers used to measure the orientation and angular velocity of the lower arm. The data processing has been carried out on low cost micro controllers. The movement of the user arm was mimicked by the anthropomorphic robotic arm. The orientation of the control unit is tracked and displayed using Embedded System. Applications include industrial operation, remote operation in hazardous area, medicine and undersea recovery. Keywords- accelerometer, inertial sensors, MEMS, motion sensing, robotic arm.

Keywords— Flexsensors; ADC; Data Glove (DG); Micro Contoller; Position Control; DOF (Degree of Freedom).

I. INTRODUCTION

Robot is an integral part in automating the flexible manufacturing system that one greatly in demand these days. Robots are now more than a machine, as robots have become the solution of the future as cost labour wages and customer's demand. Even though the cost of acquiring robotic system is quite expensive but as today's demand rapid development and speedy work

The ISO(International System Organization) standards, humans are no longer capable of such demands. Research and development of Suture robots is movingly at a very rapid once due to the constantly improving and upgrading of the quality standards of products. Robots and automation is employed in order to replace humans to perform those tasks that are routine, dangerous, dull and in a hazardous area.In a world of advanced technology today, automation greatly increases production capability, improve product quality and lower production cost. It takes just a few people to program or monitor the corn outer and came out routine maintenance

ROBOTIC ARM.

II. SYSTEM MODEL

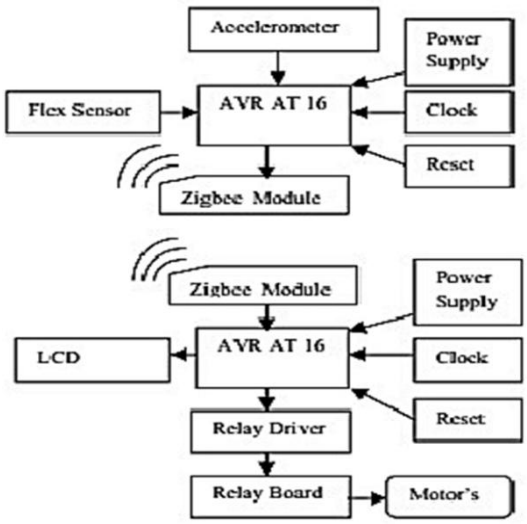

Fig 2. Block Diagram

A. OPERATIONS

The transmitter contains various modules like Zigbee, Accelerometer, Microcontroller, Flex Sensor & Power supply unit . The Receiver section is identical to the transmission . The only difference is it uses motors instead of flex sensor used at hand for the operation of the robotic arm.

B. MICROCONTROLLER:

This unit is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system. In short we can say that the complete intelligence of the project resides in the software code embedded in the Microcontroller. The controller here user

will be of 8051 family. The code will be written in Embedded C and will be burned or programmed into the code memory using a programmer. This unit requires +5VDC for it proper operation. LCD is interfaced on port C.it is connected with Accelerometers to monitors the movements of robotic Arm.it is a 16*2 LCD

C. AVR16 MICRO CONTROLLER

AVR 16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. AVR 16 is based on enhanced RISC (Reduced Instruction Set Computing architecture with 131 powerful instructions. Most of the instructions execute in one machine cycle. AVR 16 can work on a maximum frequency of 16MHz.

D. FLEX SENSOR:

Flex sensors are those sensors which change their resistance depending on the band of the arm .More the bend more will be the resistance value. They are usually in 1 inch to 5 inch long which change their resistance. They are analog resistors which act as a analog voltage dividers.

E. MOTOR DRIVER CIRCUIT:

A motor controller is a device or group of devices that serves to govern in some predetermined manner the performance of an electric motor. A motor controller might include a manual or automatic means for starting and stopping the motor, selecting forward or reverse rotation, selecting and regulating the speed, regulating or limiting the torque, and protecting against overloads and faults. Every electric motor has to have some sort of controller. The motor controller will have differing features and complexity depending on the task that the motor will be performing.

Here the motor is mounted on robotic hand which allows the movement of the arm .The motors used is DC Servo Motor .it changes positions depending upon the input given by zigbee module .Here three dc servo motors are used .One for base, one for wrist and one for fingers on the robotic arm.

F. WORKING

The working of Robotic Arm is based on Flex Sensors . Here we have mimicked the human hand movements by means of flex sensors . first we wear the gloves that contains sensors which produces the corresponding change in resistance depending upon the bending of flex sensor there are three flex sensors, one on elbow ,one on wrist and one on fingers .The bending is recorded by the microcontroller .the transmitter sends the data to the receiver through Zigbee module .Thus at receiver the corresponding signal is reconverted back to movements of the robotic hand . The Zigbee is programmed by Embedded C language . Thus corresponding mimicked operation is performed on the robotic arm which can be used for pick and place operation wirelessly within 100 meter range.

III. EXPERIMENTAL OBSERVATIONS & RESULTS

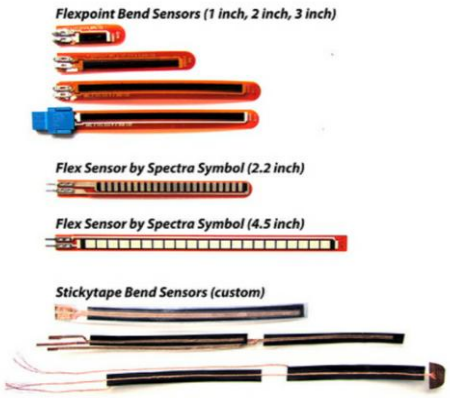

Fig.4 Step1: Flex Sensors

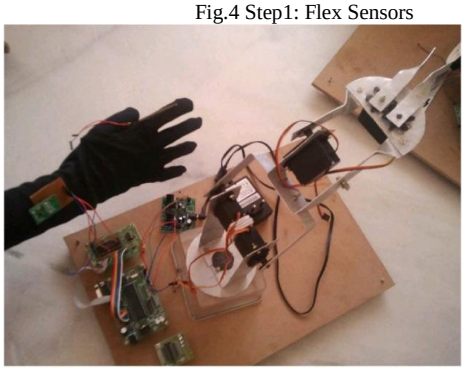

Fig 4.2 Operation

IV. CONCLUSION

By the realization of the above proposed system we can make the Robotic Arm using Flex Sensors, for pick and place of goods. This Robotic Arm will save a lot of Human Efforts of the Workers, and also we learned about humanoid robotics.By the realization of the above proposed system one can learn many aspects of a digital electronics circuit. This will give the complete knowledge of designing microcontroller based system and developing embedded software. We will also learn the software development strategies and various programming techniques for PC based applications.

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