SURGICAL ROBOTIC ARM

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ABSTRACT – This paper presents a surgical robotic system model that has a robot arm holding an instrument. Designed for performing a minimally invasive surgical procedure, The robot arm has ability to move in 4 axis direction with 5 servo motors. The controlling system for surgical robotic arm is potentiometer, it controls movement of the arm and it's instrument. The control system enhances control using joint observes the estimate joint position, velocity and acceleration of executed joint position commands with torque feedback

Key Words: Surgical Procedure, Control System

1. INTRODUCTION

A robotic arm is a kind of mechanical arm, a programmable one, which has similar functions to a human arm; the arm is the sum total of the mechanism or it will be a part of a more complex robot. The links of such a manipulator are connected by joints allowing either rotational motion, for example in an articulated robot or translational, that is in a linear displacement. The links of the manipulator are considered to form a kinematic chain. The terminus of the kinematic chain of the manipulator is known as end effector and it may be analogous to the human hand. However, the term robotic arm is also popularly known as the robotic hand.

2. METHODOLOGY

In this project we are using two robotic arms which are made up of plastic material known as abs filament. The project set up is divide into three parts such as robotic arm, processor and control unit. In robotic arm, the parts are connected with servomotor, which is used for robotic arm movement. Each robotic arm contains 4 servo motor, which is fixed with robotic arm part and is connected to the processor in digital pins. The servomotors are controlled by 3 potentiometer and 1 touch sensor. Each servomotor is controlled by each potentiometer. The one servo motor which is fixed in head part of the robotic is control open and close off grip is controlled by touch sensor. In control unit, it contains potentiometer and touch sensor. The technician or doctor can control the robotic arm by rotating the knob of potentiometer and touching the touch sensor.

3. HARDWARE IMPLEMENTATION

3.1 ARDUINO NANO

The Arduino Nano may be a small, complete, and breadboard-friendly board supported the ATmega328P released in 2008. It offers the identical connectivity and specs of the Arduino Uno board in a very smaller form factor. The Arduino Nano is provided with 30 male I/O headers, in a very DIP-30-like configuration, which may be programmed using the Arduino Software integrated development environment (IDE), which is common to any or all Arduino boards and running both online and offline

3.2ARDUINO UNO

It is the foremost flexible hardware platform used supported ATmega328P which may be programmed in step with the function where it's to be used. it's 6 analog inputs, 14 digital input/output pins (6 pins of those are often

used as PWM outputs) , a USB connection, a 16 MHz quartz, SPI, serial interface, a push button, an influence jack and an ICSP header as shown. The Arduino microcontroller isn't just for technical audience but is meant for designers and artists furthermore due to its focus to usability supported its design which helps to attain the intended goal.

3.3 POTENTIOMETER

A potentiometer may be a three-terminal resistor with a sliding or rotating contact that forms an adjustable potential divider. If only two terminals are used, one end and therefore the wiper, it acts as a resistance or rheostat. The measuring system called a potentiometer is actually a resistor used for measuring potential (voltage); the component is an implementation of the identical principle, hence its name. Potentiometers are commonly accustomed control electrical devices like volume controls on audio equipment.

3.4 TOUCH SENSOR

Touch Sensors are the electronic sensors which will detect touch. They operate as a switch when touched. These sensors are employed in lamps, touch screens of the mobile, etc. Touch sensors offer an intuitive package. Touch sensors are said as Tactile sensors. These are simple to style, low cost and are produced in large scale. With the advanced technology, these sensors are frequently replacing the mechanical switches, supported their functions there are two varieties of touch sensors- Capacitive sensor and Resistive sensor.

3.5 ECG SENSOR

This sensor may be a cost-effective board wont to measure the electrical activity of the guts. This electrical activity may be charted as an ECG or Electrocardiogram and output as an analog reading. ECGs are often extremely noisy, the AD8232 Single Lead rate Monitor acts as an op-amp to assist obtain a transparent signal from the PR and QT Intervals easily. The AD8232 acts as an integrated signal conditioning block for ECG and other biopotential measurement applications.

3.6 LCD DISPLAY

The 3.5 inch TFT LCD Touch Display Shield for Arduino Uno is fully assembled, tested and prepared to travel. Add the touch display without wiring, no soldering! Simply plug it in and cargo up a library. Works best with any type of classic Arduino ATMEGA328 Board. So boost your Arduino UNO project with a good looking large touchscreen display shield with a built-in microSD card connection. The Display has 480×320 pixels with individual pixel control. it's far more resolution than a black and white 128×64 display.

3.7 WATER PUMP MOTOR

These are pumps designed to move water from a lower level to a better one. A pump operated properly will do its job for years to include few problems. These are pumps that use energy provided by people to pump water. it always consists of a pumping handle with a spout for the water to return out. this is often the only and earliest way that moves the water for you but it works where there's no wattage. These pumps use a piston or a turbine to provide a partial vacuum to draw the water out of the well. the identical piston or turbine is then accustomed increase the pressure of the water.

4. SOFTWARE IMPLEMENTATION

Microcontroller. Arduino may be a free software electronics prototyping platform supported flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone curious about creating interactive

objects or environments. The IDE allows for writing program, verification of code, compiling, and uploading to the Arduino development board. Libraries and example code will be installed. The Arduino Software (IDE) on computer, in line with its software package. Windows, Mac OS x10.1, Linux 32 bits, Linux 64 bits, Linux ARM etc.
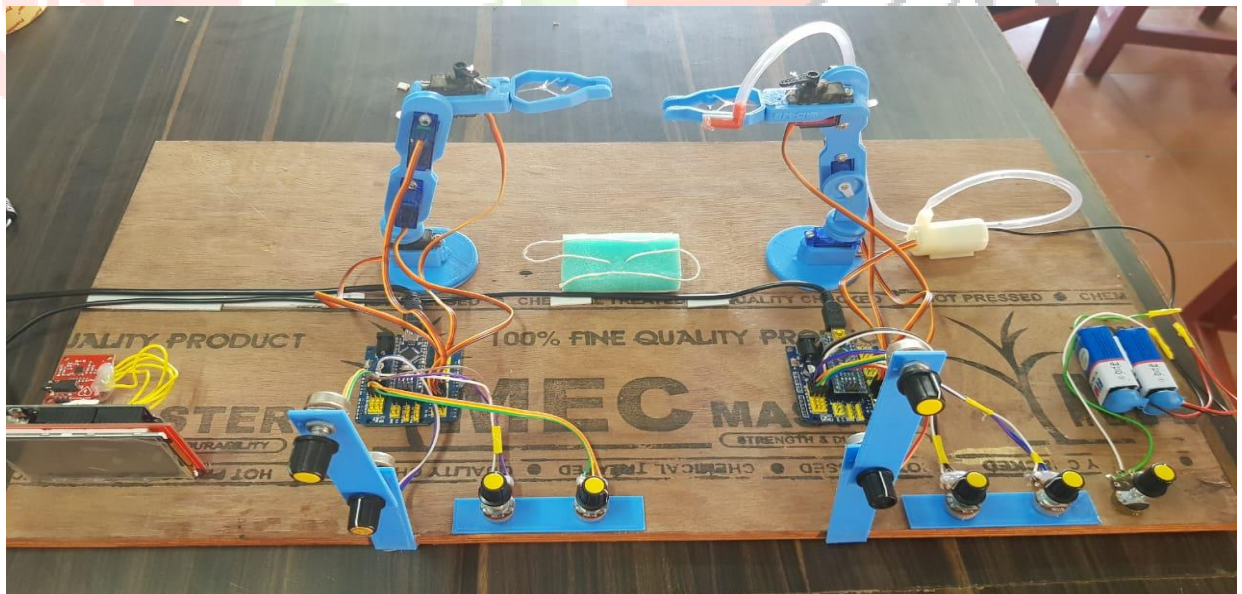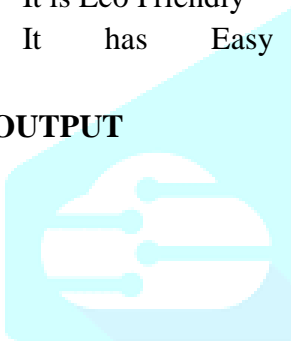
5. APPLICATION

- Useful for many surgical procedures in any specialization.
- Makes the surgery a less complicated one.
- Useful not only for complicated surgeries but also to cure small injuries.

6. ADVANTAGES

- The surgical robotic arm is Portable
- It is low in cost
- It is Eco Friendly
- It has Easy   Replaceable Parts

7. OUTPUT

8. CONCLUSION

With the corresponding sensors and components the surgical robotic arm is successfully done and it was satisfactory and it is ready to do many surgical procedures. By using this robotic arm many surgeons feel easy and less complicated while doing the surgical procedure. Using the Arduino uno and nano we call also measure the heartbeat with the help of heartbeat sensor. Thus this robotic arm will be really helpful for making many lives live peacefully and also a friendly one to surgeons or doctors.

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