

# Python Software Development For Designing of Servomotor Using Python Language

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**Abstract-** A servomotor (or servo motor) is a rotary or direct selector that allows precise control of angular or direct position, haste, and acceleration. It consists of a suitable motor coupled to a position feedback detector. Servomotors have high torque capabilities. The main ideal of this design is to experimentally demonstrate the modelling and designing of servo motor using a python grounded graphical user interface. This design focuses on the parameter setting, analog and digital accession, programming and HMI (Human Machine Interface) with GUI (Graphical user Interface) setting of servo motor designing.

**Keywords-** python language, programme Servomotor, Robotics.

## I. INTRODUCTION

In this review paper we are going to introduce the easiest way to calculate important parameters required for designing a servomotor. The main focus behind this project is to display the electrical output parameters and dimensions using python programming language. Servo motors are used for motion control in a variety of electro-mechanical industries similar as robotics. CNC manufacturing, aerospace technology, etc. to maintain accuracy and perfection. The control of the servomotor in various modes like position, haste, and torque mode is achieved using a servo drive. The position mode control is achieved through microcontroller programming to oscillate the motor shaft forward and reverse direction for the needed speed and position mode parameters are realized by configuring the operation software for servo-drive microcontroller logic. Then we are using input parameters for designing a servomotor. Based on the calculations, it'll give a fully modelled design of affair parameters. The programmer developed is able of reading serial encoder data by establishing wireless communication with a servo drive. Servo motors are typically used as prime movers in computers, numerically controlled instrument, or other applications where starting and stopping of servo motor are made quickly and accurately. Servo motors have lightweight, low- inertia Armatures that respond quickly to excitation- voltage changes. Parameters of DC motor play an

important part in achieving high performance in simulation models. Parameters vary with time due to the detraction and rowing effect which reduces performance, thus, to overcome this problem, motor parameters should be modernized and different ways have been used for this purpose.

## 1.1 DESIGNING PARAMETERS OF SERVMOTOR

Table -1: Designing Parameters Of Servomotor

Input parameters	Output parameters
Torque	Rated torque, maximum torque
Gear ratio	Rated speed, maximum speed
Voltage(PWM)	Minimum angle, maximum angle
Current	Rated current, maximum current
Duty cycle	TON, TOFF
Input analog value	PWM value

## 1.2 PWM CALCULATIONS

**T = ON Cycle + OFF Cycle;**

**Duty Cycle = (ON Cycle / T) × 100; F = 1000000 / T;**

**Vout = Vmax × Duty Cycle**  
 PWM 1.5ms = 0 degree PWM  
 2ms = 90 degree PWM  
 2.5 ms = 180 degree

PWM Calculation using Analog Values Val= Sensed Value  
 Mapped Value = map (Val, 0, 1023, 0, 255)  
 PWM = (output, mapped value)

$$\text{PWMValue10bit} = \frac{\text{Analog Input}}{1023} \times 255 \quad (\text{only integer})$$

$$\text{PWMValue12bit} = \frac{\text{Analog Input}}{4095} \times 255 \quad (\text{only integer})$$

### 1.3 PARAMETRES CALCULATIONS OF SERVO MOTOR

Torque = Force × Radius at which load is suspended

$$\text{Torque} = m \times g \times r \text{ (Nm)}$$

$$\text{Force} = \text{Load mass} \times g$$

$$= m \times g \text{ (N)}$$

$$\text{Torque(kg cm)} = \text{Torque (Nm)} \times 10.197162$$

$$\text{Gear Ratio} = \frac{\text{Teeth on Input Gear}}{\text{Teeth on Output Gear}}$$

$$\text{Speed Ratio} = (\text{Gear Ratio})^{-1}$$

$$\text{RPM} = \frac{\text{Gear Speed (rad/s)} \times 60}{2\pi}$$

$$\text{Gearspeed} = \frac{\text{Rpm Gear speed} \times 2\pi}{\omega}$$

$$\text{Resistivity} = \frac{\text{Resistance} \times \text{Area}}{\text{Length}}$$

$$T = T_{ON} + T_{OFF}$$

$$\text{Duty Cycle} = (T_{ON} + T_{OFF}) \times 100$$

$$F = \frac{1000000}{T}$$

$$\text{Hall Current} = \frac{\text{Voltage applied}}{\text{Resistance of coil}}$$

## II. LANGUAGE USED FOR DEVELOPING SOFTWARE

Python has get one of the most popular programming languages for studying in once decade. Python is a high-ranking, general- purpose programming language. Its design creed emphasizes constitution readability with the use of significant indentation. Python is generally used for developing websites and software, task mechanization, data analysis, and data visualization. Python is considerably considered among the easiest programming languages for beginners to learn. It's also one of the most considerably used.

### 2.1 COMPARISION BETWEEN PYTHON AND OTHER LANGUAGES

Table -2: Comparison Table of Different Types of Languages

Metrics	Python	Java	C++
Type	It Is Dynamicaly Type	It Is Statically Type	It Is Weakly Type
Best For	It Is Best For Date Science And Machine Learning	It Is For Embedded And Cross Platform Application	It Is Best Object-Oriented Programming Feature
Platform	Linux And Graphical User Interface	Java SC, Java FX, Java EE.	Cross Software Platform, Perl
Designed By	Guido Wan Rossum	James Gosling	Bajarne Stroustrup
Advantages	Easy To Learn And Write	Easy For Programing Language	Mid-Level programing Language, Fast And Powerful
Application	Use In Application Processor And Communi cation Vehicle	Use In Many Embedded System Running On Android Operating System	Used In Many Embedded System

### 2.2 OBJECTIVES

The main objective of this project is to solve the identical problems using python language and other main objective that we have considered in this developing a software for designing of servomotor;

- 1) Display the electrical input output parameters and dimensions using python.
- 2) Allow the users to enter its servo motor ratings.
- 3) Allow the users to analyze the various parameter with less Data.
- 4) Fast computation.
- 5) Minimize error.

## III. CONCLUSIONS

This Software is reliable and efficient for Designing Servomotor. It is easy to calculate minimum errors. All

parameters will be calculated easily if all the necessary data is available. This will reduce stress and more work occurs while calculating required parameters. Using Designing Software It will save the time.



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