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MULTI TASKING ROBOT

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ABSTRACT:

Today, technology is developing in the same direction in line with rapidly increasing human needs. The work done to meet these needs makes life easier every day, and these studies are concentrated in robotic arm studies. Robot arms work with an outside user or by performing predetermined commands. Nowadays, the most developed field of robot arms in every field is the industry and medicine sector. Designed and realized in the project, the robot arm has the ability to move in 4 axis directions with 5 servo motors. Thanks to the holder, you can take the desired material from one place and carry it to another place, and also mix it with the material it receives. While doing this, robot control is provided by connecting to the android application via Bluetooth module connected to Arduino Uno microcontroller.

Keywords: Flex sensors; MIT app; Arduino; Servo Motors; Robotic arm; Node MCU

1.INTRODUCTION:

These days people always needed additional help systems. With the rapid increase in the flow of information, people are now guided to search for different markets and people have entered the competition to manufacture quality products cheaply. Automation systems are also needed to realize this. Because standardized automation systems are required to minimize errors as well as to have experienced and well-trained employees for quality products. Because of their physical characteristics, people needed to use auxiliary machines in places where their strength was not enough. These machines, which are operated with the need for human assistance in advance, have been made to operate spontaneously without the need of human power with the progress of technology. One of the most used components of automation systems is robots. Robotic systems; Mechanical Engineering, Electrical Engineering and Computer Engineering have all come together to work together. In the project, researchers have been done and implemented in order to have knowledge about mechanics and software during the operations carried out by the robot arm which is designed to fulfill the tasks determined in accordance with predetermined commands. First, it was determined what function the robot arm would be and what movements it could

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make. Robotic arm made of Android phone or tablet control; it can carry the desired material, mix it up and perform the commands previously determined by a user. If this project is also a designated task; the robotic arm takes a piece of material and brings it to the desired position and then records its movements and lets it do the same action until we stop it. The servomotor is preferred in order to be able to perform these operations properly since the motor to be selected must operate precisely and must be at high torque. The robot arm is composed of 5 servo motors and can move in 4 axis directions with these motors. In the project, Arduino Uno microcontroller is programmed and servo motor control is provided. Thus, it is possible to perform the desired operations by means of the elements located on the Arduino without any circuit construction other than the circuit where the servo motor inputs are located. For the mechanical part, the robot arm is drawn with the Solid Works program and the dimensions of the robot arm are specified.

The rest of the paper is organized as follows. Section2 describes the review of previous papers. Section3 and 4 describes hardware and software tools used in our system respectively. Section 4 describes the system architecture and flow chart. Section5 describes experimental results and section6 describes the conclusion and future scope.

2.RELATED WORK:

There are various ways in which a robotic arm may be controlled. In the past there have been many researchers working to control robotic arm through computer terminals, Joysticks, even interfacing them with the internet so they can be controlled from anywhere in the world. Usually most of the robotic arms are controlled by a central controller which makes uses of Human Arm Movement Sensors (Accelerometers) Atmega32 Microcontroller Processing Unit Atmega640 Microcontroller Robotic Arm Actuators (Servo Motor Controller) 4 values taken in from the terminal that are entered by the user at the terminal to move the arm to a particular coordinate in space. This makes the control very difficult as the control values of the motors are very difficult to predict to achieve a particular movement.And as in recent times, an industrial robot with six joints closely resembles a human arm -- it has the equivalent of a shoulder, an elbow and a wrist. Typically, the shoulder is mounted to a stationary base structure rather than to a movable body. This type of robot has six degrees of freedom, meaning it can pivot in six different ways. A human arm, by comparison, has seven degrees of freedom.

The arm's job is to move your hand from place to place. Similarly, the robotic arm's job is to move an end effector from place to place. You can outfit robotic arms with all sorts of end effectors, which are suited to a particular application. One common end effector is a simplified version of the hand, which can grasp and carry different objects. Robotic hands often have built-in pressure sensors that tell the computer how hard the robot is gripping a particular object. This keeps the robot from dropping or breaking whatever, it's carrying. Other end effectors include blowtorches, drills and spray painters.Industrial robots are designed to do exactly the same thing, in a controlled environment, over and over again. For

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example, a robot might twist the caps onto peanut butter jars coming down an assembly line. To teach a robot how to do its job, the programmer guides the arm through the motions using a handheld controller. The robot stores the exact sequence of movements in its memory, and does it again and again every time a new unit comes down the assembly line.Most industrial robots work in auto assembly lines, putting cars together. Robots can do a lot of this work more efficiently than human beings because they are so precise. They always drill in the exactly the same place, and they always tighten bolts with the same amount of force, no matter how many hours they've been working. Manufacturing robots are also very important in the computer industry. It takes an incredibly precise hand to put together a tiny microchip.

3.HARDWARE COMPONENTS:
- Arduino Uno micro controller
- Servo motors
- Node MCU micro controller
- Nrf24L01
- Modules
- Flex sensors
- DC motors
- Motor driver
- Power Antenna

4.SOFTWARE TOOLS:
- Arduino IDE
- MIT app Inventor

5.SYSTEM ARCHITECTURE:
In the transmitter end, with the intervention of the flex sensors that are connected to the ArduinoUno microcontroller, we can control the robotic arm which was fixed at the receiver end. The movements of this mechanism were fully based upon on the

flex sensors those are fixed on a glove at the transmitter side, thereby the robotic arm was performed based on our desired operations.
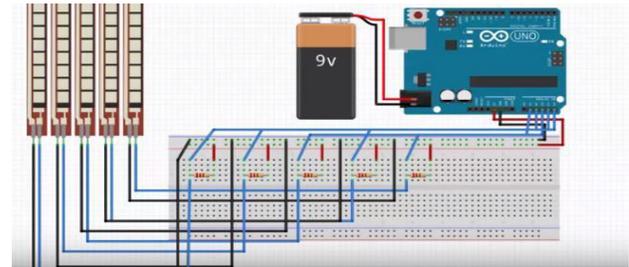

Fig 1:Transmitter End

Nrf24L01 is the transceiver that mainly used to convert the analog signals to digital signals to the servos those are used to move the fingers of the robotic arm
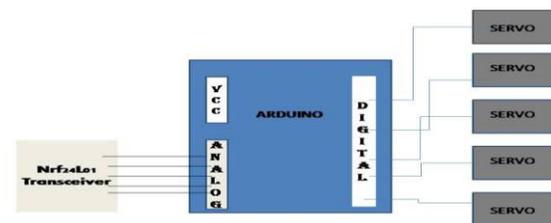
Fig 2:   Transceiver Block Diagram

Flex sensors are mounted on each joint of all five fingers and bending of sensor due to hand movement of the operator changes the resistance of the sensor and this change in resistance is fed as input to the robotic unit.
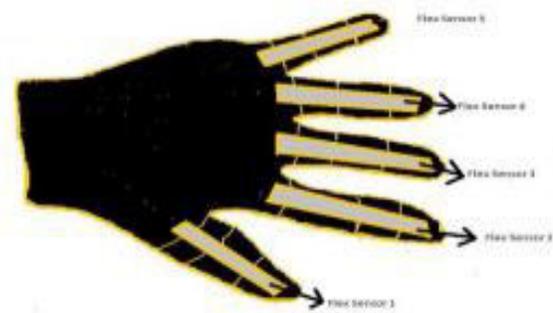
Fig 3: Flex Sensors

Following fig shows experimental setup which consists of transmitter i.e. glove

mounted on human palm with flex sensors & receiver which is robot manipulator arm. This setup shows receiver is following movement of transmitter.Different mechanisms can be used for detection of the object. For the trial run of the project the colour based detection has been selected. Since the optical sensors are used without much processing of the input data the sensing is done at a faster rate. The color sensor itself provide direct signal to the microcontroller after detecting the object. The main operation of the microcontroller is limited to servo motor control and the overall response is expected to be better. The L293D driver ICs are used to drive the DC servo motors. The drivers are fast enough to deliver the pulses at required speed to the motors This project is a combination of four to five mini projects. This is, in our multi-tasking robot we have wireless robotic hand, it can be controlled by a glove that we wear and also these control from the glove are transfer to the receiver section that is, our prototype-robotic hand through nrf24101 transceiver. Hence, the corresponding signals acts according and the output is displayed through the rotation of corresponding servo motors. We are going to design a equipment that has both robotic arm and robotic hand as the single project that we can intend the applications of our project. In our project we have robotic hand attached with a robotic arm, these as we think from this set up, we have complete human hand and we can perform maximum possible operations that a human hand does. To made this entire set up mobiles all over this surface(movable) we are going to design surface base to this setup. To device this

setup wireless we use node mcu micro controller along with the servo motors and hence in our project t we are introducing wi-fi technology. We can control this project up to a practical range of 100 meters from our setup. To use this entire setup in defences, for example in bomb detection applications, we are going to place land mine detector at the front end of the base so that it will give some rotation to the detector. Once the bomb is identified we can dismantle it by using our robotic hand. In additional to this, we can have surveillance camera as the front of our base and it acts a surveillance robot. To us this robot in industries like picking and packing objects we use a colour detector circuit on the palm of the robotic hand. This, the output from the robotic hand decides the operation that is to be performed future.
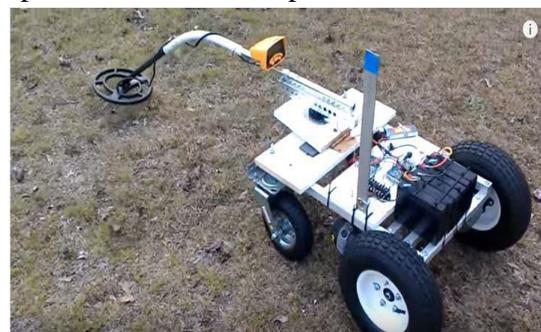

Fig 4: Real time existing model

5.3 Flow chart:
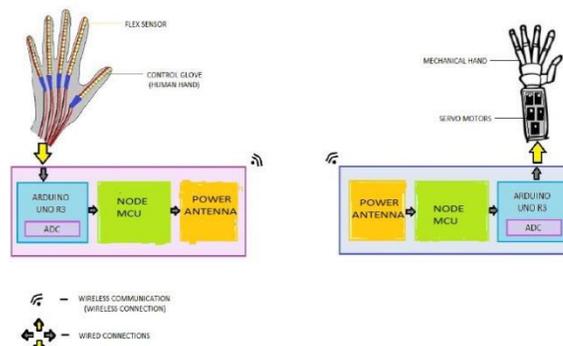
Fig 5: Flow Chart for Robotic Hand

Here as in the Fig 5 shows the overall model of the robotic hand. The main mechanism

behind the flow chart was to control the robotic hand through the human arm movement which was done by using the flex sensors, and according to those flex sensors we can connect to the Arduino Uno and thereby it passes to the node MCU and to the power antenna which helps in increasing the range for the wirelesstransmission.
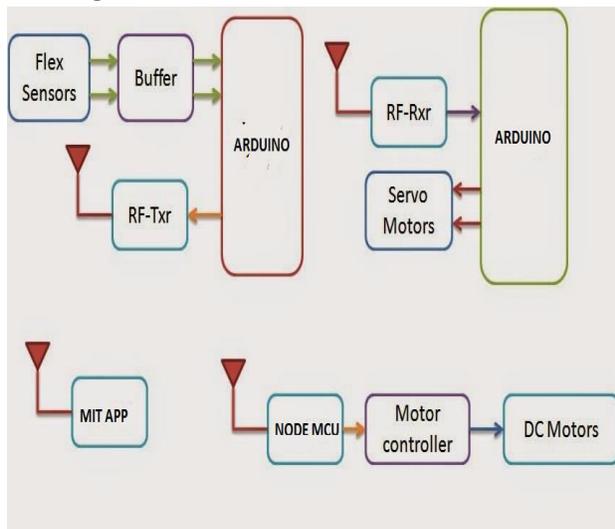

Fig 6: Flow Chart for Robotic vehicle

The Fig 6 shows the working of the robotic vehicle and it can be done through the MIT app inventor. As per the code which was given to the node mcu microcontroller, it drives the motor driver to perform DC motors in a desired way in which we can control the robotic vehicle through our own instructions.

6.RESULTS:

Flex Sensor Output Variation: Figure 7 shows the variation of volt with respect to variation in deflection of flex sensor. Initially the flex sensor is at default position, a constant value of 73 degree. The value decreases as we start bending the flex sensor. This particular change in flex sensor value is used to rotate servo motors.
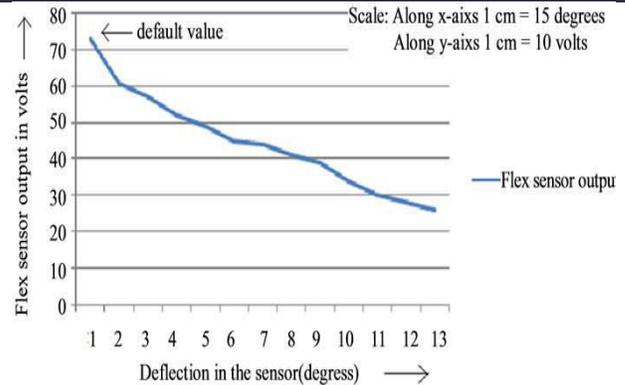
Fig 7: Deflection in the sensor V/S flex sensor output.

Servo Motor Variation: Fig 8 shows the servo motor variation according to the PWM signal which determines the rotation of the servo motor in different angles.
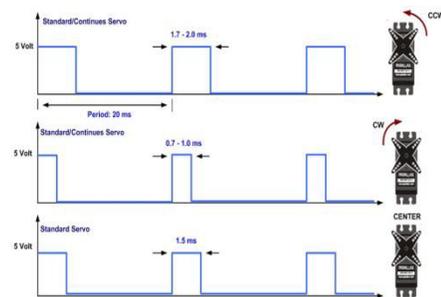
Fig 8: Servo Motor PWM Timing Diagram

7.CONCLUSION AND FUTURE SCOPE:

Robotic arms, many areas are developable. Thanks to the robotic arms, many tasks are made easier and the resulting error level has been reduced to a minimum. For example; some pharmacy-based drug-giving robots and a projected robot arm have been developed. In addition to this, the ability to move the robot arm is further increased, and when the camera is placed in the finger area and the sensitivity is increased, it can be used in a wide range of applications from the medical sector to the automation systems. With the robotic arms developed in this way, the risk of infecting the patient in

the medical sector is minimized, while the human errors are minimized during the surgical intervention. Despite the fact that the robotic arm made by this project is of prototype quality, it has a quality that can be improved for more robotic systems. Besides these, robotic arm sector, which is open to development, will keep its importance in the future. The purpose of the project is to provide control of 4 axes moving robot arm design and this robot arm with a suitable microcontroller and Bluetooth module with android application. The necessary theoretical and practical information for this purpose has been obtained and the necessary infrastructure has been established for the project. During the process of making and developing the project, a lot of theoretical knowledge has been transferred to the practice and it has been ensured that it is suitable for the purpose of the project.

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