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# **Workshop on Android based Robot Control**

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# Who are we?

- ▶ TechshopBD([www.techshopbd.com](http://www.techshopbd.com)) is an online shop for selling electronic components.
- ▶ From tiny resistors or capacitors to large robotic arms, you name it. You can find almost all of your desired electronic bits and pieces at TechshopBD.



# What is a Robot?

- ▶ According to the Robot Institute of America,  
*“A robot is  
a reprogrammable, multifunctional  
manipulator designed to move materials,  
parts, tools or specialized devices through  
variable programmed motions for the  
performance of a variety of tasks”.*
  
- ▶ *In Simple words, A Robot is an electro-  
mechanical machine capable of performing  
a complex series of actions automatically.*



# Android Controlled Robot



Android App



Bluetooth Module



Arduino Uno



L293D Motor Driver

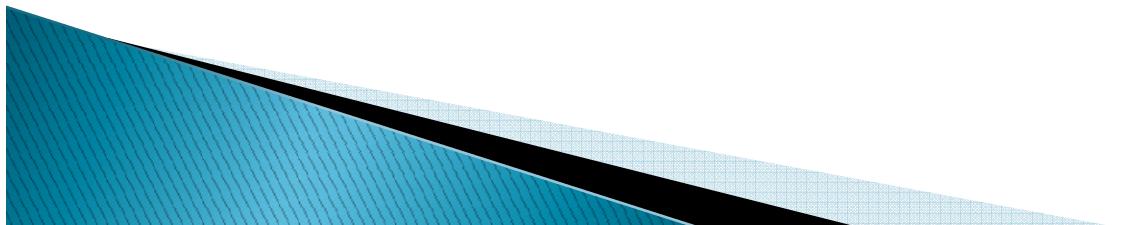


Motor



# Uses

- ▶ **Surveillance purpose.**
- ▶ **Military uses.**
- ▶ **Automatic Wheelchair.**
- ▶ **Home and industry Automation.**





# Main parts of the circuit

- ▶ Arduino Uno-R3





# Arduino

- ▶ **Arduino** is an **open-source** physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board.





# Arduino - Features

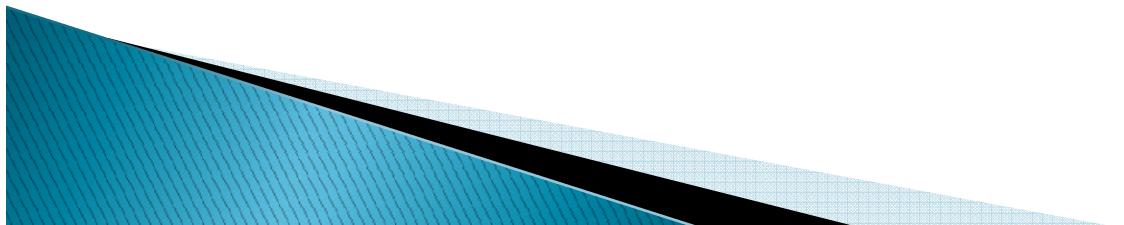
- ▶ Open-source.
- ▶ Easy to use and all-in-one Hardware.
- ▶ Easy to learn Software.
- ▶ Cross Platform.
- ▶ Large community forum.





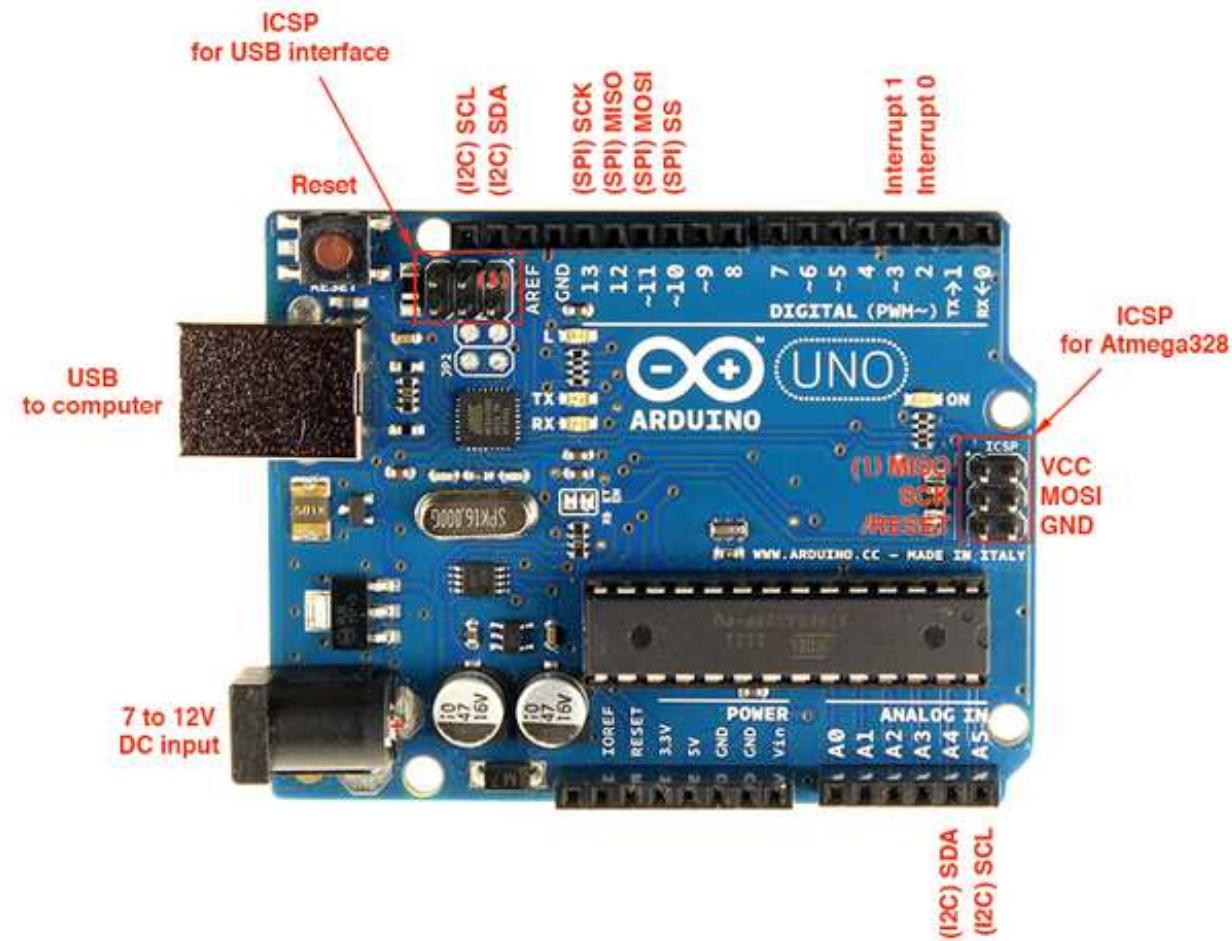
# Arduino Uno

- ▶ The Arduino Uno is a microcontroller board based on the ATmega328P .
- ▶ It has 14 digital input/output pins (of which 6 can be used as PWM outputs)
- ▶ 6 analog inputs
- ▶ 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.
- ▶ It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



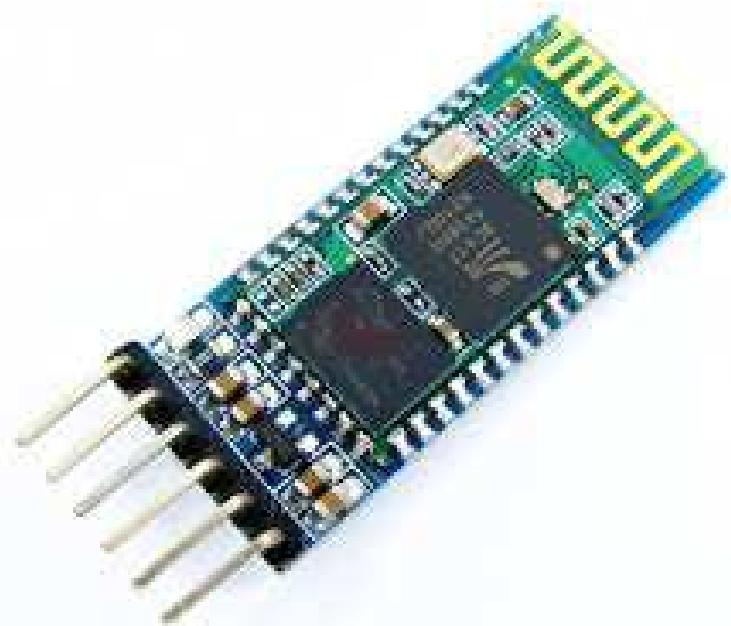


# Arduino Uno-R3 Pinout

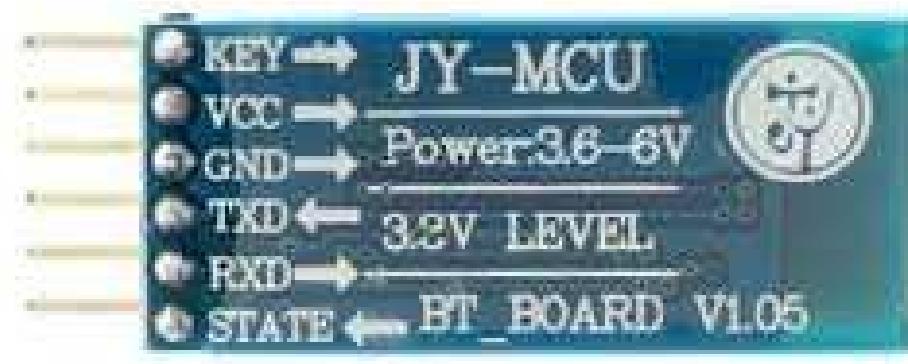




# HC-05 Bluetooth Module



Front View



Back View

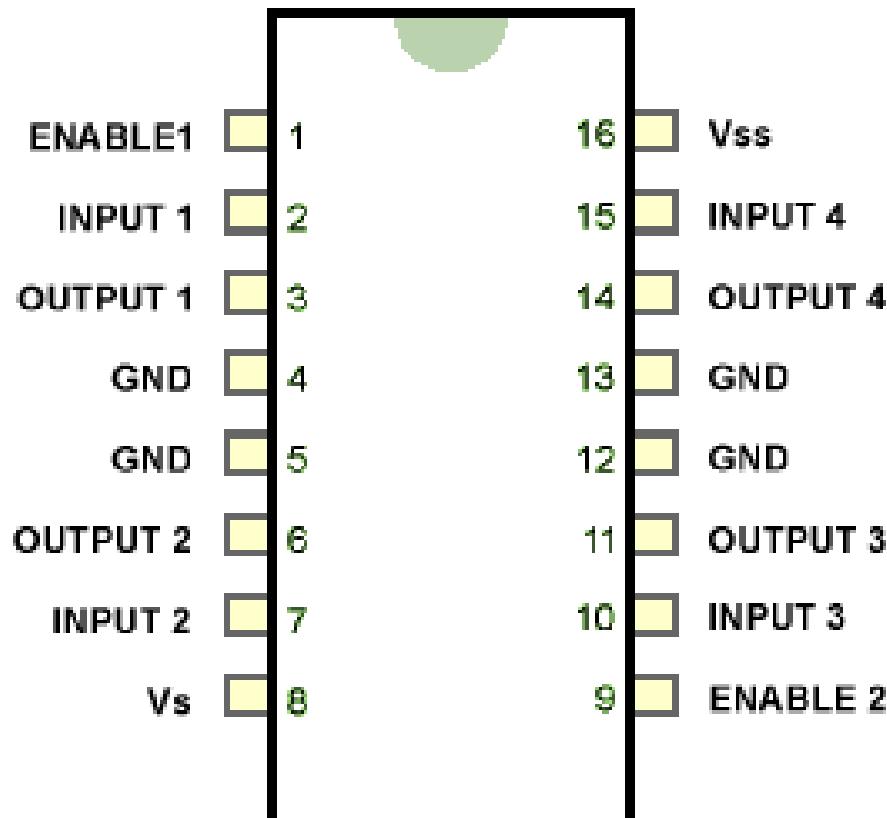


- ▶ **Motor Driver IC- L293D**
- ▶ L293D can drive two motors simultaneously.





# Pin Diagram of L293D



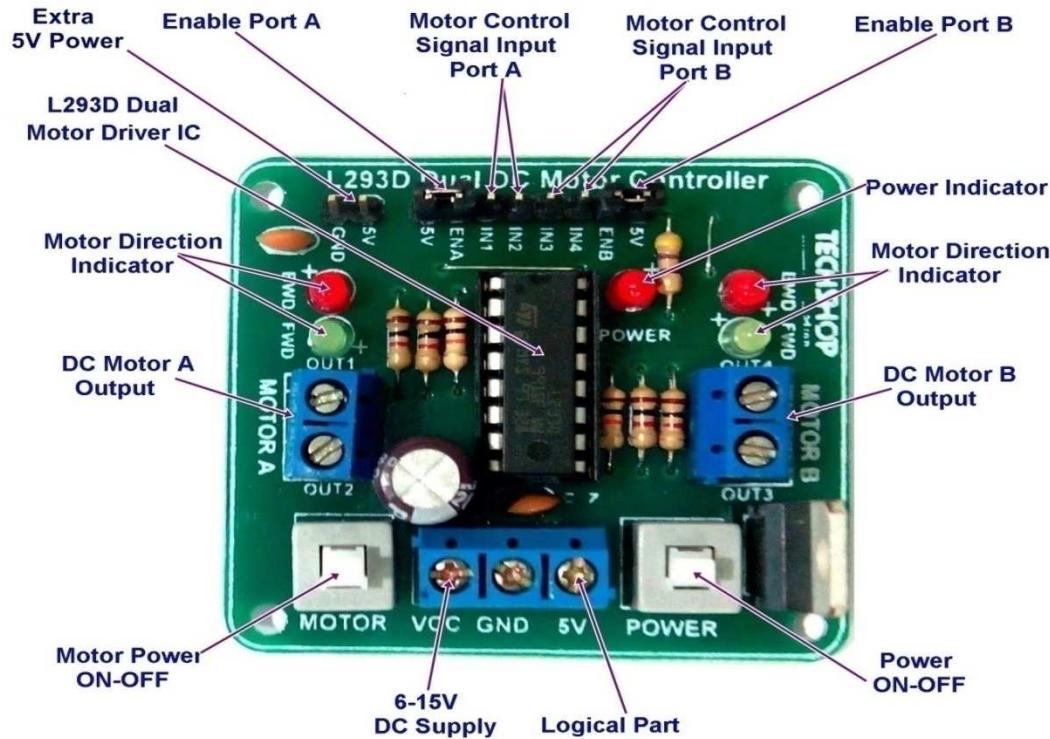


# L293D Truth Table

<i>EN 1</i>	<i>IN 1</i>	<i>IN 2</i>	<i>Motor Status</i>
0	x	x	<i>Stopped</i>
1	0	0	<i>Stopped</i>
1	1	1	<i>Stopped</i>
1	1	0	<i>CW</i>
1	0	1	<i>CCW</i>



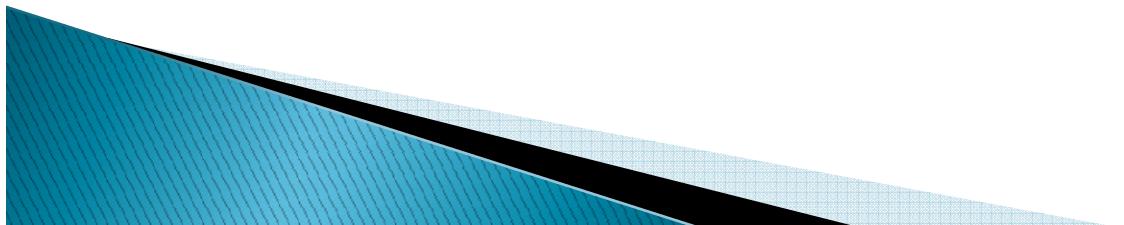
## L293D Dual DC Motor Controller





# Introduction to software

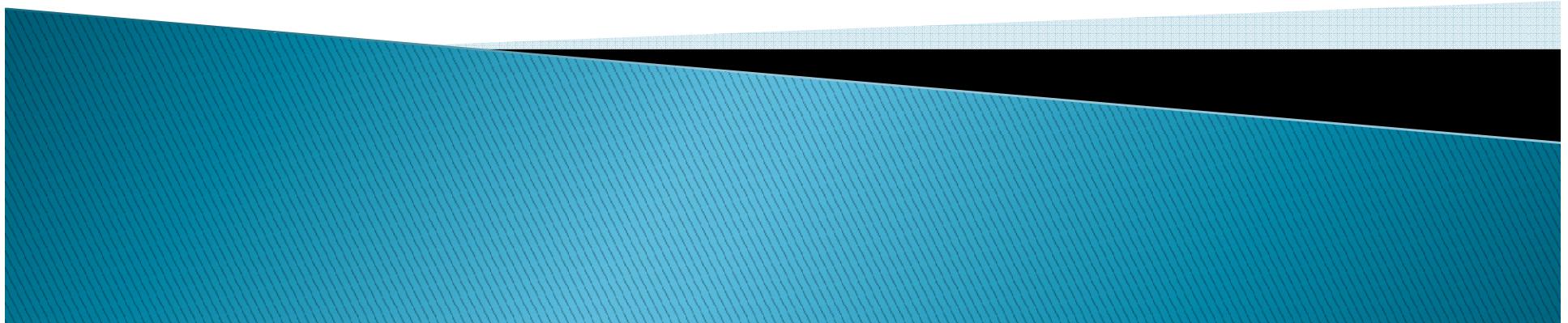
- ▶ Arduino IDE
- ▶ Android App-Bluetooth Robot Remote Control





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# Arduino IDE





# What is IDE?

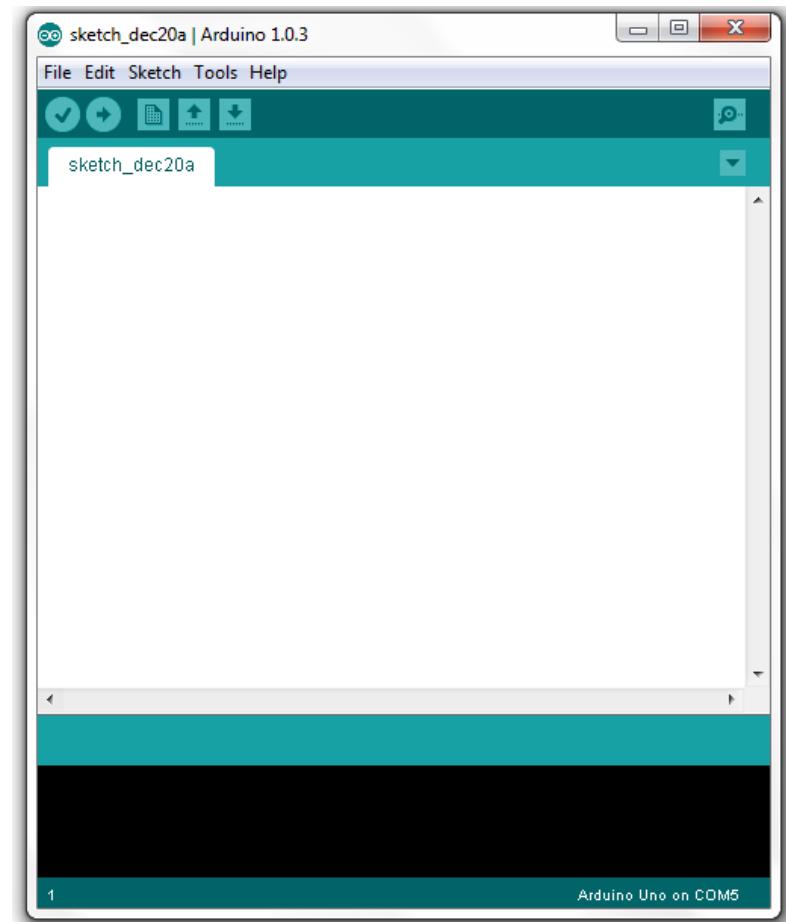
- ▶ An integrated development environment (**IDE**) or interactive development environment is a software application that provides comprehensive facilities to computer programmers for software development. An IDE normally consists of a source code editor, build automation tools and a debugger.



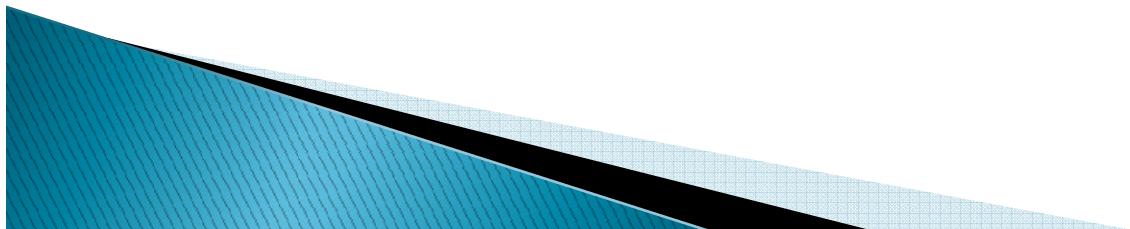
# Introduction with Arduino IDE

The **Arduino** development environment contains:

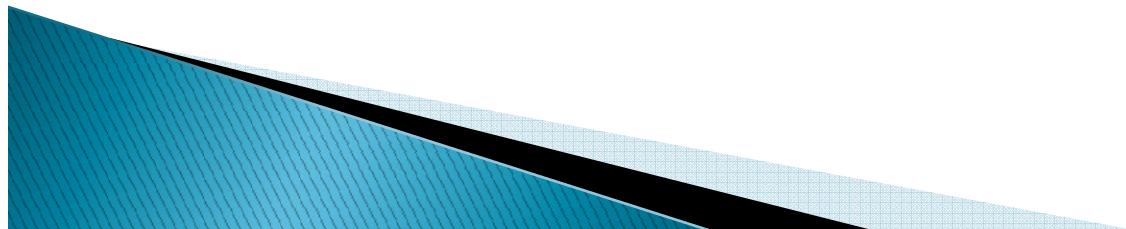
- ▶ A *text editor* for writing code,
- ▶ A *message area*,
- ▶ A text *console*,
- ▶ A *toolbar* with buttons for common functions
- ▶ A series of *menus*.



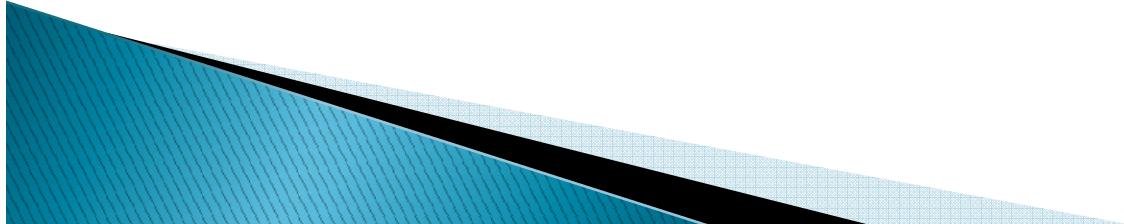
# Toolbar



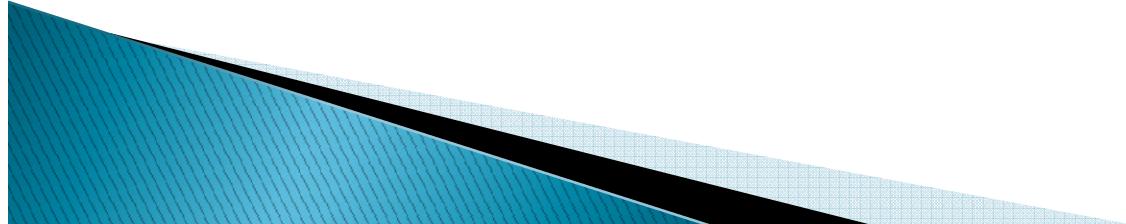
# Toolbar - Verify



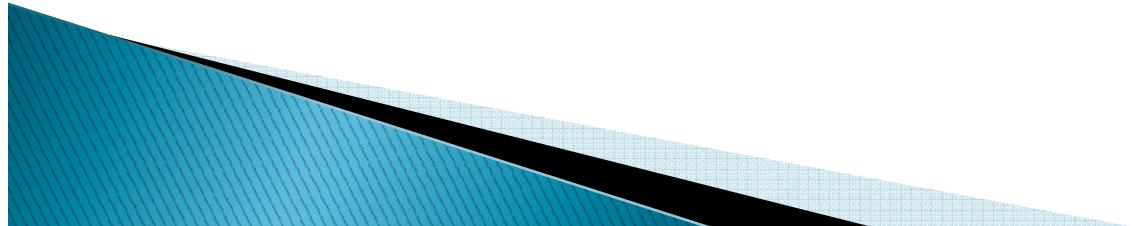
# Toolbar - Upload



# Toolbar - New



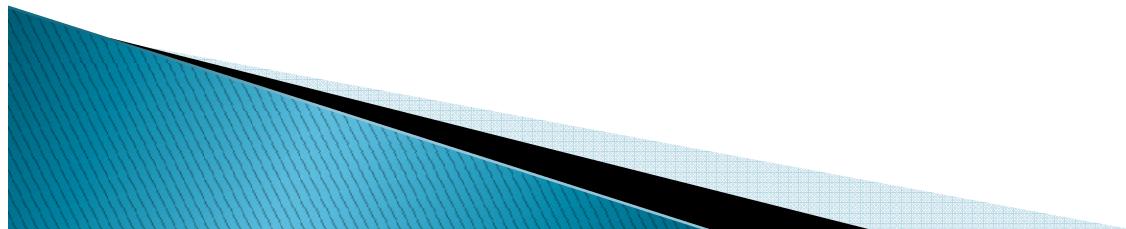
# Toolbar - Open



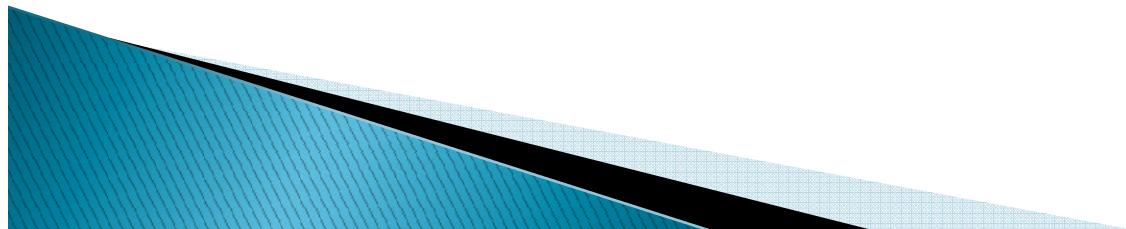


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# Toolbar - Save



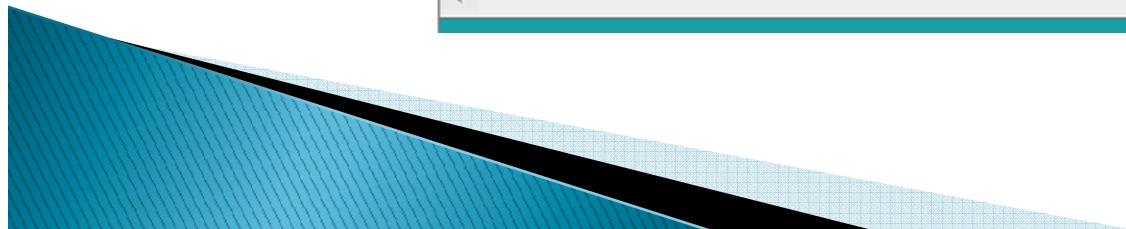
# Toolbar - Serial Monitor



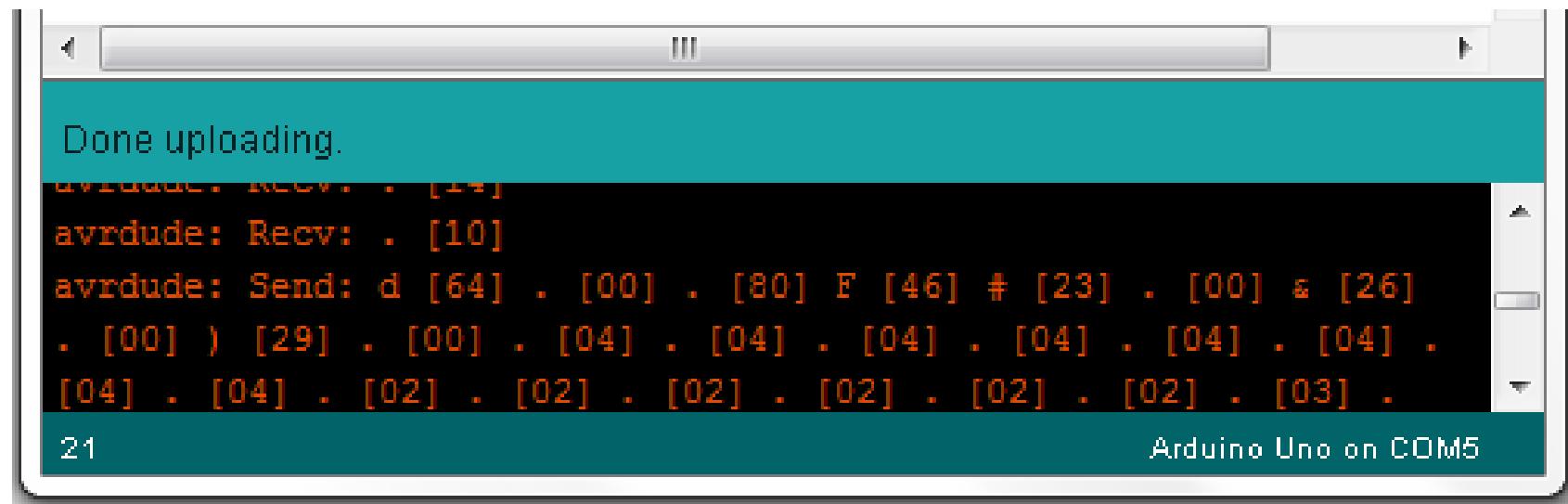


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# Text Editor



# Message box and Console

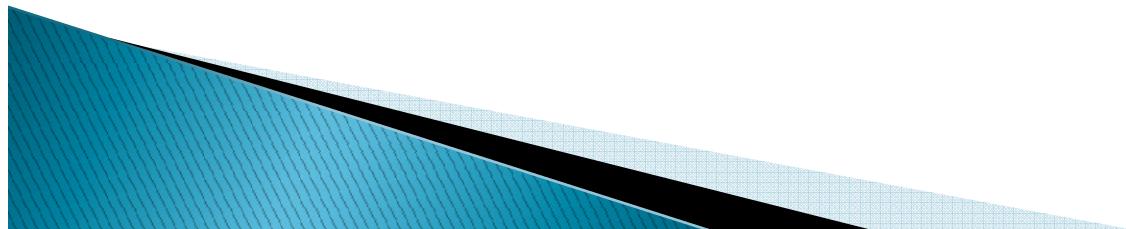




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# Menu bar

File Edit Sketch Tools Help





# Android App

- ▶ Bluetooth Robot Remote Control





# App Instructions

- ▶ 1. Pair HC-05 Bluetooth Module with your mobile. The default password for pairing is "**1234**". Check the manual of Bluetooth module.
- ▶ 2. Click on "**SELECT DEVICE**" icon to select paired Bluetooth module.
- ▶ 3. When you press "**UP Arrow**" it sends the data "**A**" to Bluetooth Module connected with the circuit. When Microcontroller detects "**A**" the Robot / Robot Car moves **FORWARD**.
- ▶ 4. When you press "**Down Arrow**" it sends the data "**B**" to Bluetooth Module connected with the circuit. When Microcontroller detects "**B**" the Robot / Robot Car moves **REVERSE**.
- ▶ 5. When you press "**LEFT Arrow**" it sends the data "**C**" to Bluetooth Module connected with the circuit. When Microcontroller detects "**C**" the Robot / Robot Car turns **LEFT**.



- ▶ 6. When you press "**RIGHT Arrow**" it sends the data "D" to Bluetooth Module connected with the circuit. When Microcontroller detects "D" the Robot / Robot Car turns **RIGHT**.
  
- ▶ 7. When you press "**STOP**" button which is in the center of remote it sends the data "E" to Bluetooth Module connected with the circuit. When Microcontroller detects "E" the Robot / Robot Car gets **STOPPED**.



- ▶ 8. When you press "**360 Degree**" button it sends the data "**F**" to Bluetooth Module connected with the circuit. When Microcontroller detects "F" the Robot / Robot Car rotates **CLOCKWISE** on the same position.
- ▶ 9. When you press "**-360 Degree**" button it sends the data "**G**" to Bluetooth Module connected with the circuit. When Microcontroller detects "G" the Robot / Robot Car rotates ANTI-CLOCKWISE on the same position.
- ▶ 10. Click on "**DISCONNECT**" icon to disconnect paired Bluetooth module.



# Circuit Connection

