

# A Review Paper on, D.C. Motor Controlled by Arduino

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**Abstract**— This work presents a simple speed control application for a DC motor in laboratory use. The purpose of this application is to maintain the desired speed on a generator operating on the same axis to the motor. Two small laboratory DC machines of 1kw and 300W nominal power have been used for testing the controller. Close loop control has been applied by using appropriate speed encoder. The controller functions as a DC chopper and PWM signal is produced by an Arduino UNO controller. The nominal input voltage was 200Volt, so IGBT switching devices were used. There are over voltage and over current protections and, moreover, a mode without speed metering is available (open loop control scheme). A detailed analysis is provided on the equipment and the techniques that have been used for the control of the power electronic device. The scope of this work was to plan and test the controller, in terms of energy efficiency and economical operation. This study presents the critical results of the tests focusing on the best operational point and discusses the related conclusions. The controller's operation was efficient in both low and high speeds that were tested.

**Keywords:** D.C. Motor, Arduino

## I. INTRODUCTION

Arduino is an open-source platform used for constructing and programming of electronics. It can receive and send information to most devices, and even through the internet to command the specific electronic device. It uses a hardware called arduino uno circuit board and software programme C++ to programme the board. In these modern day, Arduino are used alot in microcontroller programming among other things due to its user friendly or easy to use setting, like any microcontoller an arduino is a circuit board with chip that can be programmed to do numerous number of tasks, it sends information from the computer programme to the Arduino microcontroller and finally to the specific circuit or machine with multiple circuits in order to execute the specific command. An arduino can help you read information from input devices such as e.g Sensors, Antenna, Trimmer e.t.c ... and can also send information to output devices such as LED, Speakers, LCD Screen, DC motor e.t.c ...

### A. Arduino Board



Fig. 1: Arduinio board

The Arduino platform has become well aquinted with people into electronics. Unlike most previous programunable circuit boards, the Arduino does not have a separate piece of hardware in order to load new code onto the board, you can simply use a USB cable to upload, and the software of the Arduino uses a simplified version of C++ , making it easier to learn to program, and it provides you with an easier environment that bypass the functions of the micro-controller into a more accessible package. Arduino boards are available with many different types of built-in modules in it. Boards such as Arduino BT come with a built-in Bluetooth module, for wireless communication. These built-in modules can also be available separately which can then be interfaced (mounted) to it. These modules are known as Shield. Some of the most commonly used Shields are:

**Arduino Ethernet shield:** It that allows an Arduino board to connect to the internet using the Ethernet library and to read and write an SD card using the SD library. **Arduino Wireless shield:** It allows your Arduino board to communicate wirelessly using Zigbee. **Arduino Motor Driver Shield:** It allows your Arduino boards to interface with driver of a motor etc.

## II. ELEMENTS OF ARDUINO BOARDS

Elements of an Arduino Board can be done into two categories:

- Hardware
- Software

### A. Hardware:

The Arduino Development Board consists of many components that together makes it work. Here are some of those main component blocks that help in its functioning:

- **Microcontroller:** This is the heart of the development board, which works as a mini computer and can receive as well as send information or command to the peripheral devices connected to it. The microcontroller used differs from board to board; it also has its own various specifications.
- **External Power Supply:** This power supply is used to power the Arduino development board with a regulated voltage ranging from 9 – 12 volts. International Journal of Control, Automation, Communication and Systems, Vol.1, No.2, April 2016 24
- **USB plug:** This plug is a very important port in this board. It is used to upload (burn) a program to the microcontroller using a USB cable. It also has a regulated power of 5V which also powers the Arduino board in cases when the External Power Supply is absent.
- **Internal Programmer:** The developed software code can be uploaded to the microcontroller via USB port, without an external programmer.
- **Reset button:** This button is present on the board and can be used to resets the Arduino microcontroller.
- **Analog Pins:** There are some analog input pins ranging from A0 – A7. These pins are used for the analog input /

- output. The no. of analog pins also varies from board to board.
- Digital I/O Pins: There are some digital input pins also ranging from 2 to 16. These pins are used for the digital input / output. The no. of these digital pins also varies from board to board.
- Power and GND Pins: There are pins on the development board that provide 3.3, 5 volts and ground through them.

#### B. Software:

The program code written for Arduino is known as a sketch. The software used for developing such sketches for an Arduino is commonly known as the Arduino IDE. This IDE contains the following parts in it: • Text editor: This is where the simplified code can be written using a simplified version of C++ programming language. • Message area: It displays error and also gives a feedback on saving and exporting the code. • Text: The console displays text output by the Arduino environment including complete error messages and other information • Console Toolbar: This toolbar contains various buttons like Verify, Upload, New, Open, Save and Serial Monitor. On the bottom right hand corner of the window there displays the Development Board and the Serial Port in use.

### III. L298N MOTOR DRIVER

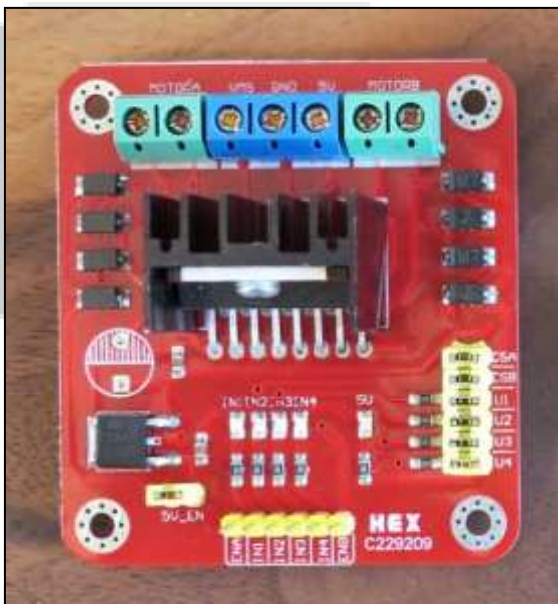


Fig. 2: L298n Motor driver

The L298 is an integrated monolithic circuit in a 15-lead Multiwatt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors.

#### L298 Module Features & Specifications:

- Driver Model: L298N 2A
- Driver Chip: Double H Bridge L298N
- Motor Supply Voltage (Maximum): 46V
- Motor Supply Current (Maximum): 2A
- Logic Voltage: 5V
- Driver Voltage: 5-35V
- Driver Current: 2A
- Logical Current: 0-36mA

- Maximum Power (W): 25W
- Current Sense for each motor

### IV. DC MOTOR



Fig. 3: DC motor

A direct current (DC) motor is a type of electric machine that converts electrical energy into mechanical energy. DC motors take electrical power through direct current, and convert this energy into mechanical rotation.

### V. WI-FI MODULE

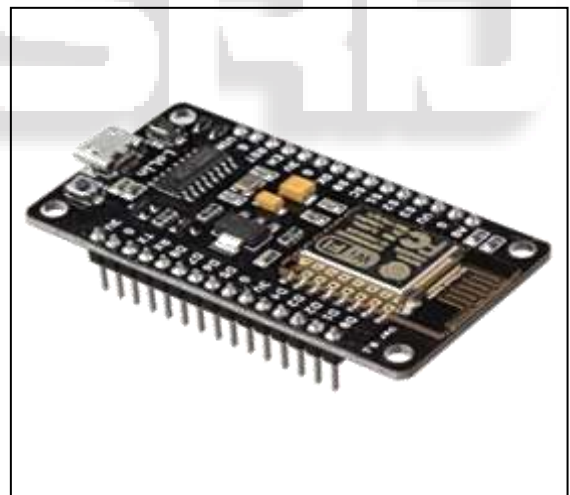


Fig. 3: Wi-fi module

A highly integrated chip designed for the needs of a new connected world. It offers a complete and self-contained wi-fi networking solution, allowing it to either host the application or to offload all wi-fi networking functions from another application processor.

## VI. CIRCUIT DIAGRAM

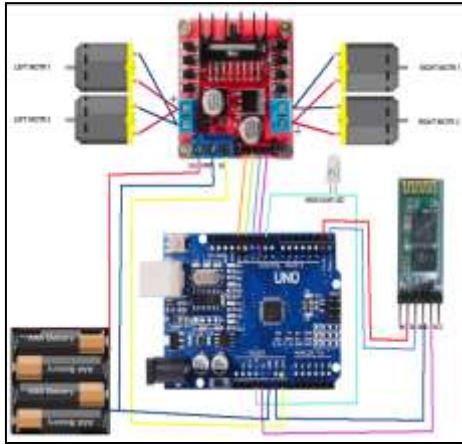


Fig. 5: Circuit diagram

## VII. CONCLUSION

- by using this system we can effectively control the speed of the vehicle according to different zones.
- This system can be implemented in any kind of vehicle
- By using this system we can control the over speed and the rash driving of the drivers.
- We can use this system in highly populated regions and thus we can decrease the effect of accidents
- First, it was the automatic feedback speed control using tacho signal from the machine shaft. When performing experiments but found that the speed measuring device was defective, and not having any other option we turned to open-loop control, with potential for expansion in a closed loop, or using tacho, or drum current measuring device.

## REFERENCES

- [1] Michael Margolis, "Arduino Cookbook" 2<sup>nd</sup> addition.
- [2] J.M. Hughes, "Arduino A Technical References".
- [3] Jhon-David Warren, Josh Adams, and Harald Molle, "Arduino Robotics".
- [4] Jhon Nussey, "Arduino for Dummies".
- [5] Vinay Sagar K N, Kusuma S M., "Home Automation Using Internet Of Things" IRJET Vol. 2, Issue no.3, Jan. 2015.
- [6] Kishore P Jadhav, Santosh G Bari, "Hand Gesture Based Switching Using MATLAB", IJIREEICE, Vol.4, May 2016.
- [7] Sharmad Pasha, "ThinkSpeak Based Sensing and Monitoring System For IoT with MATLAB Analysis", IJNTR, Vol.2, June 2016.
- [8] Angel Deborah S., "Home Automation Systems - A Study", IJCA, Vol. 116, April 2015.
- [9] Prof.(Dr.)Khanna Samrat Vivekanand Omprakash., "WIRELESS HOME SECURITY SYSTEM WITH MOBILE", IJAET, Vol. 2, Dec. 2011.
- [10] Jayashri Bangali, Arvind Shaligram, "Design and Implementation of Security Systems for Smart Home based on GSM technology", IJSH, Vol.7, 2013.