Next few sessions

- 11 Nov
  - H-bridge
  - Soldering
- 18 Nov ???
  - Gyro
  - Construction
- Date ???
  - PID (Proportional)
  - Wireless
- Date ???
  - Pressure sensor
  - PID (Proportional + Derivative)

Slides available at: http://a9i.sg/vjc

Plan for today

- Watch and discuss video
- Form teams
- 2-Wheel robot
  - H-Bridge driver
  - Soldering
- Discuss underwater robot design

Slides available at: http://a9i.sg/vjc

Videos

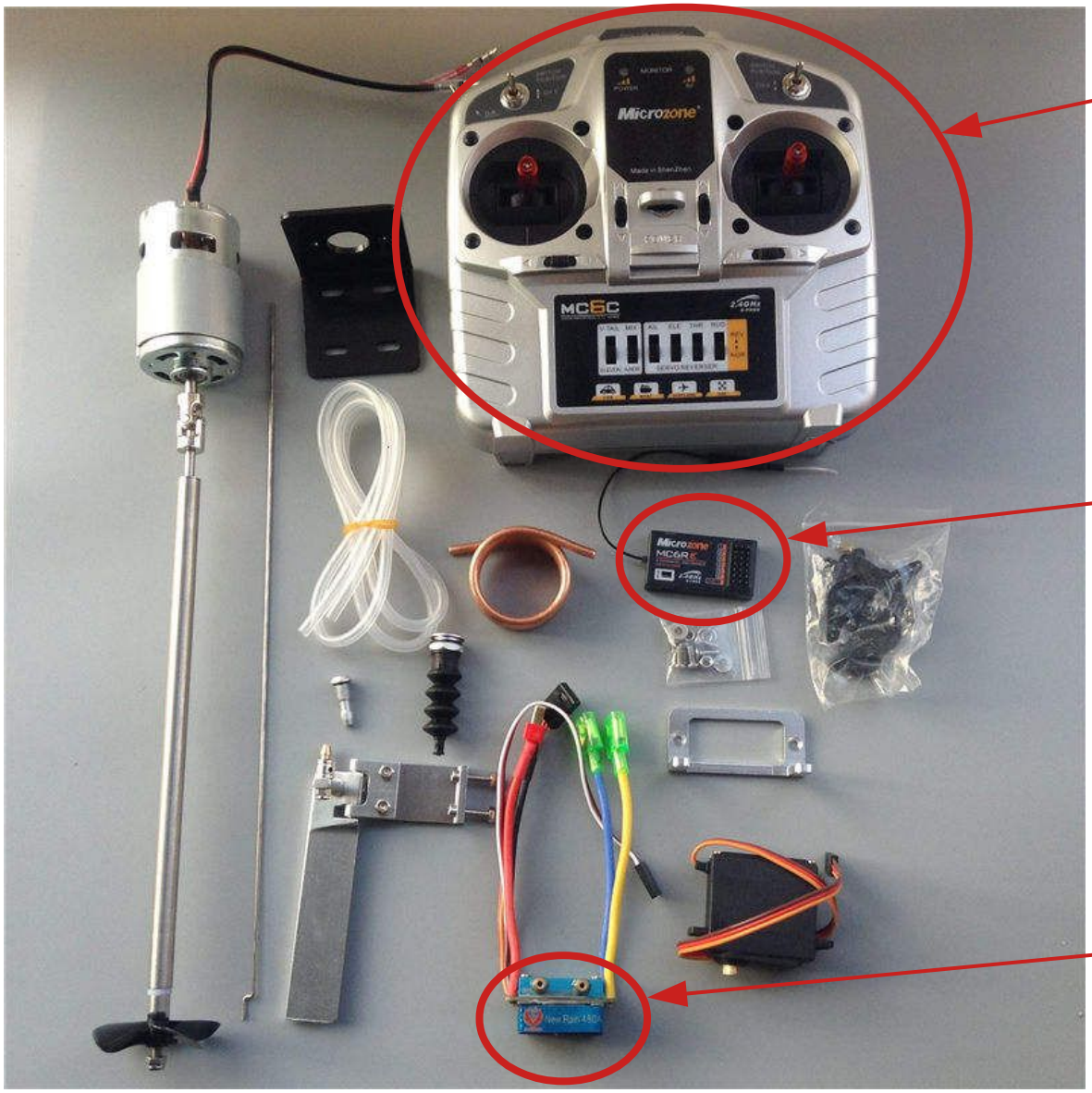
Slides available at: http://a9i.sg/vjc

Radio Transmitter and Receiver

Radio Transmitter and Receiver

Slides available at: http://a9i.sg/vjc

Radio Transmitter and Receiver



Transmitter

Receiver

Motor driver

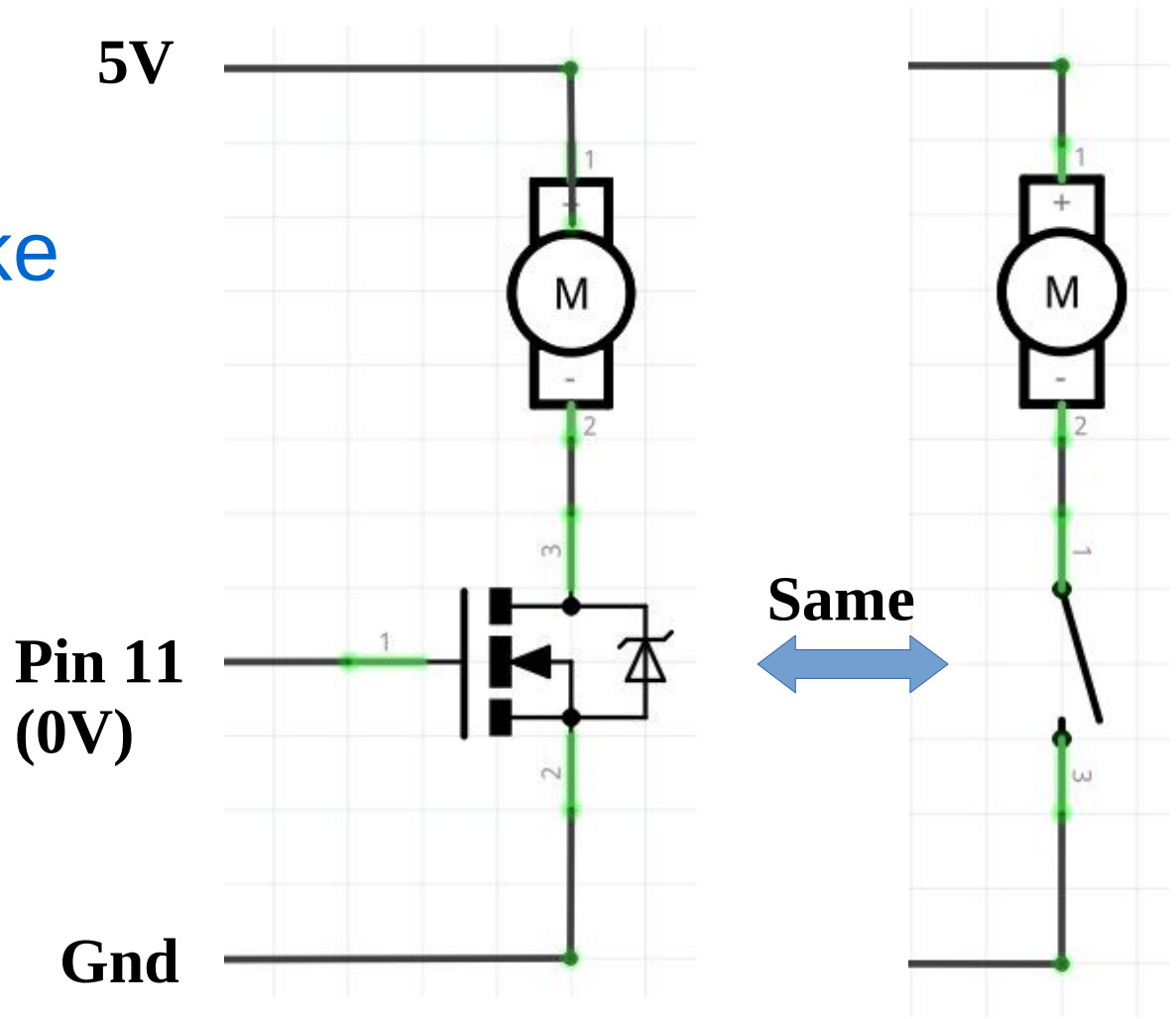
Slides available at: http://a9i.sg/vjc

Form Teams

- Not more than 4 in a team and at least 2
- Decide by end of the session
- Can discuss later during soldering...

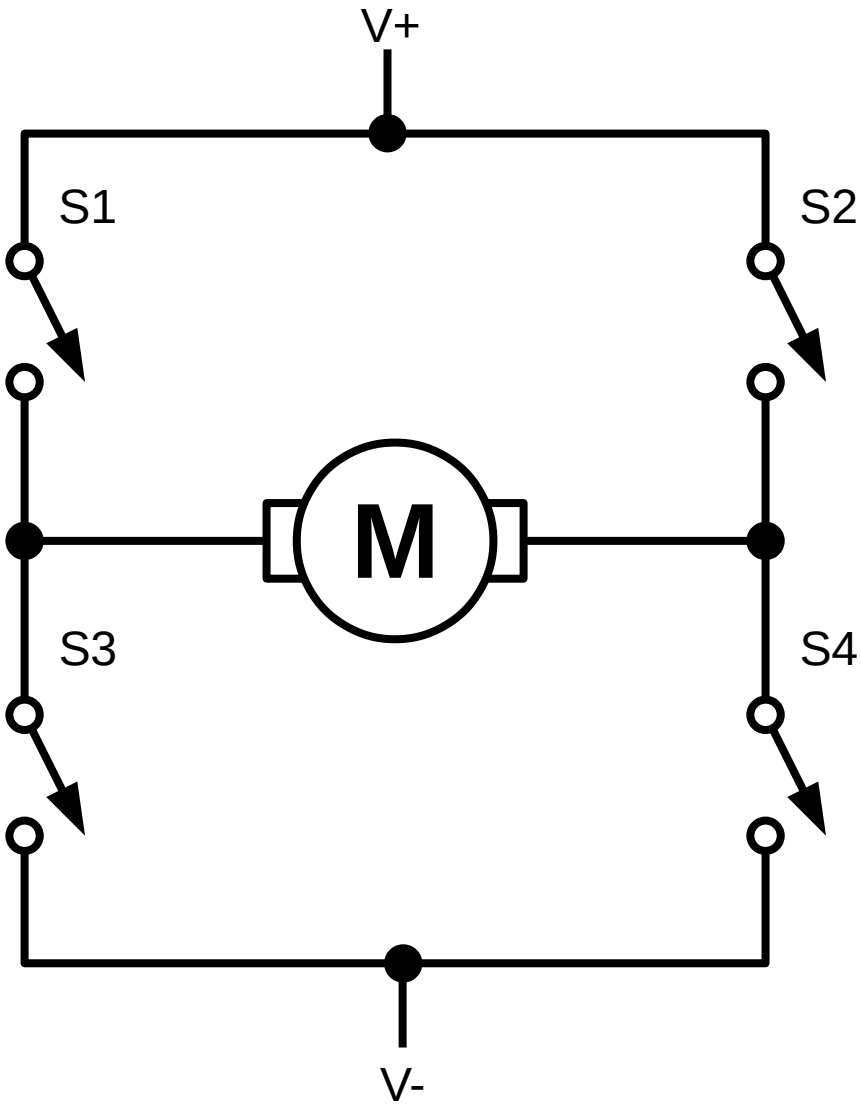
H-Bridge

- Refresher...
- Transistors acts like a switch
- Can turn motor on and off
- How to reverse?



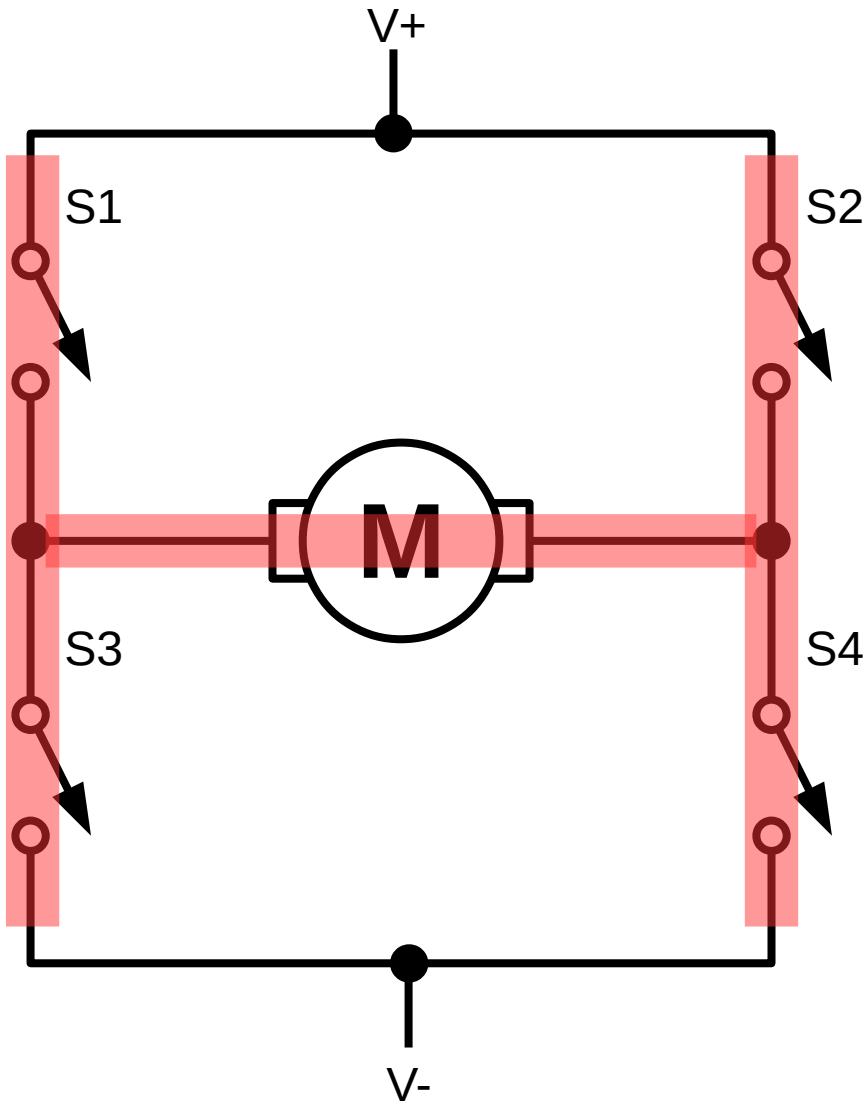
H-Bridge

- Use a H-Bridge...



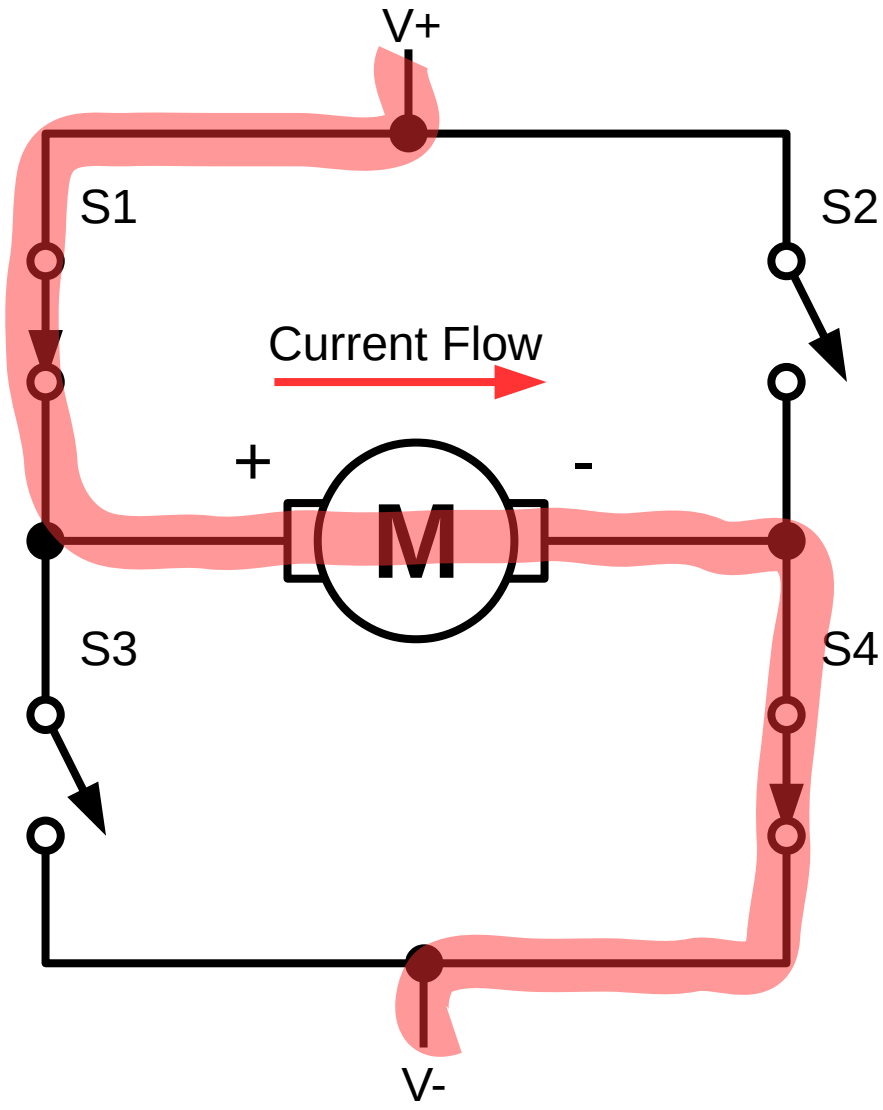
H-Bridge

- ...which looks kind of like a “H”



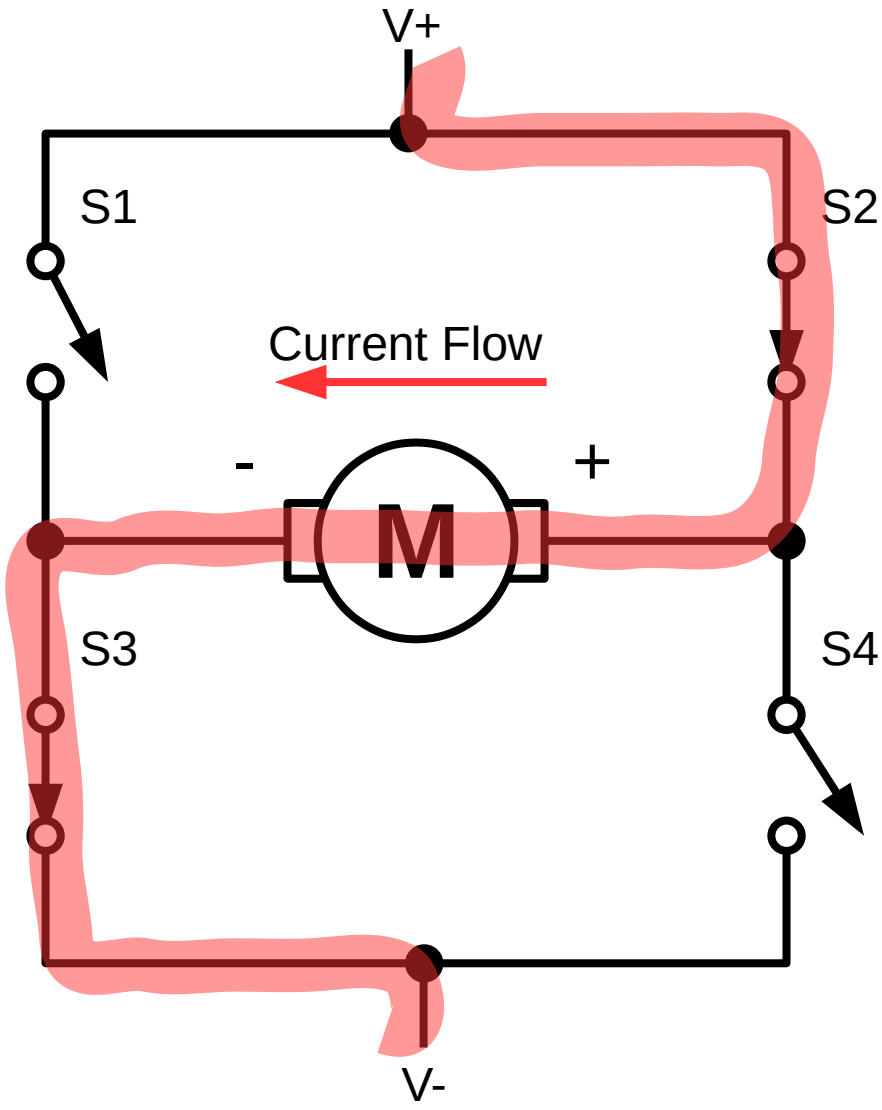
H-Bridge

- Direction 1
  - On: S1 & S4
  - Off: S2 & S3



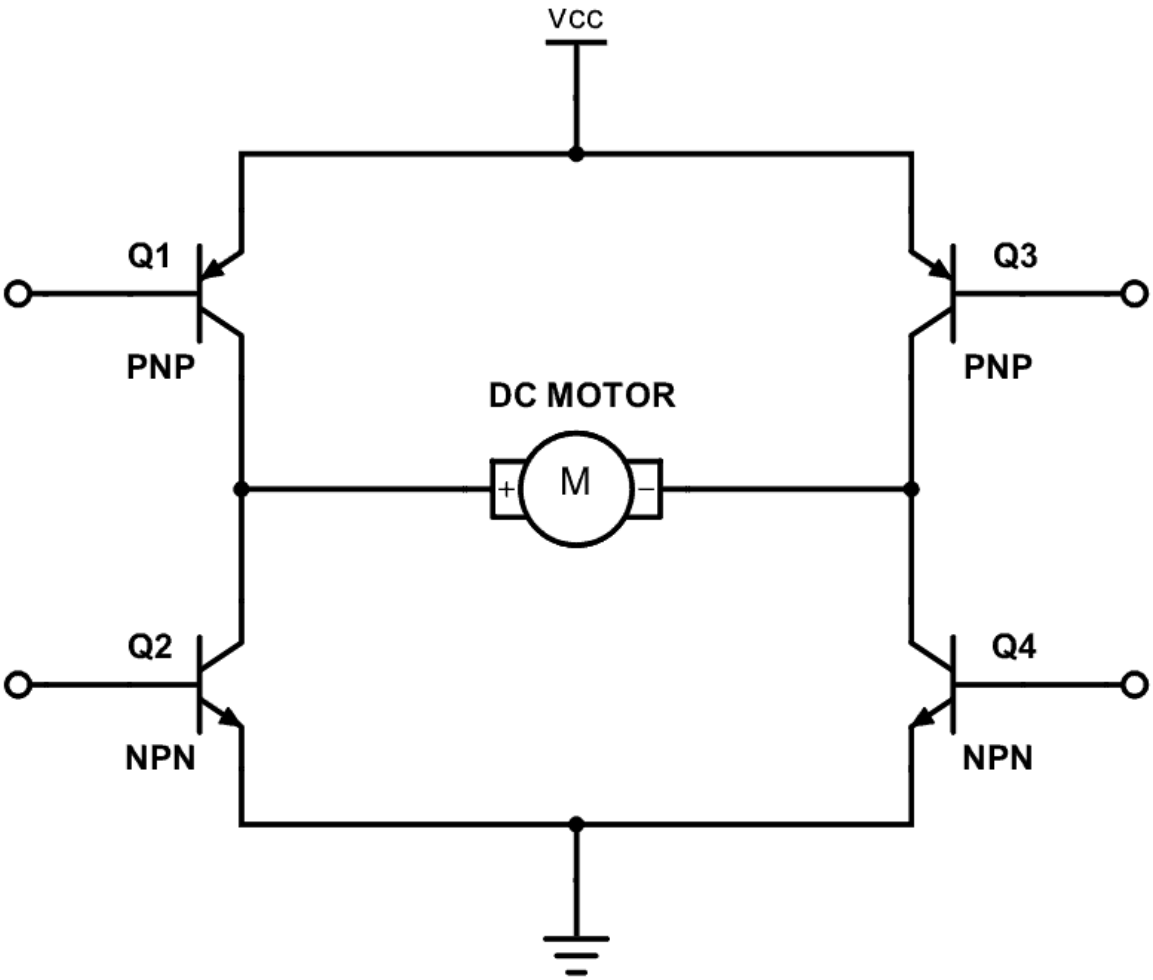
H-Bridge

- Direction 2
  - On: S2 & S3
  - Off: S1 & S4



H-Bridge

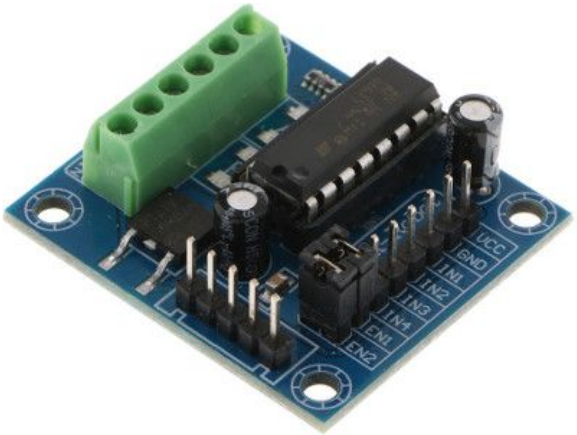
- Replace switches with transistors...
- Combine some of the controls...
  - eg. Q1 & Q4 can be merged into one



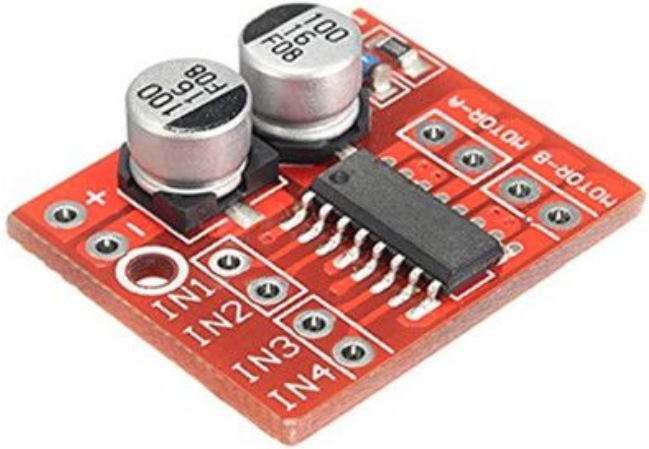
Slides available at: http://a9i.sg/vjc

H-Bridge

- H-Bridge drivers contains...
  - H-Bridge circuit
  - Combines some controls
  - A few extras (varies)



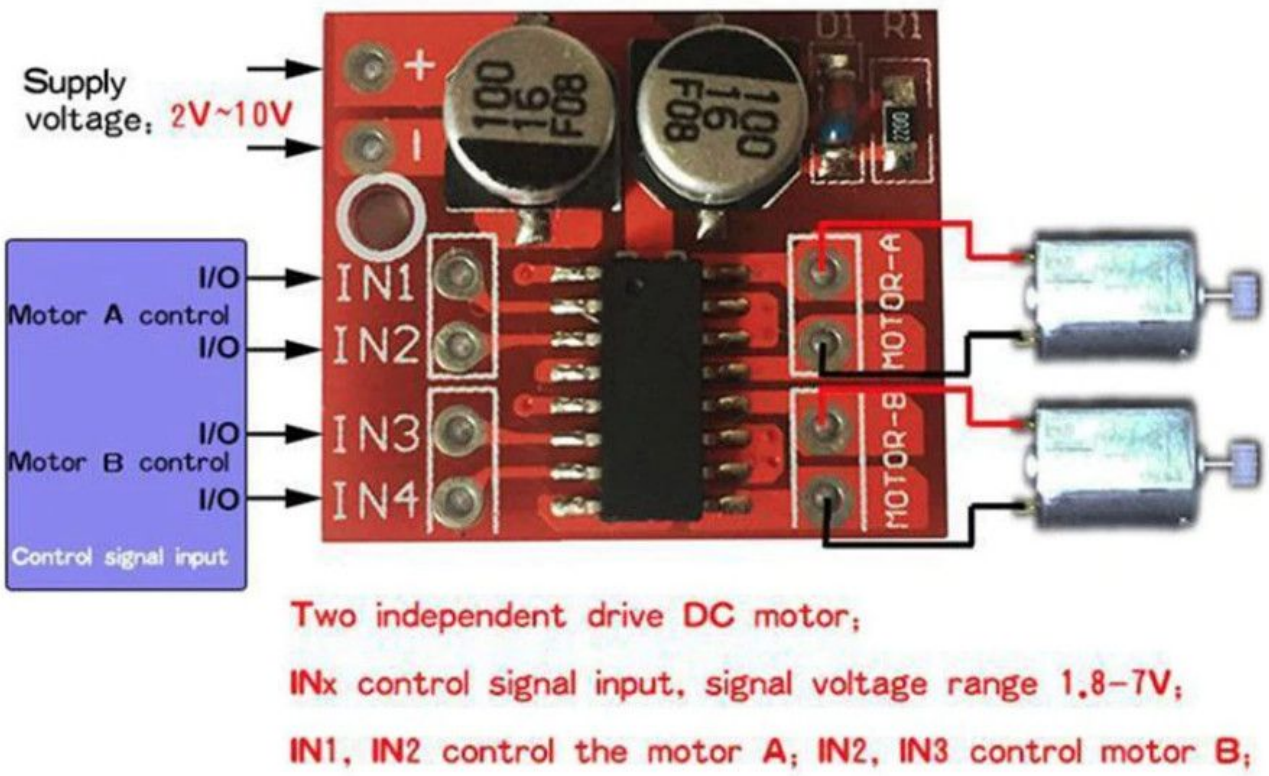
This is the one we'll be using



Slides available at: http://a9i.sg/vjc

H-Bridge

- Contains 2 H-bridges
  - Can control 2 motors
- Max:
  - 1.5A
  - 10V
- Needs soldering



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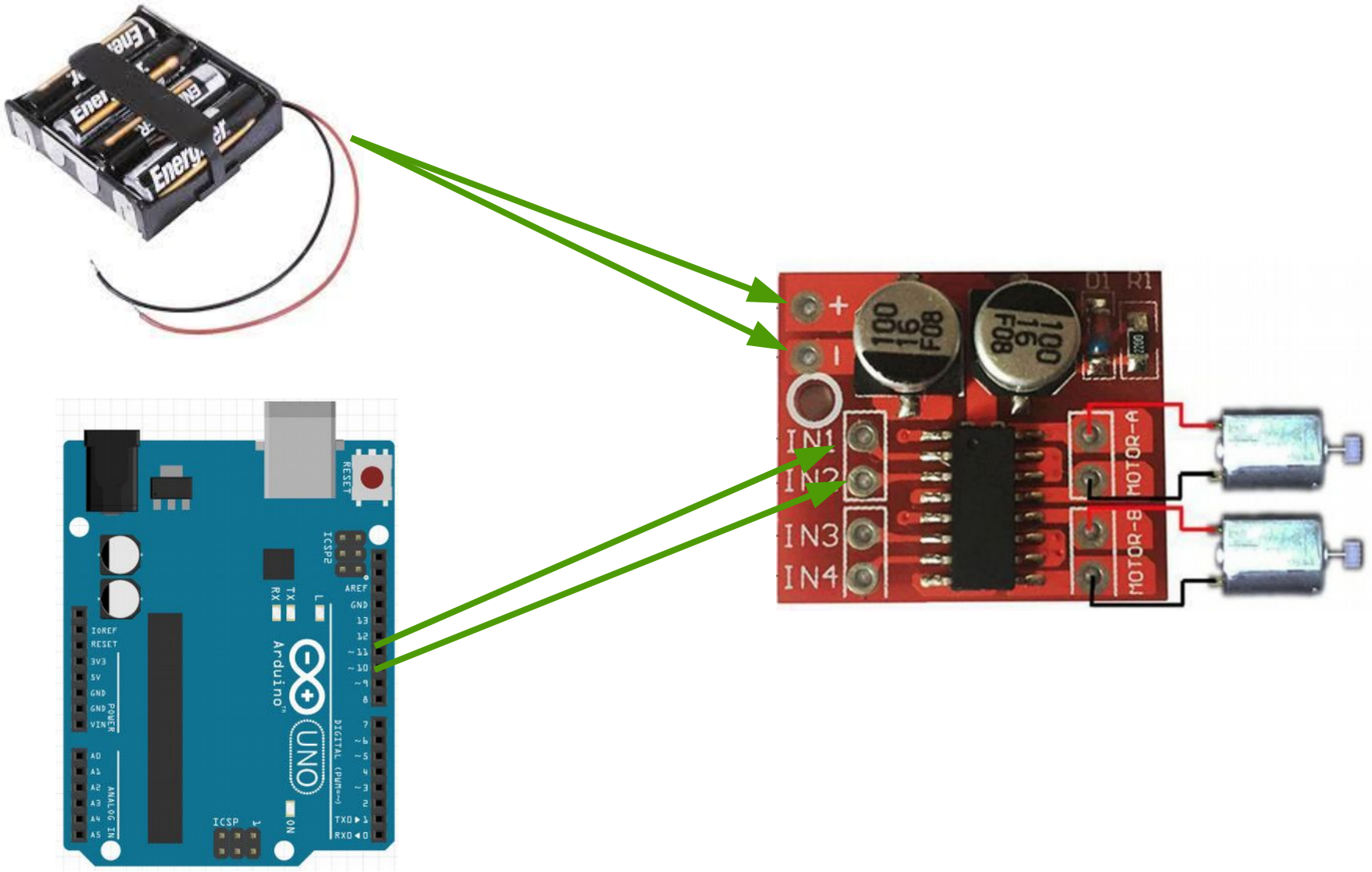
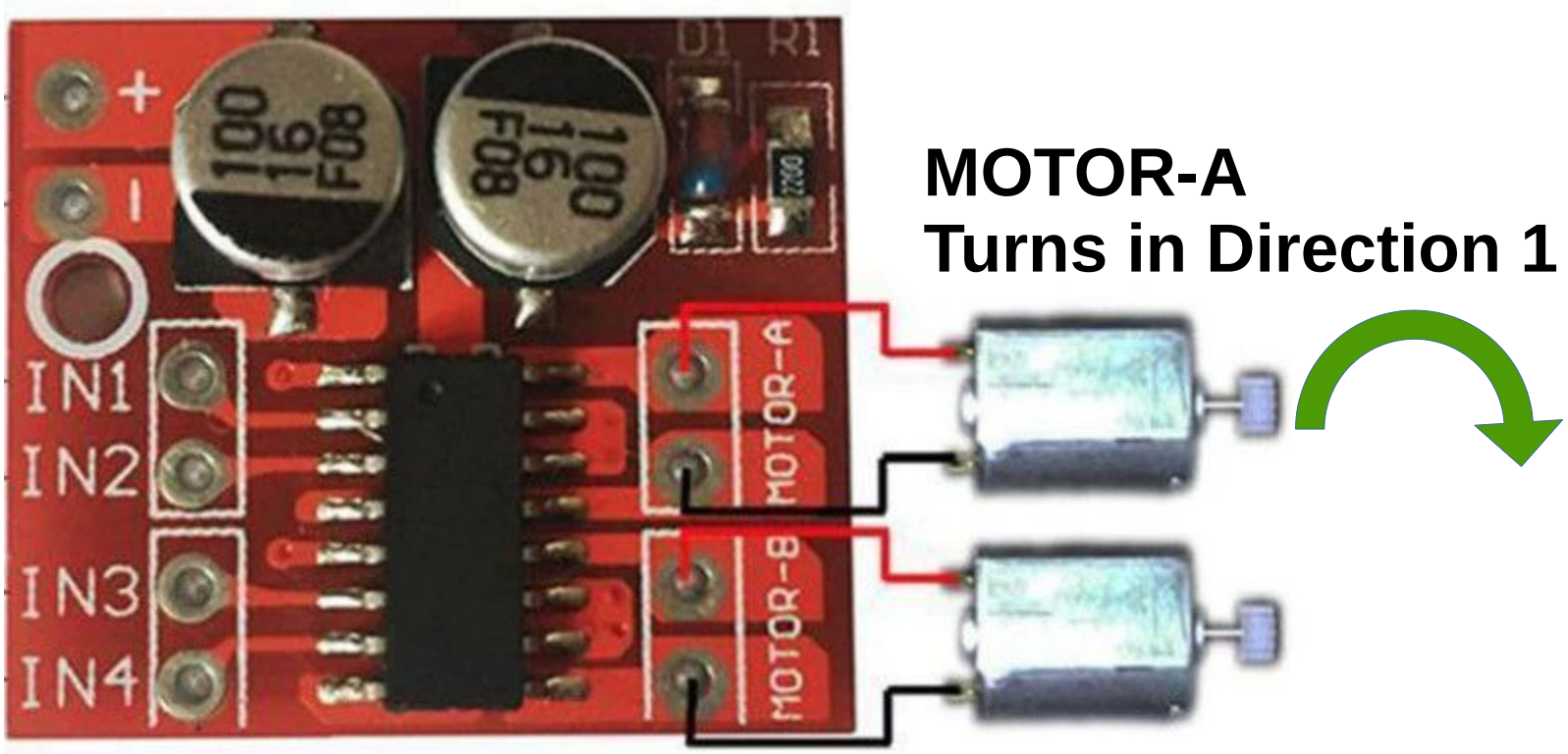
H-Bridge


+
-
IN1
IN2
IN3
IN4
MOTOR-A
MOTOR-B
RESET
ICSP2
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX
RX
L
Arduino
UNO
ON
ICSP
TXD
RXD
IOREF
RESET
3V3
5V
GND
GND
VIN
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN

H-Bridge

IN1 : HIGH

IN2 : LOW

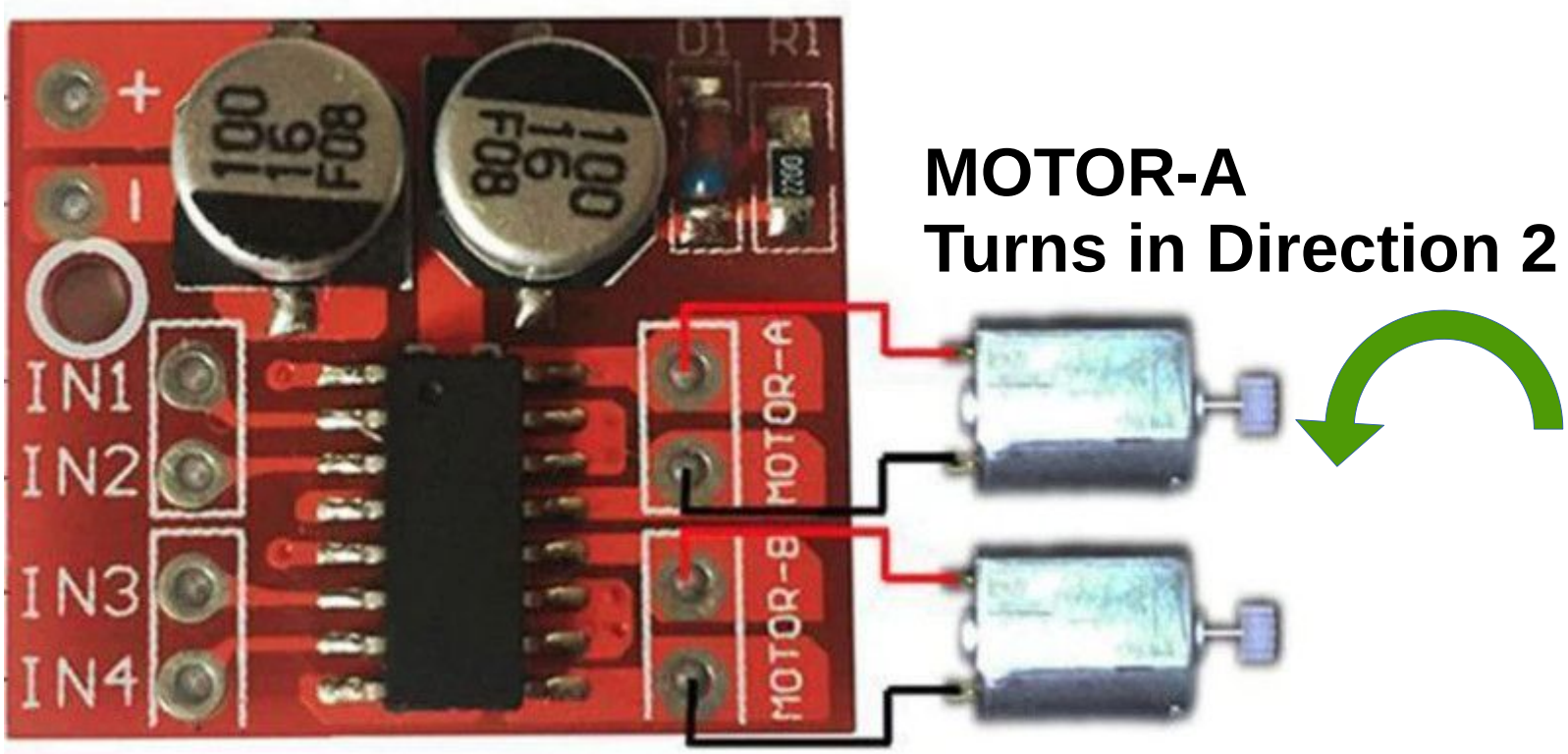


MOTOR-A
Turns in Direction 1

H-Bridge

IN1 : LOW

IN2 : HIGH

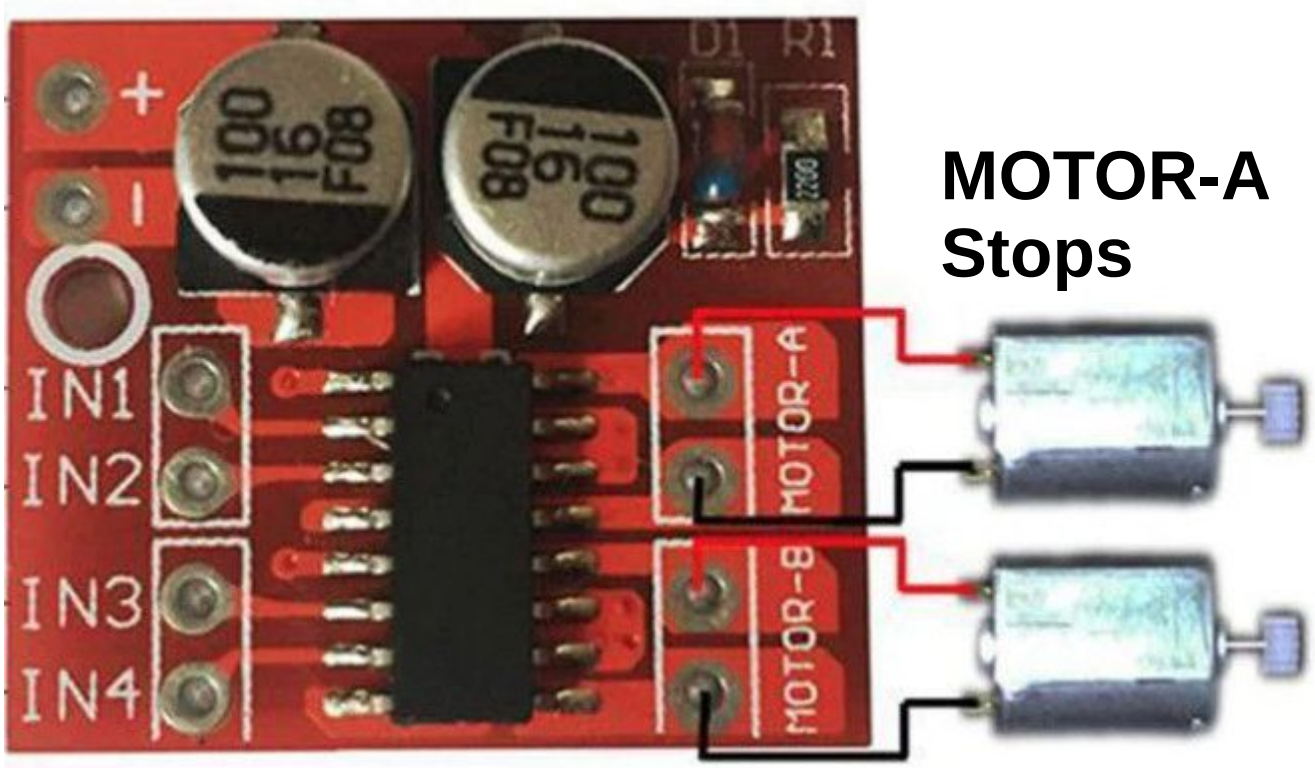


MOTOR-A
Turns in Direction 2

H-Bridge

IN1 : LOW

IN2 : LOW

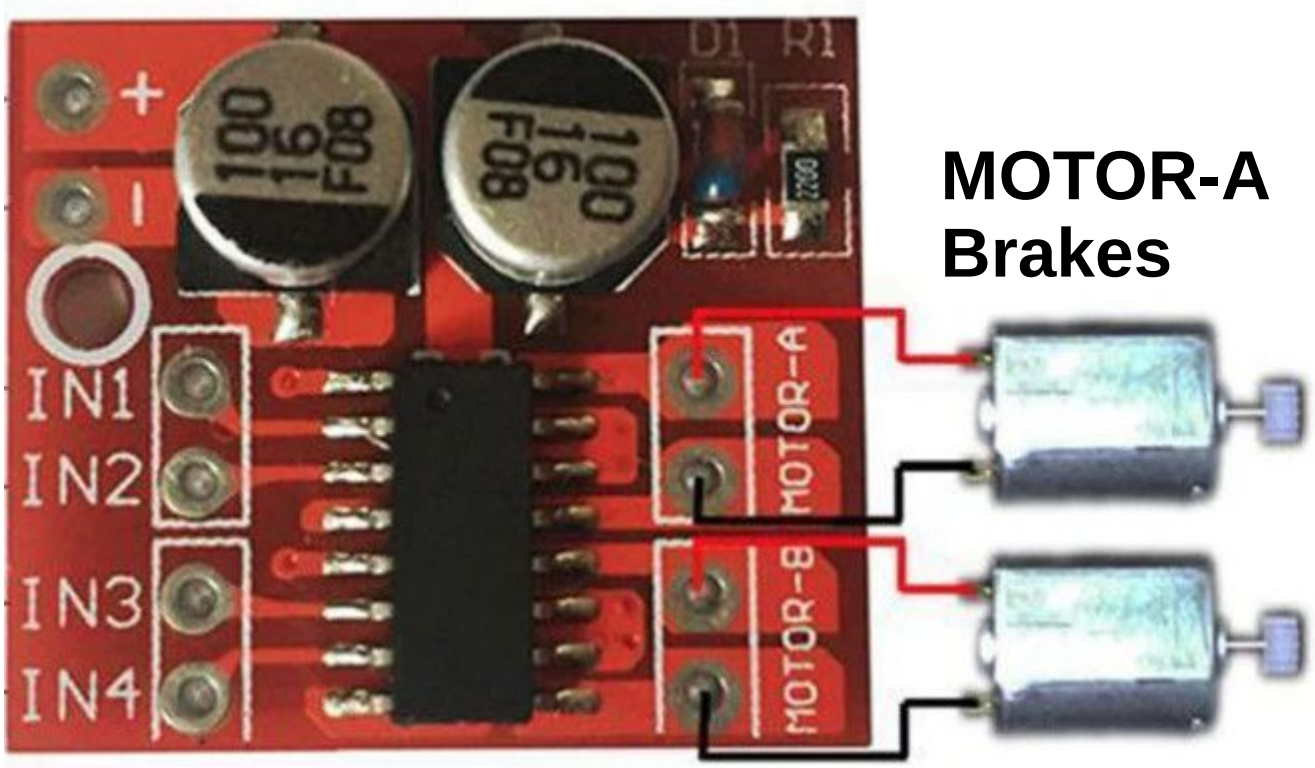


MOTOR-A Stops

H-Bridge

IN1 : HIGH

IN2 : HIGH



MOTOR-A Brakes

H-Bridge

- Can control direction by choosing which pin to turn on
- Can control speed using PWM (...just like what we did before using the transistor)

Forward at full power*

```
analogWrite(11, 255);
analogWrite(10, 0);
```

Reverse at half power*

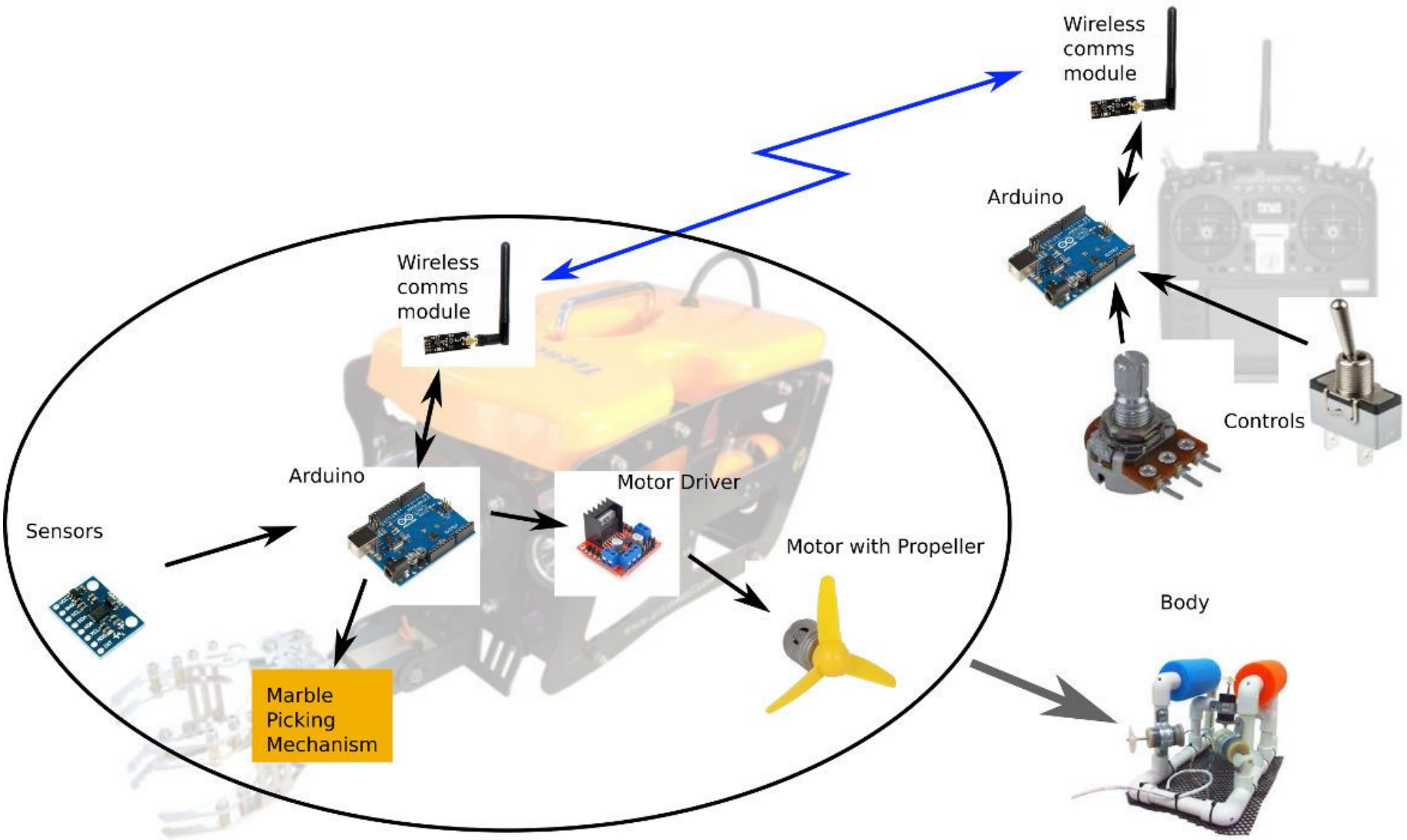
```
analogWrite(11, 0);
analogWrite(10, 127);
```

* Assumes pin 10 & 11 are connected to H-bridge driver. Direction depends on wiring.

Soldering

- Limited number of soldering irons
- While waiting...
  - Plan your teams
  - Discuss your underwater robot design

Underwater Robot Design



Contact

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