UP Competitive Robotics Club

Workshop 1: Intro to Competitive Robotics

Slides by:
Pio Mendoza and Alfred Abanto

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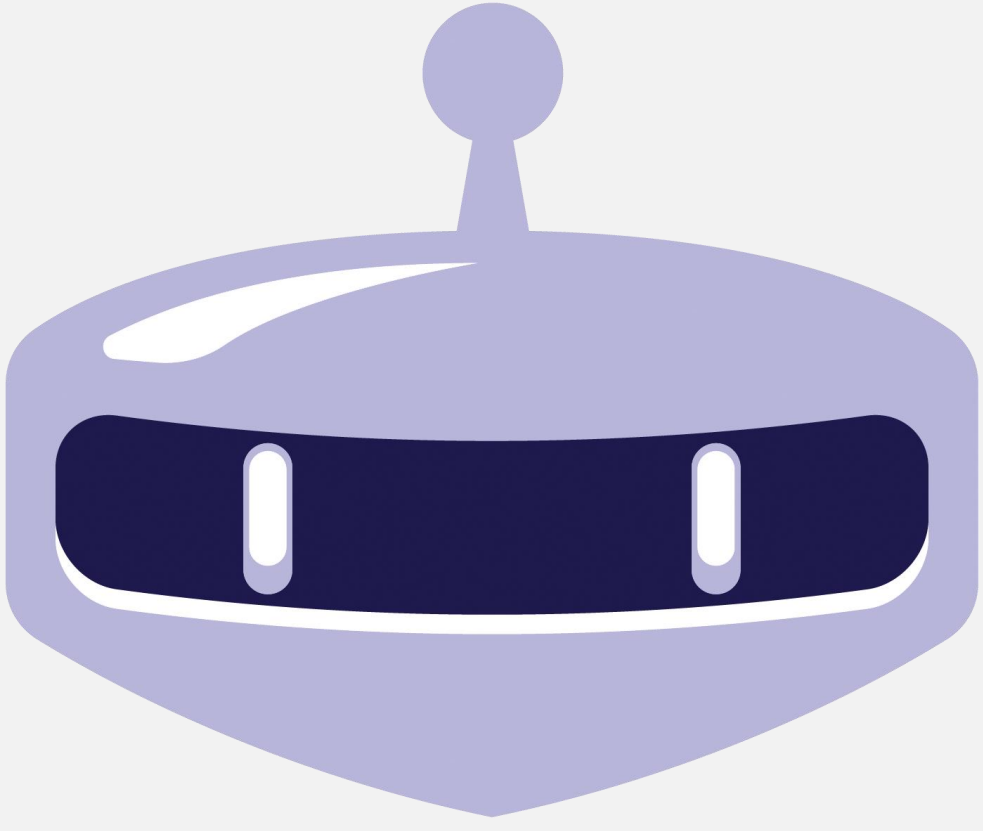

ABOUT US

Who we are

The UP Competitive Robotics Club is an organization established to pursue and facilitate competitive robotics.

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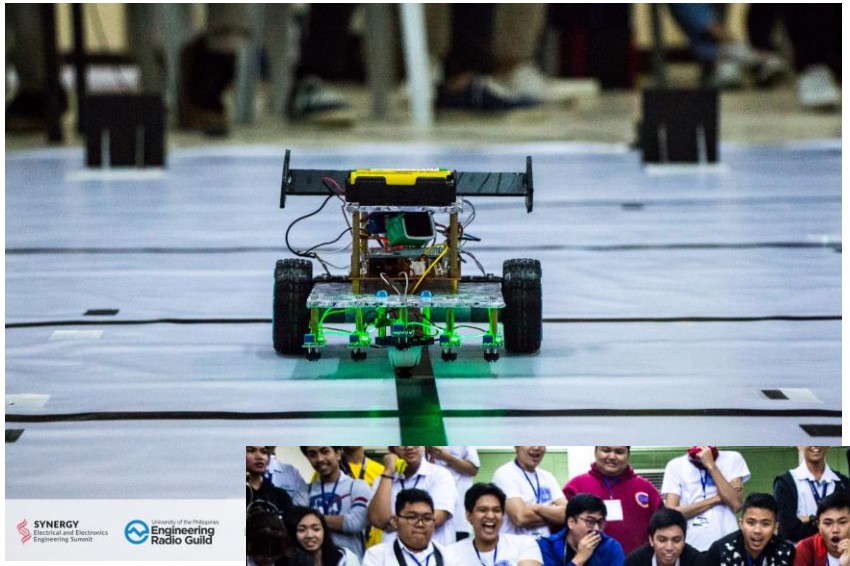

ABOUT US

What do we do?

Pursue competitive robotics

Introducing and popularizing competitive robotics to universities and schools in the Philippines

Host robotics tournaments

Pushing for people to get creative and be better at robotics

Develop robotics-based solutions

Helping communities and localities through robotics research

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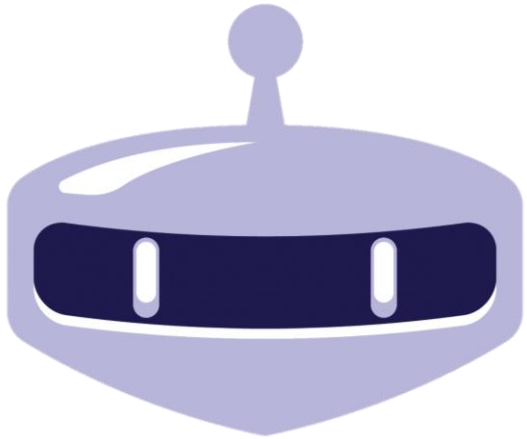
Speaker



Alfred Jason Abanto

- UP CRC Chief Executive Officer
- Synergy: Revolutionary Robotics 2019 – Head
- Synergy: Revolutionary Robotics 2018 – Head
- Revolutionary Robotics workshop speaker 2019
- Revolutionary Robotics workshop speaker 2018
- Dagitab 2019: Day 4 – Guest speaker
- Smartfox Data solutions Inc. - Developer

Questions

Go to menti.com and type in
the code –here–

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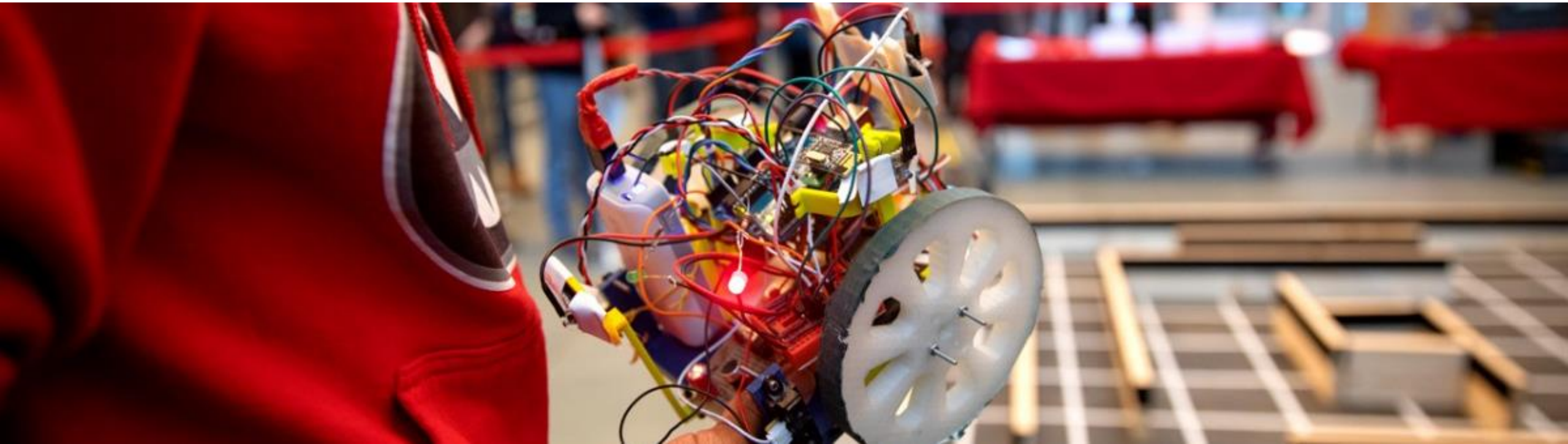
Why competitive robotics?

Besides being really cool; It allows anyone to practice robotics and provides an opportunity for anyone to learn and develop new skills that might eventually lead to better opportunities. It’s a way forward for not only students and enthusiasts, but also for small businesses and the local industry.



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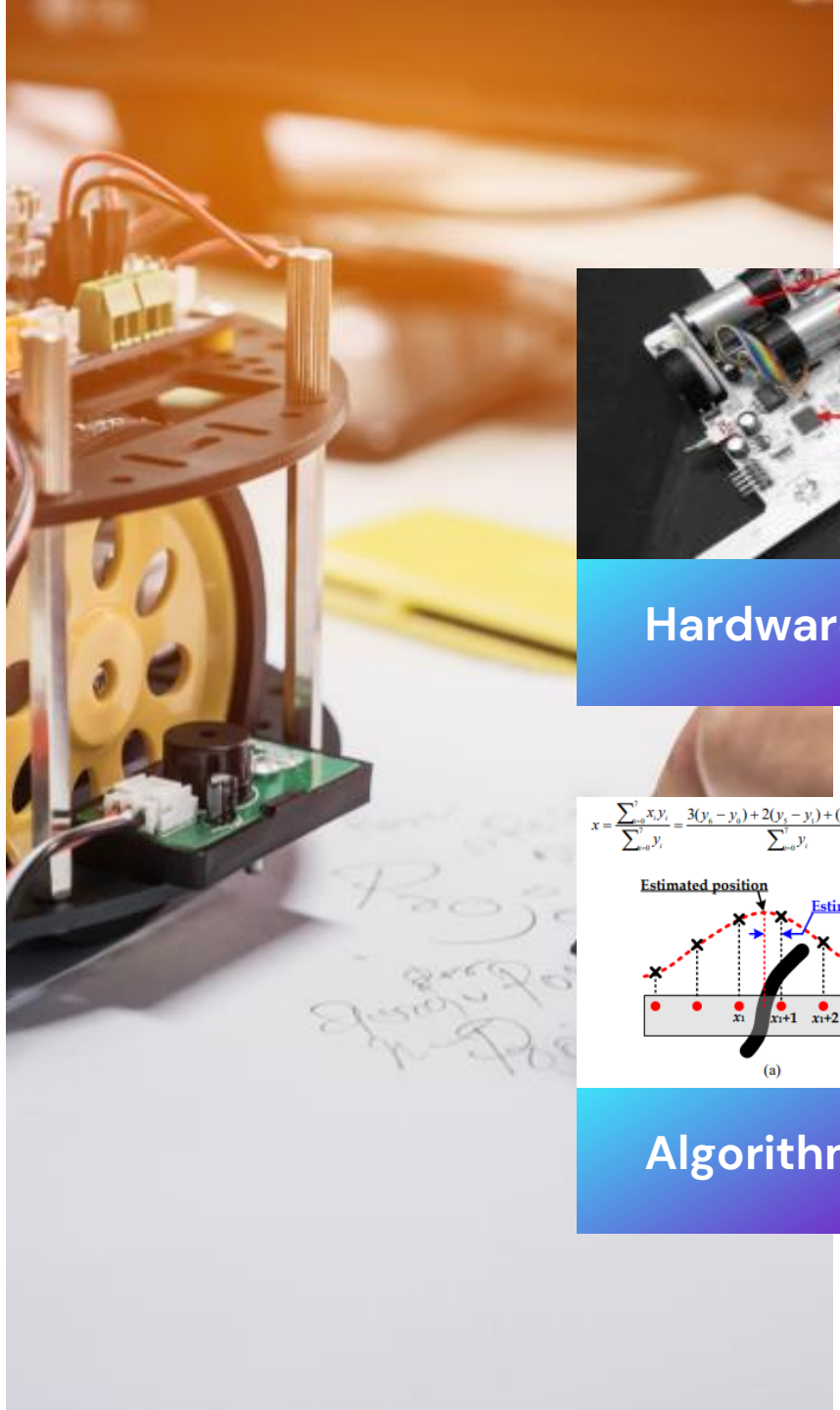
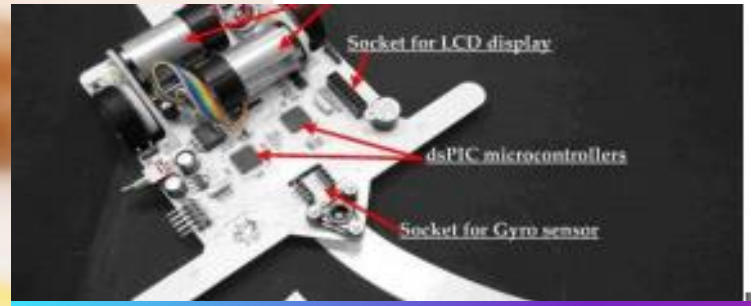
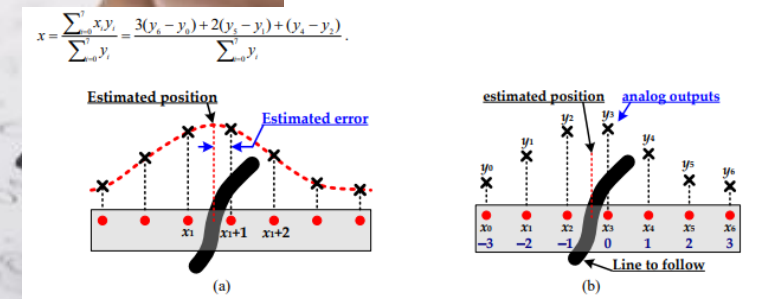
How do I start? – with research

- **An intelligent line-following robot project for introductory robot courses by:** Juing-Huei Su, Chyi-Shyong Lee, Hsin-Hsiung Huang, Sheng-Hsiung Chuang & Chih-Yuan Lin Lunghwa University of Science and Technology Taoyuan County, Taiwan





Hardware Description



Algorithms and Maths

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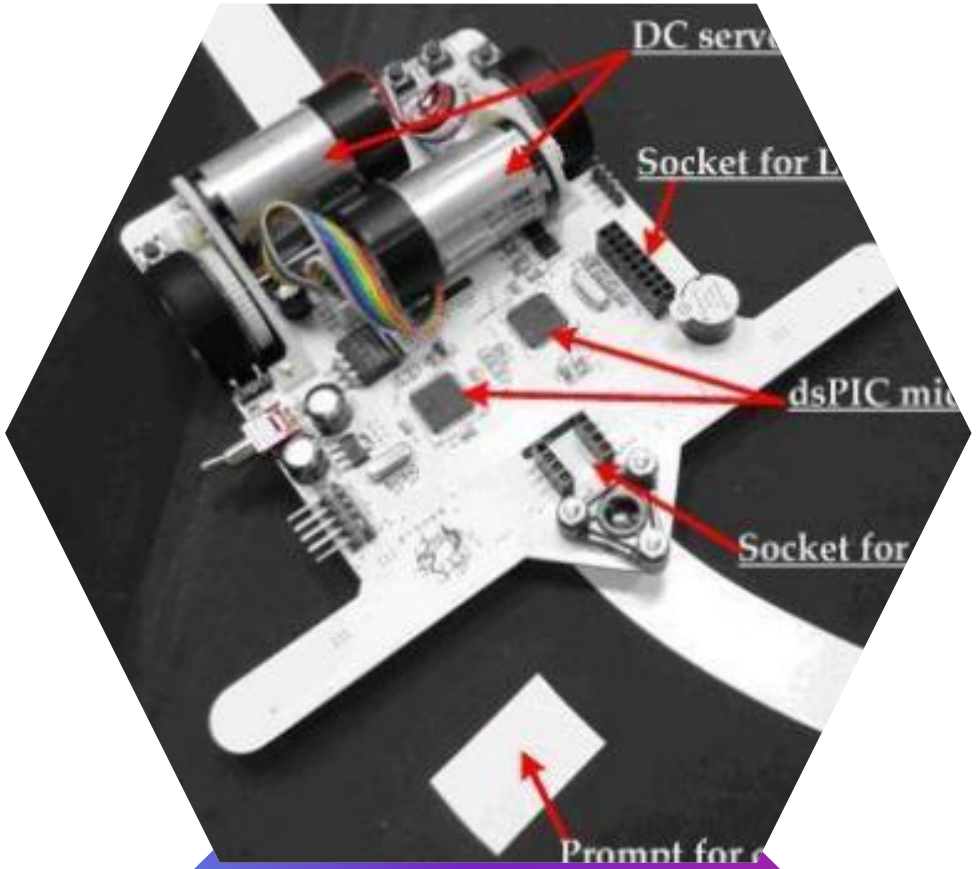
Building a maze solving robot

Microcontroller

- Small footprint
- Convenient to use

Geared Motors

- Low current draw
- High torque



Sensors

- Easy to source
- Low-cost

Drivers and power circuits

- Low-cost
- Easy to source

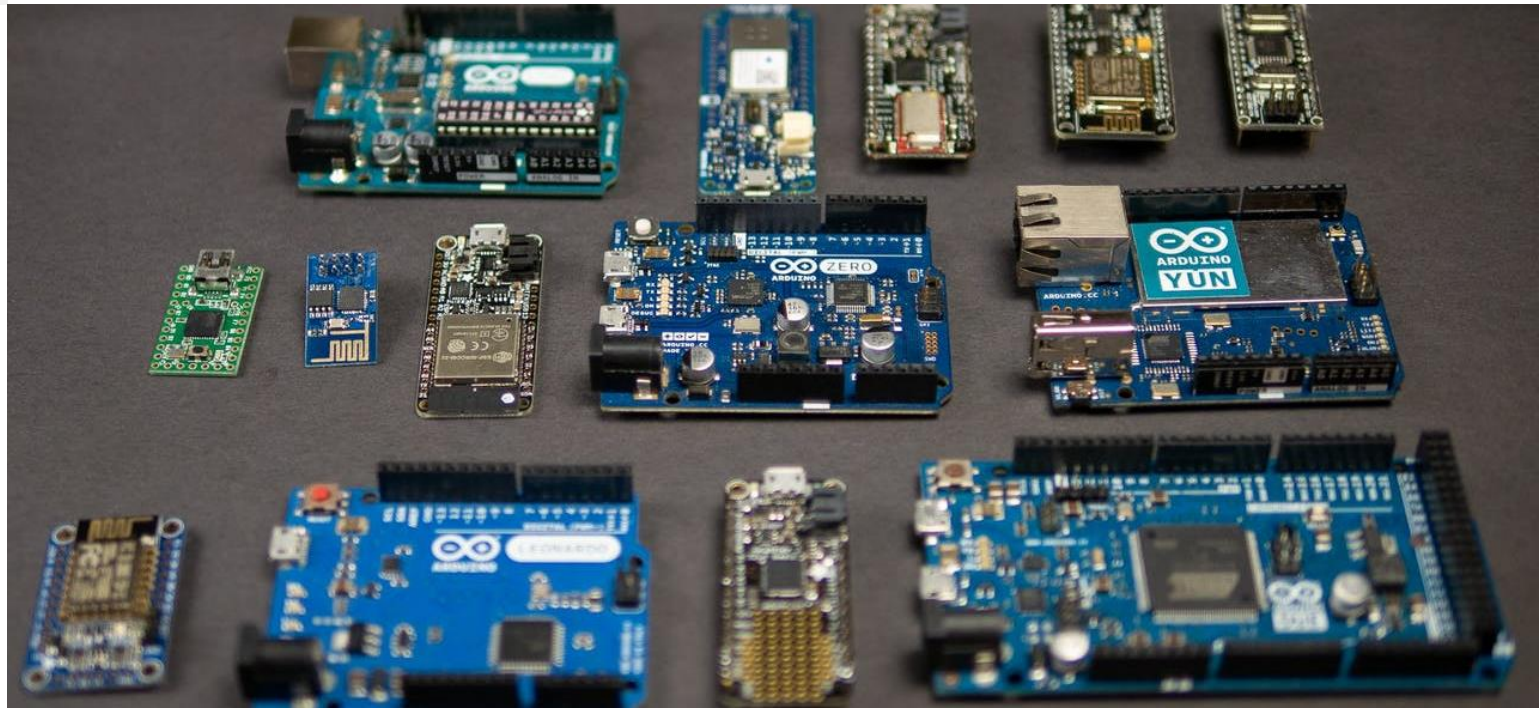
Microcontroller – Arduino

Popular and a good all in one solution

Arduinos are open source so clones are very common and easy to source. It also comes with its own power circuits

Easy to program

Arduinos also have onboard communication chips and a USB connector which makes it easy to program. You can also transfer your program to other boards easily



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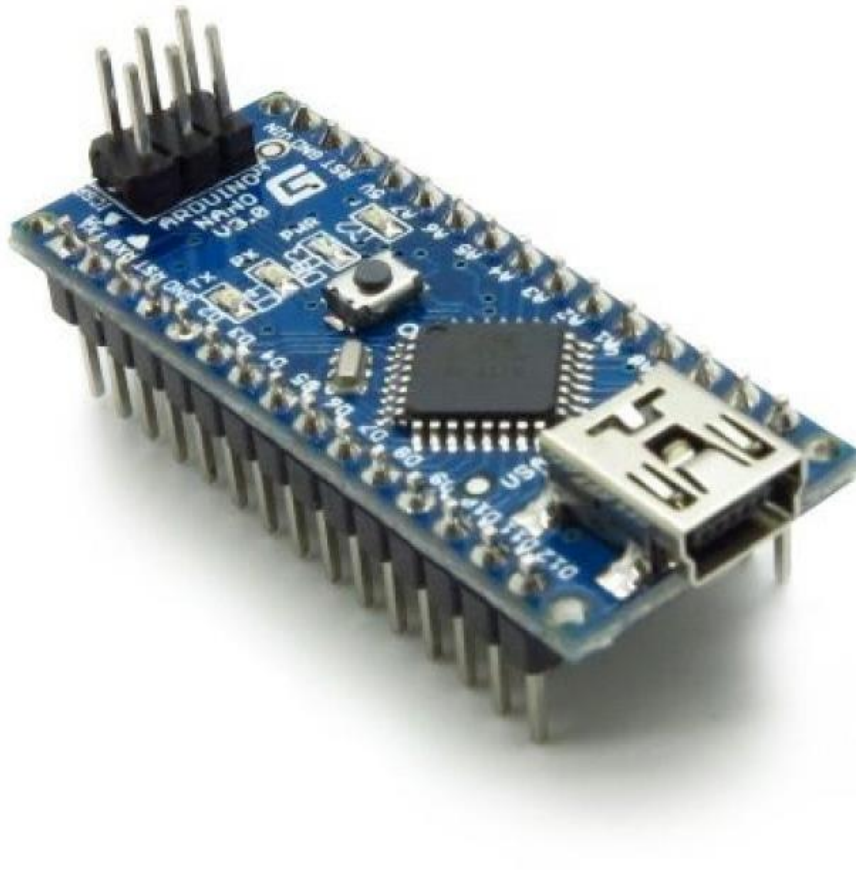

Crash course Arduino

Functions you need

- **digitalRead()**

Returns 1 or 0 if the pin measures 5V and 0V respectively.

- **digitalWrite()**

Applies 5V of 0V to the pin.

- **analogRead()**

Returns a value between 0-1023 which represents the measured voltage measured at the pin (from 0V to 5V)

- **analogWrite()**

Applies a voltage from 0V to 5V based on the input value ranging from 0 to 255 respectively

- **pinMode()**

Sets the pin as an output or and input

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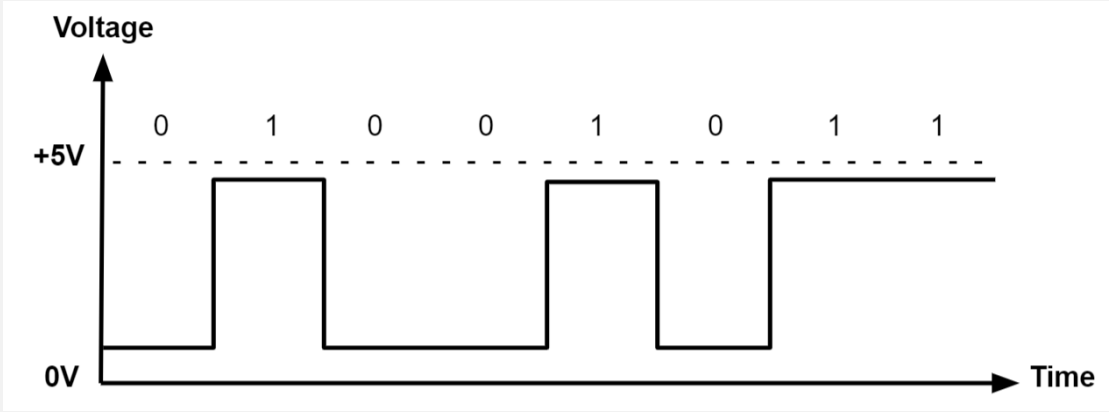
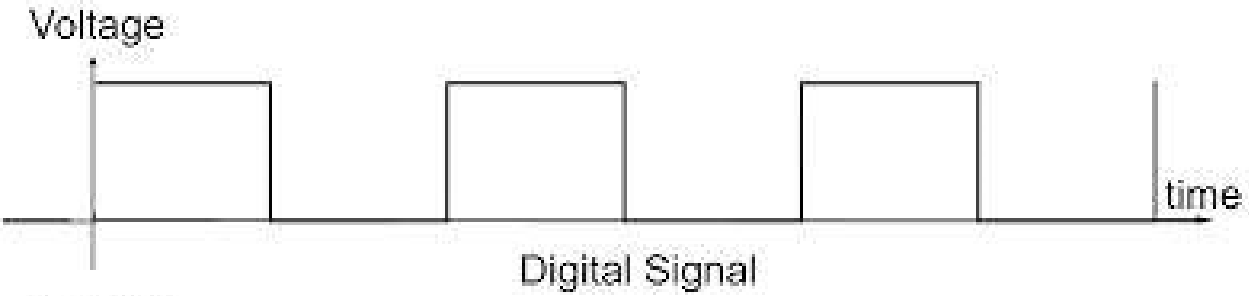
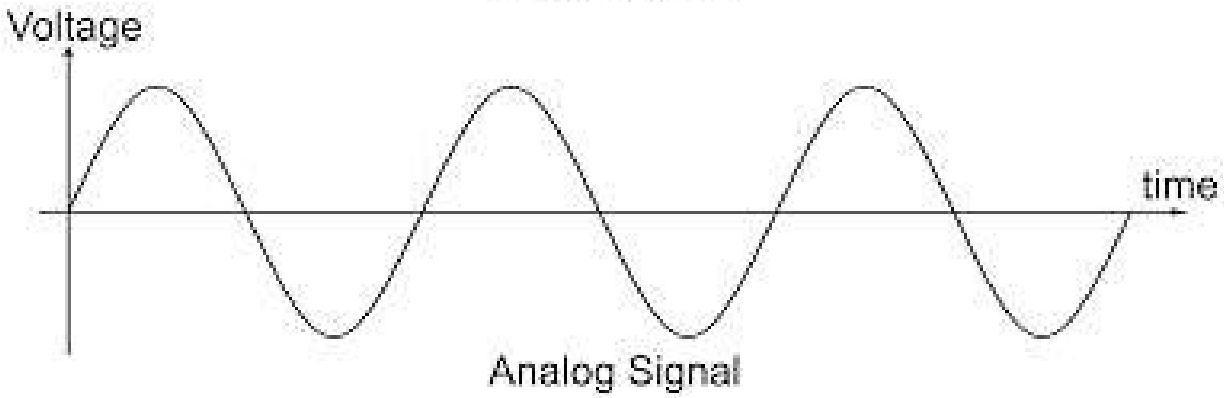
Analog vs Digital

And why it matters to you







Analog signals have a more continuous range of values (ex. 0V, 3.3V, 2.5V) while **Digital signals** only have a high or low value (ex. 0V and 5V for low and high respectively)

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Analog

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Geared DC motors

Old reliable

Brushed DC motors are simple to control and can be salvaged from almost everywhere. You can easily control 2 motors using a single **L293D** motor driver

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How do motors work?

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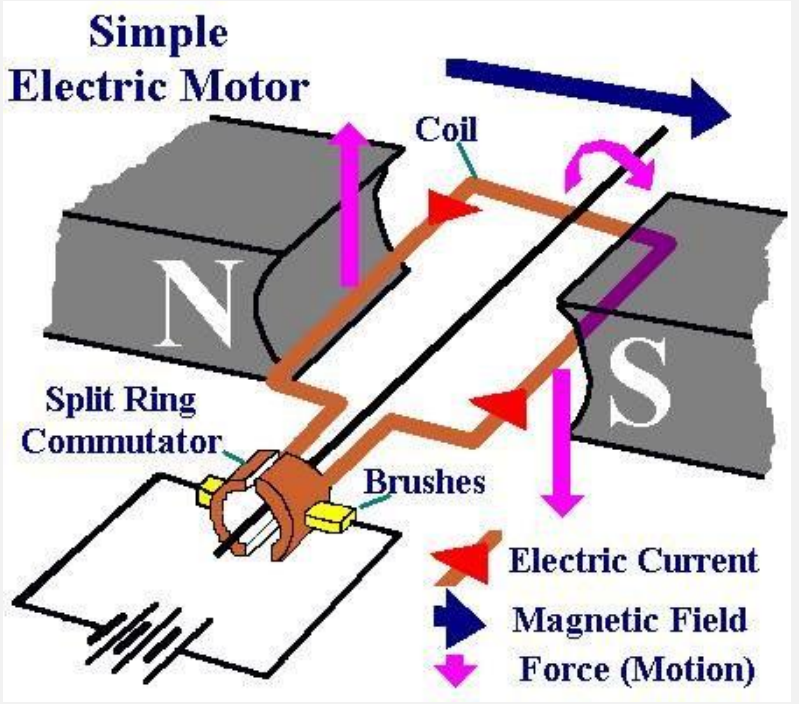
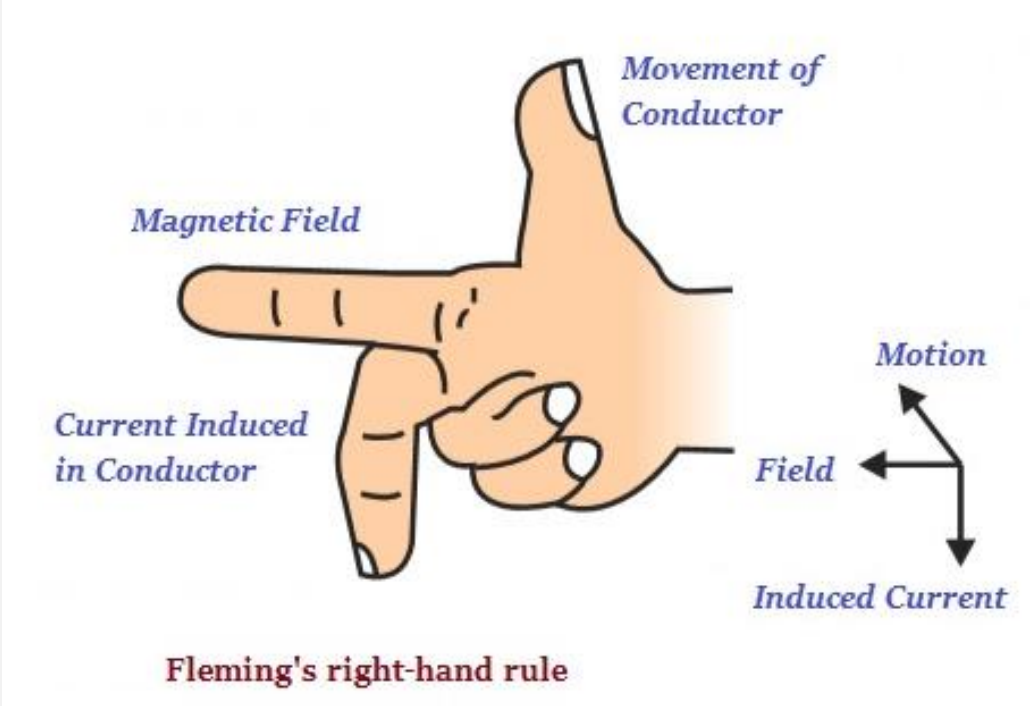
How do they work?

Black magic





For brushed DC motors, the dc voltage at the terminals causes current to flow through the coils. The magnets inside the motor produce the electric field that turns the coil. Thus, if more voltage is supplied, more current will flow and the motor will turn faster

Voltage make motor go brr

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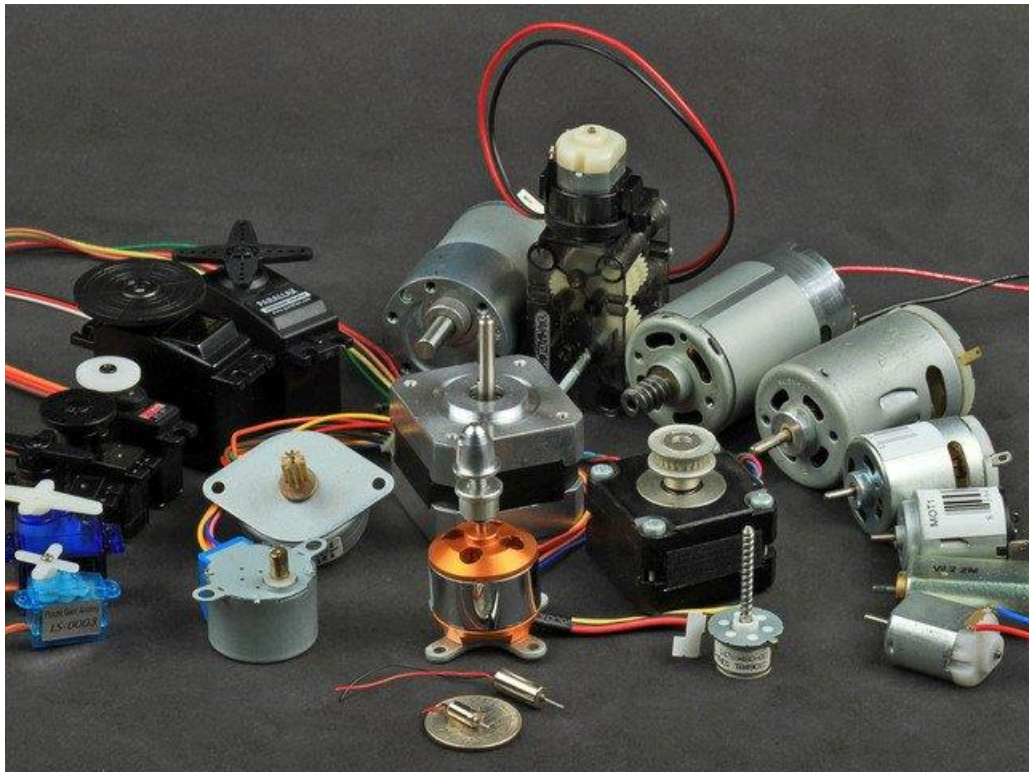

How do I pick?

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Parts Help

Picking a motor

Generic plastic geared motor (upper left)

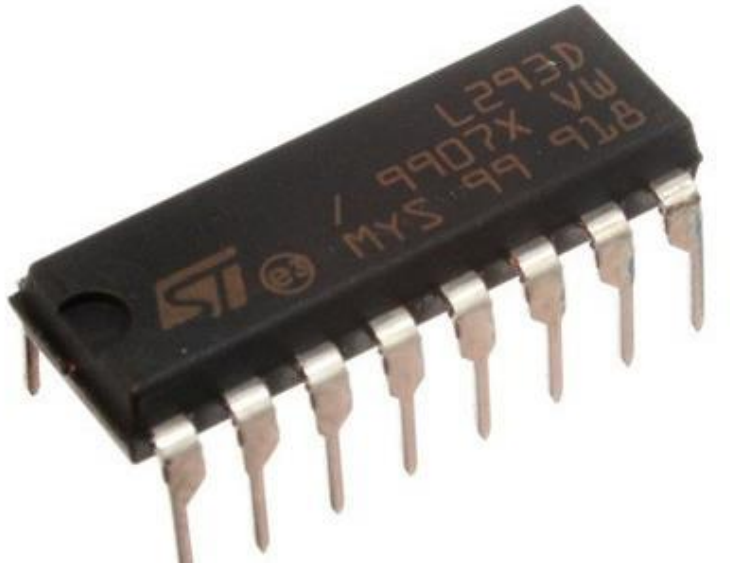
- Low-cost
- Needs high current
- Power hungry
- Low-torque

N20 geared motor (upper right)

- Costly
- Low current consumption
- High-torque

Geared motors are encouraged since they allow you to be able to control your speed and position much easier. They also enable you to move much more weight for the same amount of current. **This is important since current output will dictate your motor driver options.**

But how do you control them?



Very affordable

Perhaps the easiest driver to source here locally per piece.

Note: take account current limitation

Convenient

Straight forward control, small footprint and does not need any supporting circuitry.

Motor Driver – L293D

Dual H-Bridge Motor Driver for DC or Steppers 600mA L293D

Product Code: AK005
Availability: 60

₱45

- 1 +

ADD TO CART

Add to Wish List

☆☆☆☆☆ 0 reviews / Write a review

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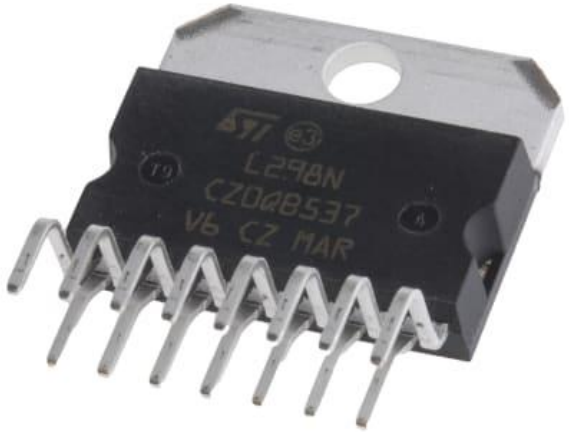

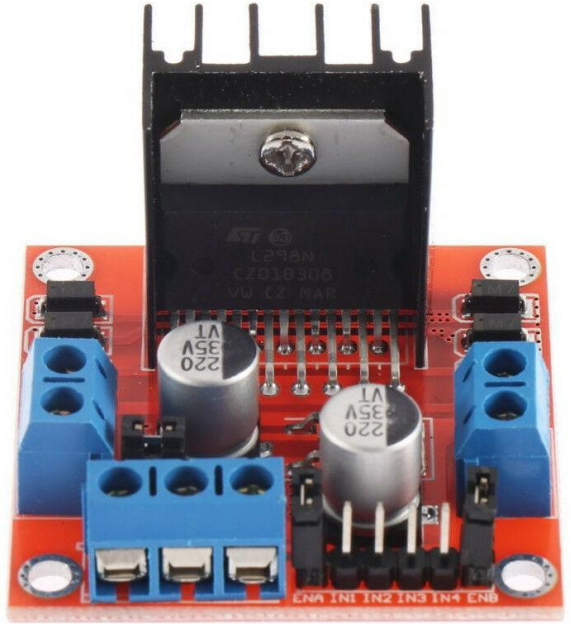

Other motor driver options – L298N

But how EXACTLY do you use them?

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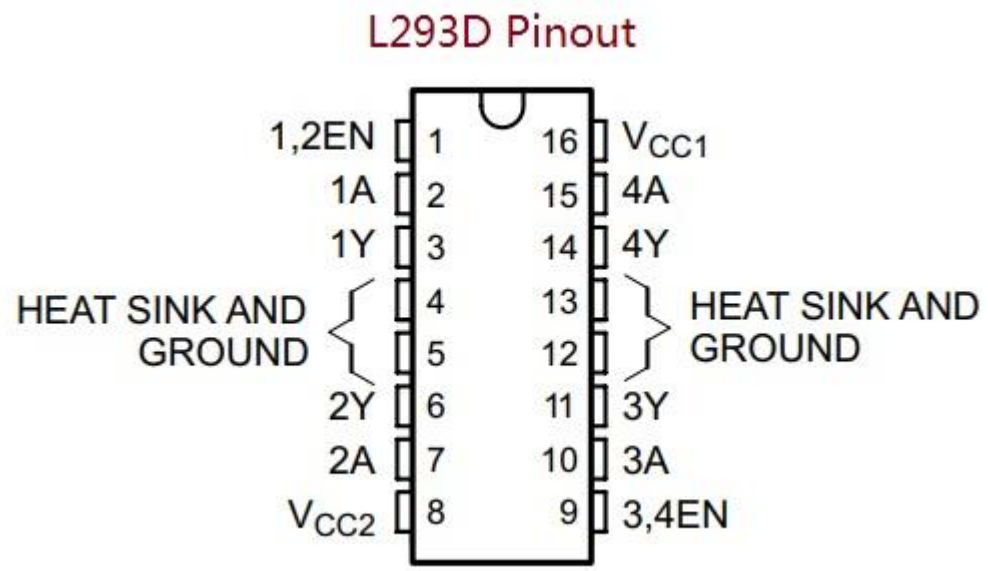

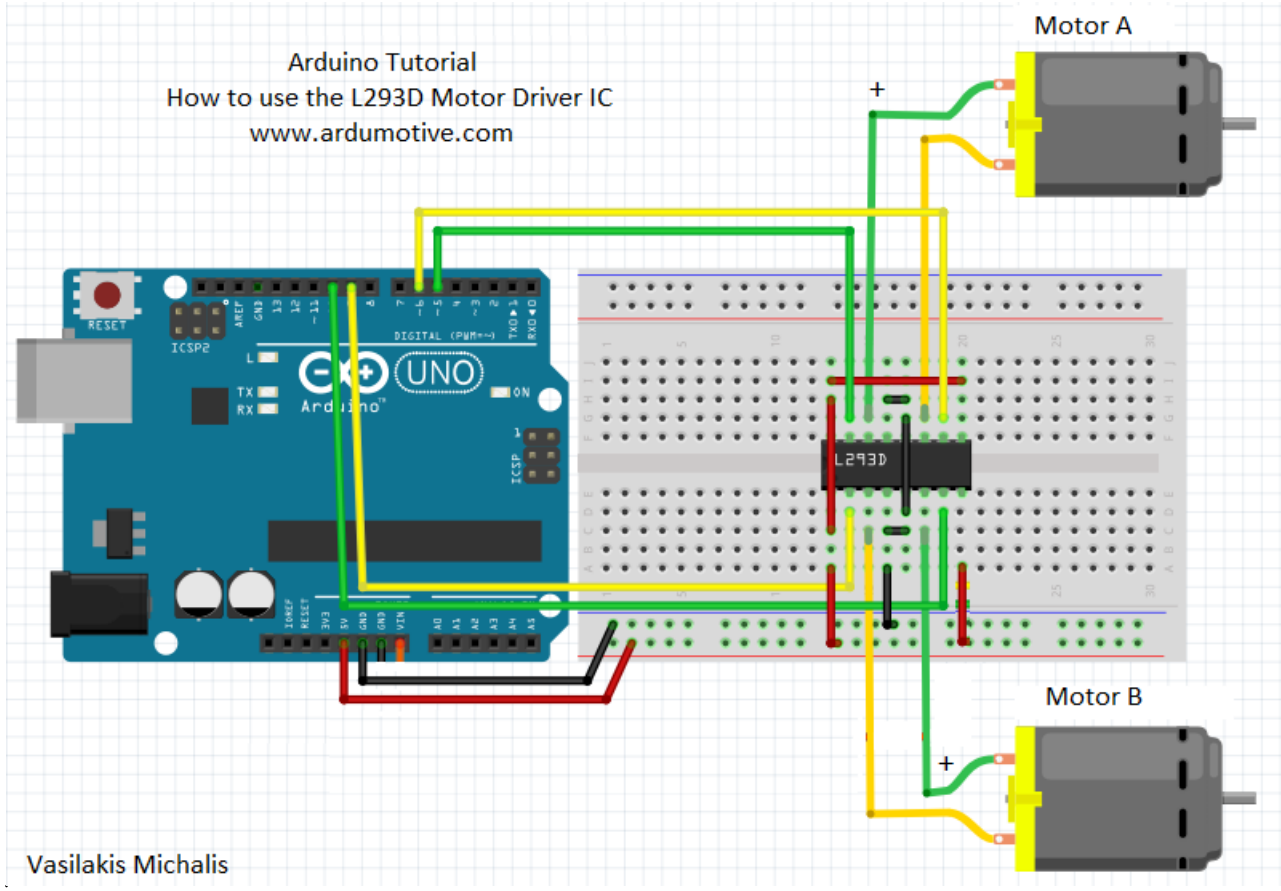

you'll find out in our hands-on activity

Q&A

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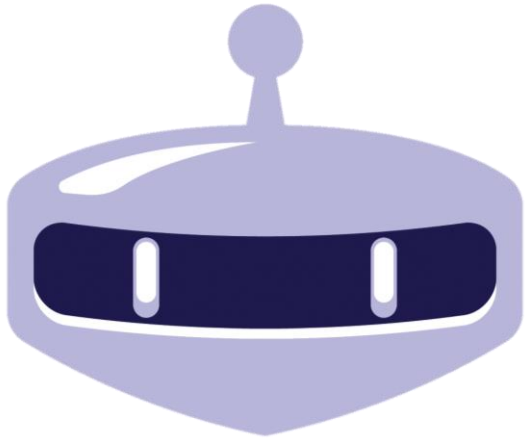
Closing Remarks



Thank You

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