# MOTOR SPEED CONTROL BASED ON PWM USING STM32

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## ABSTRACT

With the continuous advancement of technology, the reliance on automated machines has significantly increased. Most modern machines incorporate motors as a critical component for their operation. As the number of such machines grows, manually controlling each one becomes inefficient and impractical. To address this, microcontroller-based systems offer a reliable solution for precise and automated motor speed control.

In this project, the STM32L496AGI6 microcontroller is used to generate a Pulse Width Modulation (PWM) signal to control the speed of a motor. The microcontroller is programmed using STM32Cube IDE, a powerful integrated development environment that simplifies peripheral configuration and code generation. The work utilizes STM32's Hardware Abstraction Layer (HAL) libraries to set up and generate the PWM signal efficiently. Once the system is programmed, it can operate independently without human supervision, providing accurate and consistent motor speed regulation. This experiment demonstrates the effectiveness of STM32-based solutions in achieving precise motor control in embedded systems.

*Keywords: Pulse Width Modulation (PWM),Duty cycle,Speed Control*

## 1. INTRODUCTION

In earlier days the controlling of the machines was controlled by humans in person.By the day by day development in technology there are many newly invented machines such as computers ,laptops,robots,etc.In [1] The light following robot is controlled by using the smart phones.Then in [2]-[4] by the use of various sensors they achieved obstacle avoidance.In this paper a light following robot using a LDR Module,logic gates and a transistor(TIP-122) was interfaced with STM32 Microcontroller for the speed control. The STM32 Microcontroller is programmed using STM32 Cube IDE.The generated PWM signal can be seen through a Digital Signal Oscilloscope(DSO). So after programming the microcontroller the speed of the motor will be controlled by the microcontroller. The speed of the motor will be controlled by the STM32 microcontroller until the program in the board is changed. When the change in the speed of motor is required, there is no need for people to deal with the motor directly,they can edit the program according to the required speed so that the speed the motor can be changed accordingly.

## 2. SYSTEM DESCRIPTION

The LDR's resistance decreases with increasing light intensity. This change in resistance alters the voltage across the LDR in a voltage divider circuit. The comparator in the LDR module converts this analog voltage into a digital signal. If no light is detected,the motor is considered in invalid state.If the left LDR is detected the right motor will turn ON.If the right LDR is detected then the left motor will turn ON.

To control the speed of the motor the PWM signal is generated.For implementing the PWM in the STM32 Board,STM32 Cube IDE Software is used for programming.The programming in this software is done with the help of HAL libraries of STM32.Also the STM32 Board is configured using this Software which helps in assigning the pins for the PWM output.