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CONTROLLING GUI BASED SERVO MOTOR USING IOT

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Abstract:**Servo Motor control is prevalent in robotic applications such as industrial robots in factories. The project that is being developed is widely used in most electronic devices nowadays. Many applications have been developed based on servo motor control in the electronic field, such as automation, Flexible Manufacturing Systems (FMS) and Computer Integrated Manufacturing (CIM). This project aims to develop the Graphical User Interface or GUI of servo motor Control through Python GUI package PyQt5 and Arduino, interface the GUI with hardware and software via communication serial port and sockets, control the servo motor through Python GUI. Using PyQt5 provides a set of tools that simplify laying out and programming GUIs and interfacing with the microcontroller via a serial communication port to control the servo motor. The microcontroller ATMEGA 328P on an Arduino UNO board controls the servo motor. As a result, the servo motor can be controlled through the GUI and interface the python GUI with ATMEGA 328P via the serial communication port.**

Keywords**-Sero Motor, Python GUI, IoT, ATMEGA 328P**

1. INTRODUCTION:

DC motors were the first form of motor widely used for industrial applications. Small DC motors are also used in tools, toys and appliances. This motor is a class of rotary electrical machines that converts electrical energy into mechanical energy. Almost all the DC motors have some internal mechanism, either electromechanical or electronic, to change the direction of the current flow. DC motors are classified based on their excitation configuration as follows.

1) Separately Excited DC motor.
2) Self-Excited DC motor

The basic working principle of a DC motor is "Whenever a current-carrying conductor is placed in a magnetic field, it experiences a mechanical force". Fleming Left Hand Rule gives the direction of this force. The overall system is based on IoT, an interrelated computing device with the ability to transfer data over a network without requiring human to human or human to computer interaction. The IoT evolved due to the convergence of multiple machine learning and commodity sensors. In the consumer market, IoT technology is the most synonymous with the products pertaining to the "Smart home" concept covering devices and appliances. IoT

devices are part of the concept of home automation, which can include lighting and air conditioning. These IoT based devices can be used to enable remote health monitoring and emergency notification system. The IoT can assist in integrating communication, control and information processing across various transportation systems. Industrial IoT devices analyze data from connected equipment, operational technology, location and people. The IoT is used for multiple manufacturing devices. It enables rapid manufacturing of new products and dynamic response to product demands. The IoT application used in this work is farming, such as collecting data on temperature, rainfall, humidity, wind speed and soil content. This data can be used to automate farming techniques and take informed to improve quality and quantity.

The significant trend of IoT is the increase in connected devices that are controlled by the internet in recent years. IoT creates opportunities for more direct integration of the physical world into the computer-based system, resulting in efficiency improvements, economic benefits and reduced human exertion. The number of IoT devices increased from 31 % over the year to 8.4 billion in 2017, and it is estimated that there will be 30 billion devices by 2020. The global market value of IoT is projected to reach $ 7.1 trillion.

I. METHODOLOGY

The primary methodology of this project depends on an IoT-based embedded system, and therefore interfacing hardware with Wi-Fi and the internet is an essential part of its functioning. The whole programming is done in Arduino IDE and then loaded into the ATMEGA 328 microcontroller with the help of Wi-Fi and various sensors. The required results are obtained by protecting motor from the abnormal or faulty conditions. The current and voltage is measured by obtaining different motor parameters like temperature, speed etc. It is also possible to control the direction of motion of the motor with the help of a relay. And the heat developed in the motor is obtained by the temperature sensor. The total functioning of the project in terms of the block diagram is shown in Fig 1.

II. COMPONENTS USED

Wi-Fi Modules (8266): Wi-Fi modules are used as IoT devices connected to the website. The command received from the website will send the signals to the processor through Wi-Fi modules.

Atmega 328: It is the heart of the system. The Arduino IDE (Integrated Development Environment) is used to program the speed control of DC motor and Wi-Fi modules.

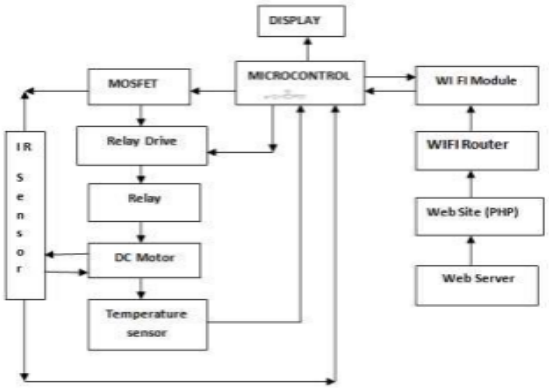

Fig 1. Block Diagram

Temperature Sensor: A temperature sensor is a device that provides for temperature measurement through an electrical signal.

Humidity Sensors: A Humidity sensor is a device that provides the measurement values of the humidity where the motor is located

Gas Sensors: A Gas sensor is a device that is used to detect the gases and gas level in the area of work and send signals using Arduino

Servo Motors: It is a motor which rotates from 0 to 180 degrees and is mostly used in robotics and automation.

Dc Motors: These motors rotate from 0 to 360 degrees and can be operated at any speed. This speed can be controlled using GUI pages of the server.

LCD (Liquid Crystal Display): LCD is connected to the processor. It is used to display the motor's temperature and speed of the DC motor at the rated value.

III. PROPOSED WORK:

Servo motors are small controllable motors that lend to implementation in many applications. Servos have many different speeds, sizes and torque capabilities, but all have three wires, power, ground and control. Servo motors are popular with hobbyists because they are inexpensive, $15-$100, and management of Servo motors with microcontrollers is universal for all models. Servo's receive pulse width modulated (PWM) signals to determine how to move. There are many ways to send this signal to the motor; this application covers how to send the desired PWM signal to the Servo motor using the Arduino UNO microcontroller. The Arduino UNO is a popular microcontroller which comes on a development board to accelerate programming and provides simple interfacing with peripheral devices and connection with computers. The Arduino UNO (fig3) chip is programmed with the Arduino programming language and Arduino IDE software through a USB port on the board, which plugs into a computer's USB port. The Arduino IDE software writes code from the software to the chip by uploading the file containing the desired code to the board. Once the chip has been programmed with the desired code, it can be removed from the development board and connected to any other circuit.

For building a connection between the client and server, serial communication is being used. NGROK sockets for wireless communication. This NGROK provides a free IP address and port numbers for users.

Both client and server are connected to the same IP address and port number. In this project, our client and server are connected to

IP address: '127.0.0.1' and port number: 4450, which was provided by the NGROK and connected using serial communication.Here not only servo motor is connected by using this algorithm, but other DC motors and sensors like temperature and humidity sensors, gas sensors, and ultrasonic sensors are also connected to the Arduino to collect the data at the site location. This data was transmitted to the GUI page (fig4) using sockets and serial communication

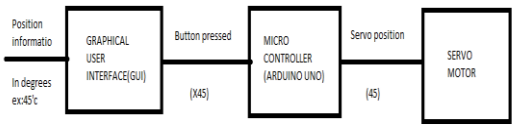

Fig 2: Flow chart

IV. RESULTS:

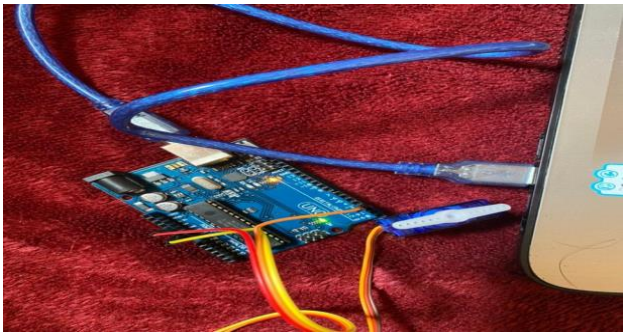

Fig 3: Arduino setup

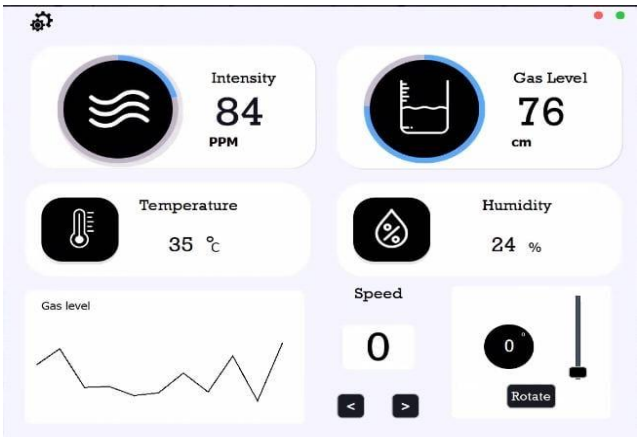

Fig 4: GUI page

V. CONCLUSION:

Though there are various ways to control servo motor and DC motor using various coding languages. This method helps user to save time. We can control servo motor and dc motor using an app to which direction we want. The controlling servo motor and dc motor using IoT is also the most efficient one out of lot, the other methods require way more resources when compared to controlling servo motor using IoT. Here we not only control the servo motor and DC motor,we will also get the values of temperature, humidity, intensity, gas level and gas level graph using sensors at the site location which are connected to Arduino. Outputs from all these sensors and motors are transmitted using best method i.e., IoT

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