International Journal of Future Generation Communication and Networking
Vol.14, No. 1, (2021), pp. 4717- 4721

Position Control and Object Detection for Security and Targeting using Servo Motor

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Abstract—

AC Servomotors are widely used in the industries for the control of static and dynamic loads. Precise control of position, speed, and torque are the main issues with the AC Servomotor. AC Servomotors are highly demanded by the industries to have a precise response under dynamic load conditions. Many control techniques are commercially available for the control of AC Servomotor under static and dynamic load conditions.

Positioning servomechanisms were first used in military fire-control and marine navigation equipment. Today servomechanisms are used in automatic machine tools, satellite-tracking antennas, remote control airplanes, automatic navigation systems on boats and planes, and antiaircraft-gun control systems.The proposed system will work towards achieving accurate position control from distance using GUI and Servo motor.Servo motors are known for its feedback which will help the system to be more accurate according to the given Input angle.This system can be used for variety of applications.We are going to use a Camera as an output device. Many autofocus cameras also use a servomechanism to accurately move the lens. In industrial machines, servos are used to perform complex motion, in many applications.

Keywords— *Servo Motors,Graphical User Interface,Indusrial Machines,Security,Object Detection.*

I. INTRODUCTION

Servo motors are part of a closed-loop system and are comprised of several parts namely a control circuit, servo motor,shaft, potentiometer, drive gears, amplifier and either an encoder or resolver. A servo motor is a self-contained electrical device, that rotate parts of a machine with high efficiency and with great precision. Motors are classified into different types based on their application, such as the AC servo motor, and DC servo motor. Here we will be using BLDC motor i.e Brushless DC motor as they have Less overall maintenance due to lack of brushes, High efficiency and high output power to size ratio,greater efficiency at rotating the load. Thanks to reliability and ease the brushless DC motor has expanded into many applications. It is common in many industries: Manufacturing, computing, biomedical and much more. Next generation electric vehicles and even some power tools use them!

ISSN: 2233-7853 IJFGCN

There are many places where human presence is not usually possible or prohibited.Due to this it becomes difficult to access such remote places be it for safety reasons or survillience.These are the situations where our system can be effectively used.The load of the system can be decided according to the application for eg,A camera, a weapon etc.

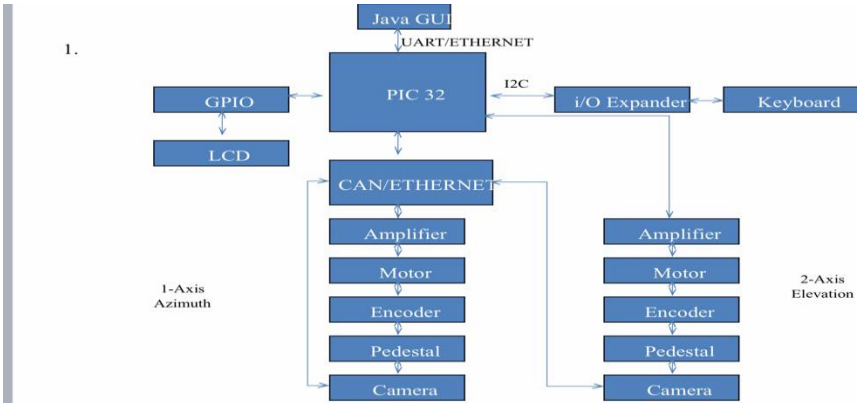
Also the camera can be operated from distance using a dedicated GUI.And also using image processing methods any changes in that area can be detected

II. LITERATUARE SURVEY

There are two types of positional rotation servo motor which are DC servo motor that is controlled by DC, and Alternating Current (AC) servo motor which is controlled by AC. The servo motor "internal" positional feedback consists of either encoder feedback or voltage feedback. The built-in encoder inside the servo motor provides a pulse signal in which it will be processed by the servo controller to get the position feedback [5]. In contrast, the voltage feedback consists of a built-in potentiometer which is coupled with the servo motor axis to get the relative angular position depending on the value of the potentiometer [6]. In particular, the DC servo motor is mostly utilized in the field of electronic, robotics and automation system, especially for special types of applications where the rotation of the motor only requires a certain angular movement such as for robot arm, robot gripper, and etc [7]. Unlike typical DC motor, the main advantage of DC servo motor is it can provide an angular precision where it will only rotate to the desired position depending on the signal given. A typical DC motor only involves an OFF and ON voltage control signal, while the control signal for servo motor is in the form of pulses that directly proportional to the angle of rotation [8]. Currently in the market, the DC servo motor comes in a variety of shapes and sizes [7]. It also has physical stops placed with the gear mechanism to prevent rotation beyond the limits as well as to protect the rotational sensor (potentiometer) [7]. In general, positional rotation servo motor system can be divided into two types which are closed-loop and openloop.

Brushed DC motors develop a maximum torque when stationary, linearly decreasing as velocity increases. Some limitations of brushed motors can be overcome by brushless motors; they include higher efficiency and a lower susceptibility to mechanical wear. These benefits come at the cost of potentially less rugged, more complex, and more expensive control electronics. A typical brushless motor has permanent magnets which rotate around a fixed armature, eliminating problems associated with connecting current to the moving armature. An electronic controller replaces the brush/commutator assembly of the brushed DC motor, which continually switches the phase to the windings to keep the motor turning. The controller performs similar timed power distribution by using a solid-state circuit rather than the brush/commutator system.

III. METHODOLOGY



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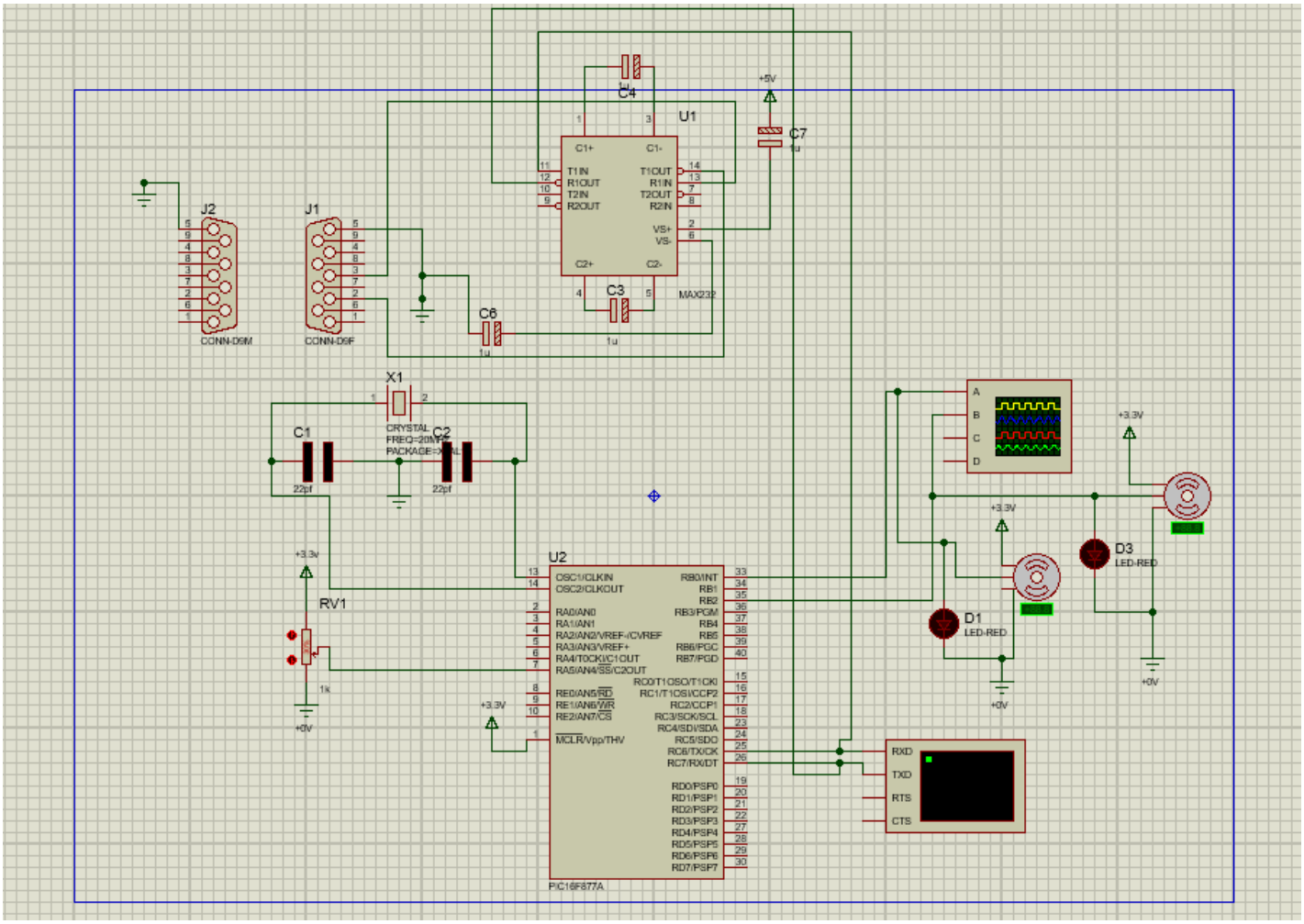
Figure(a). Block diagram of system

In this block diagram we have tried to describe you the whole working of our project. The basic working of this model is,A person gives an input through the GUI which can be a specific angle at which the camera is to be shifted,Once the input is given through the GUI to the microcontroller UART using Ethernet ,The signal is then transmitted and amplified and then decoded before given to the Camera.According to the input angle to motor turns and the Camera is then shifted to that desired angle perfectly.

IV. IMPLEMENTATION



Figure(b). Hardware simulation.

The above result is proteus simulation, our project is hardware based so first we need to do simulation .We will use Arduino for tool kit for software purpose. Flexi force sensor is used for measure force or pressure. And the support component for the same. Basically we are changing the input voltage of the FSR in the simulation for respective output.

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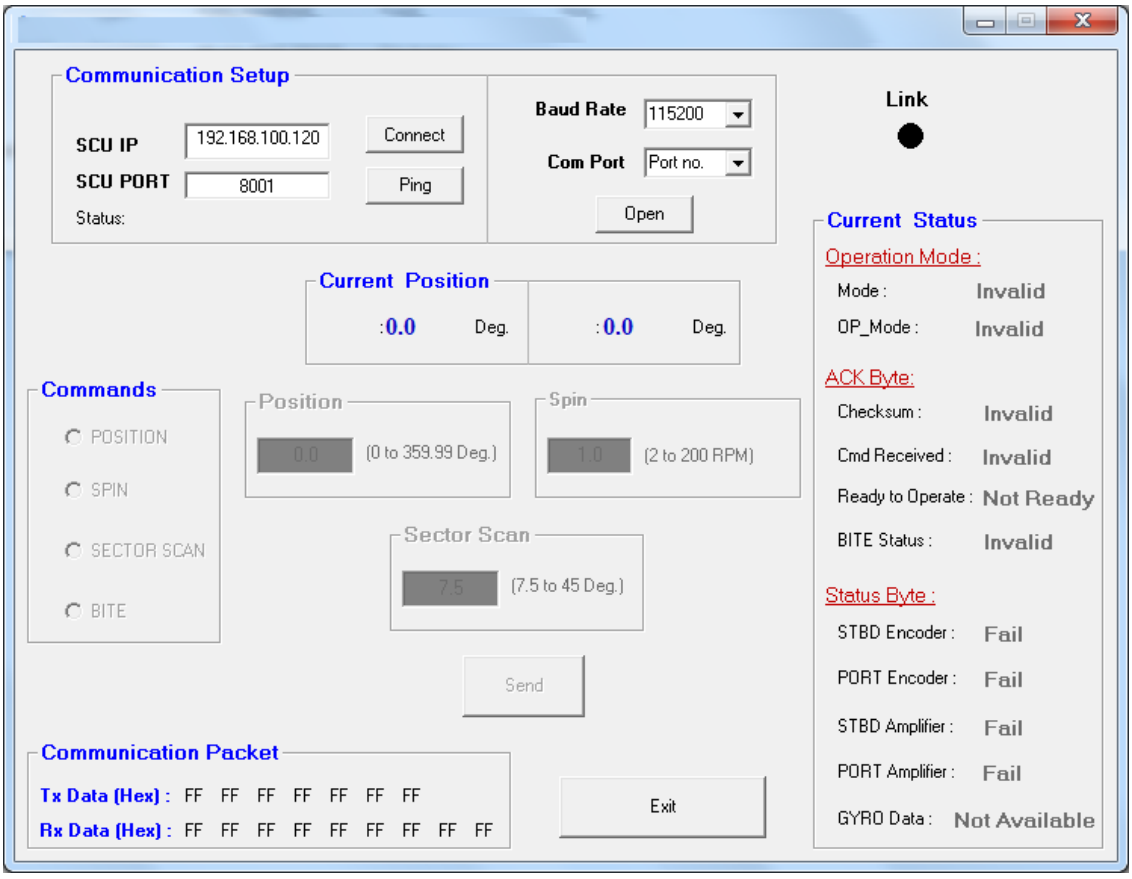
V. RESULT



Figure(c), User interface of labview.

Lab VIEW (Laboratory Virtual Instrument Engineering Workbench) is a graphically based programming language developed by national instruments .As we can see in above fig we have taken two gauge by named right gauge and left gauge to see force applied on flexiforce sensore also we have placed two LED's across the gauges and as we can see we can save patients name,age and weight for future reference for better operation we have placed stop button we can operate this system so flexibly.

VI. CONCLUSION

2-Axis Servo Position control using OpenMV IP camera for image processing and location detection and detection of change in environmental surroundings has been observed and implemented using pic32 processor.

Overall used in defense companies to apply security and target detection of desired position. Using Microsoft visual c based GUI. Developed and implemented 2-Axis Servo position with ±0.10 accuracy.

ISSN: 2233-7853 IJFGCN

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ISSN: 2233-7853 IJFGCN