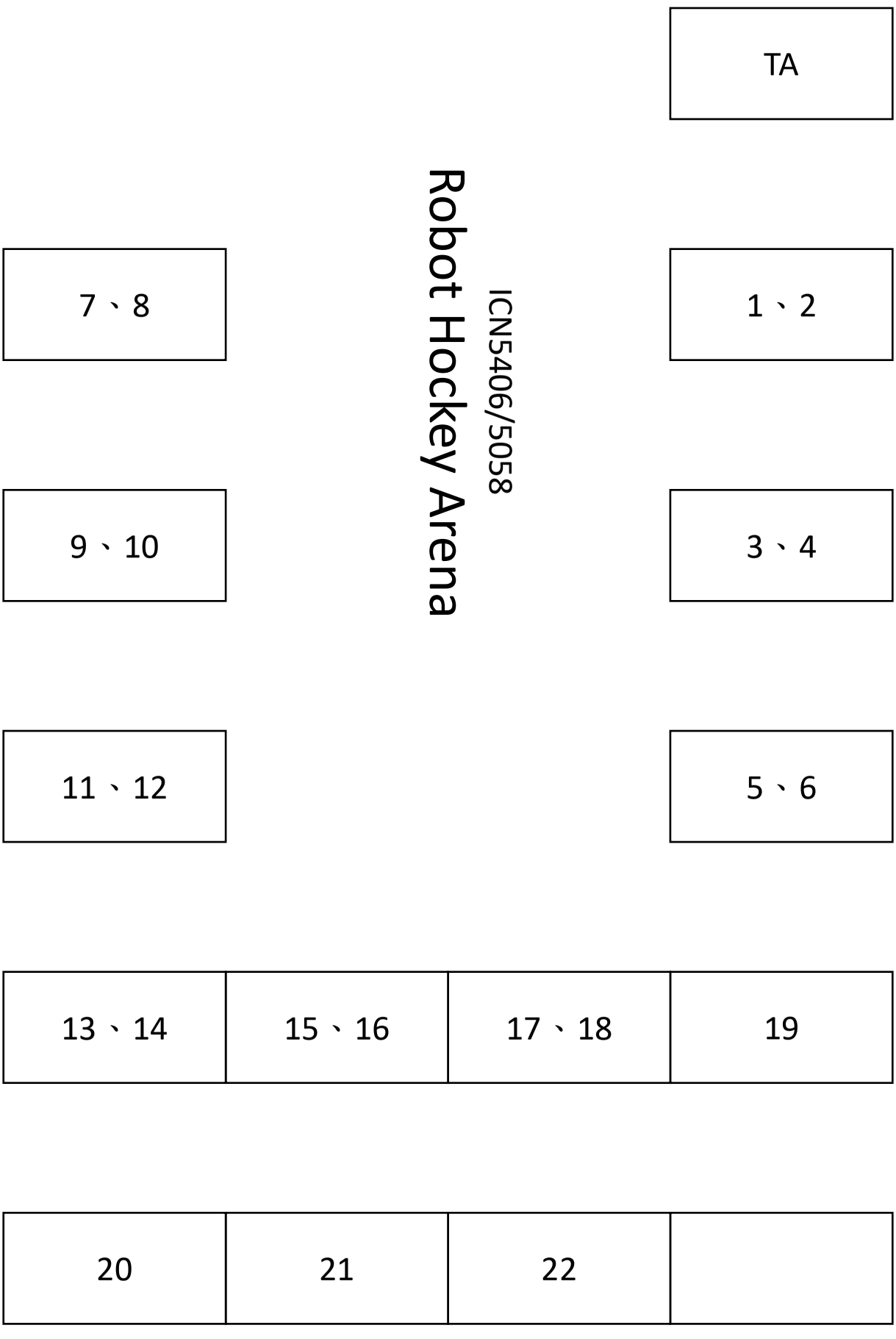
Floor plan EE632



Checkpoint #2

Demo Due : 10/22/2021

Report Due：10/29/2021

Outline

- CP #2 Supplies Check
- Checkpoint #2 Assignment
- Arduino - L298n - Motor with Encoder
- L298N
- Motor with Encoder

CP #2 Supplies

Checkpoint#2 Material List			
1	Chassis	5	L298N Motor driver module
2	DC Motor x 2	6	Li-po battery
3	Wheel x 2	7	A pack of screws
4	Caster wheel	8	Screwdriver
Team _____			

Checkpoint #2 Assignment

- Purpose:
  Motion Control of basic DC motors by encoder with Raspberry Pi and Arduino.
- Tasks:
  To control two motors with encoder signals.
  - Move forward. (25%)
  - Move backward. (25%)
  - Turn right. (15%)
  - Turn left. (15%)
  - How straight the robot can move when moving forward. (20%)

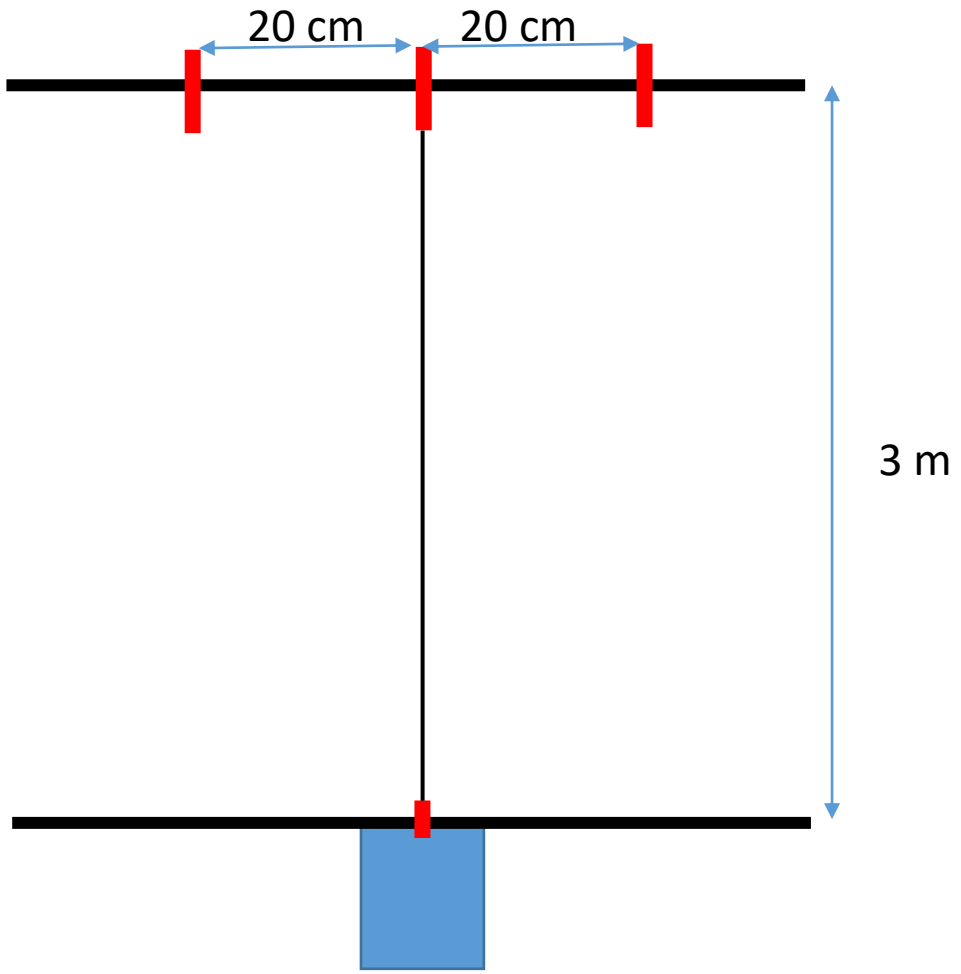
Checkpoint #2

You should send the right wheel and left wheel PWM signal command on the RPI, then send the command to Arduino to control motors in each task.

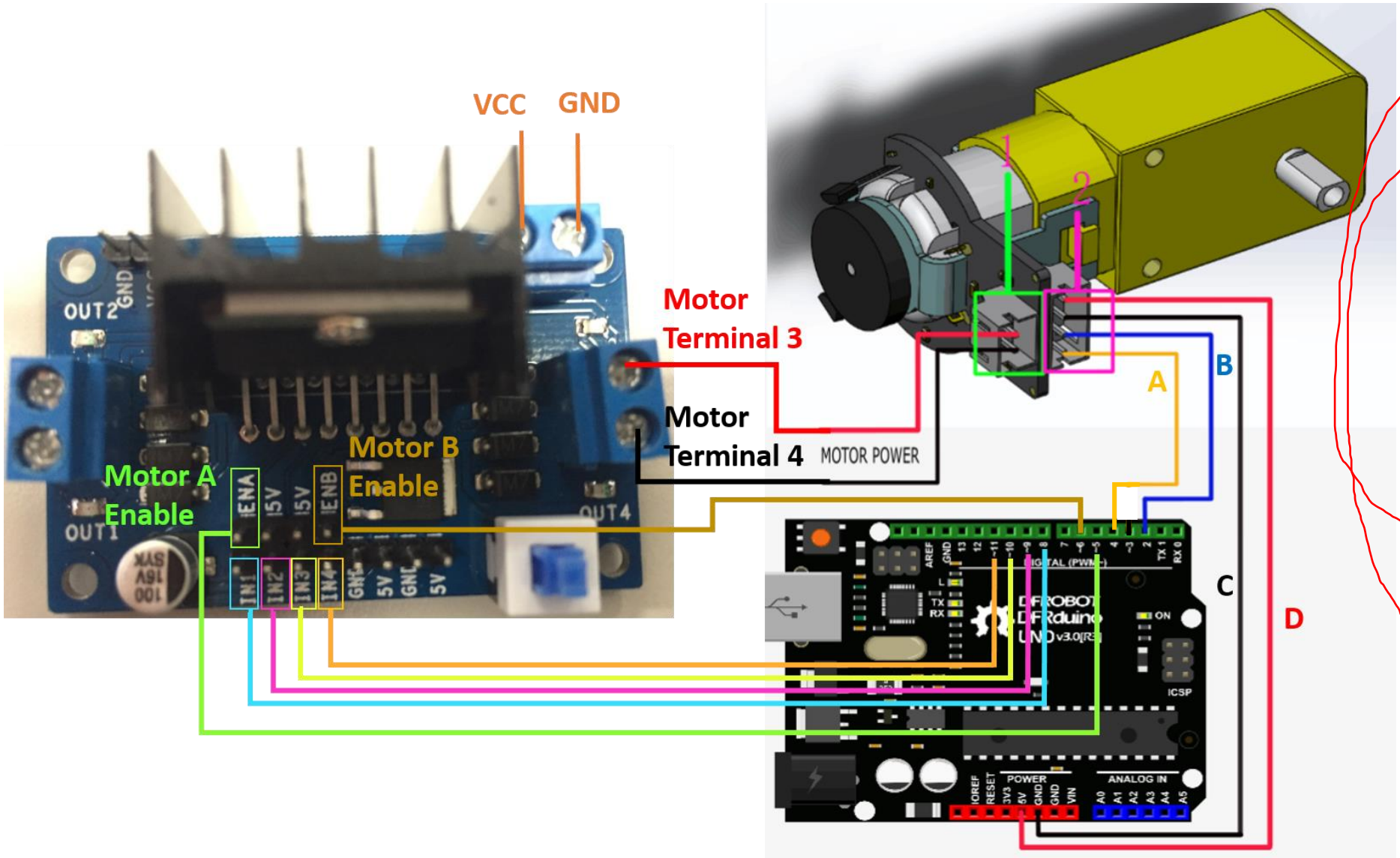
```
setting /run_id to 0fc9125a-1011-11e8-9501-b827ebaa4d9b
process[rosout-1]: started with pid [2832]
started core service [/rosout]
process[connect_arduino-2]: started with pid [2835]
process[checkpoint2-3]: started with pid [2836]
user's right is 120
user's left is 120
user's right is -100
user's left is 50
user's right is 100
user's left is 200
user's right is 0
user's left is 0
user's right is 100
user's left is 100
user's right is -50
user's left is 50
user's right is 0
user's left is 0
```

Checkpoint #2 Task 5 Scoring Rules

- Your mobile robot will move forward 3 meters until the caster wheel passes the finish line. You have two chances to challenge.
- We will measure how far the caster wheel deviate from the center point of the finish line.
- One point will be deducted for every deviation of 2 cm.
- If the deviation is over 20 cm, you will get 0 point in task 5.



Arduino - L298n with Motor Encoder



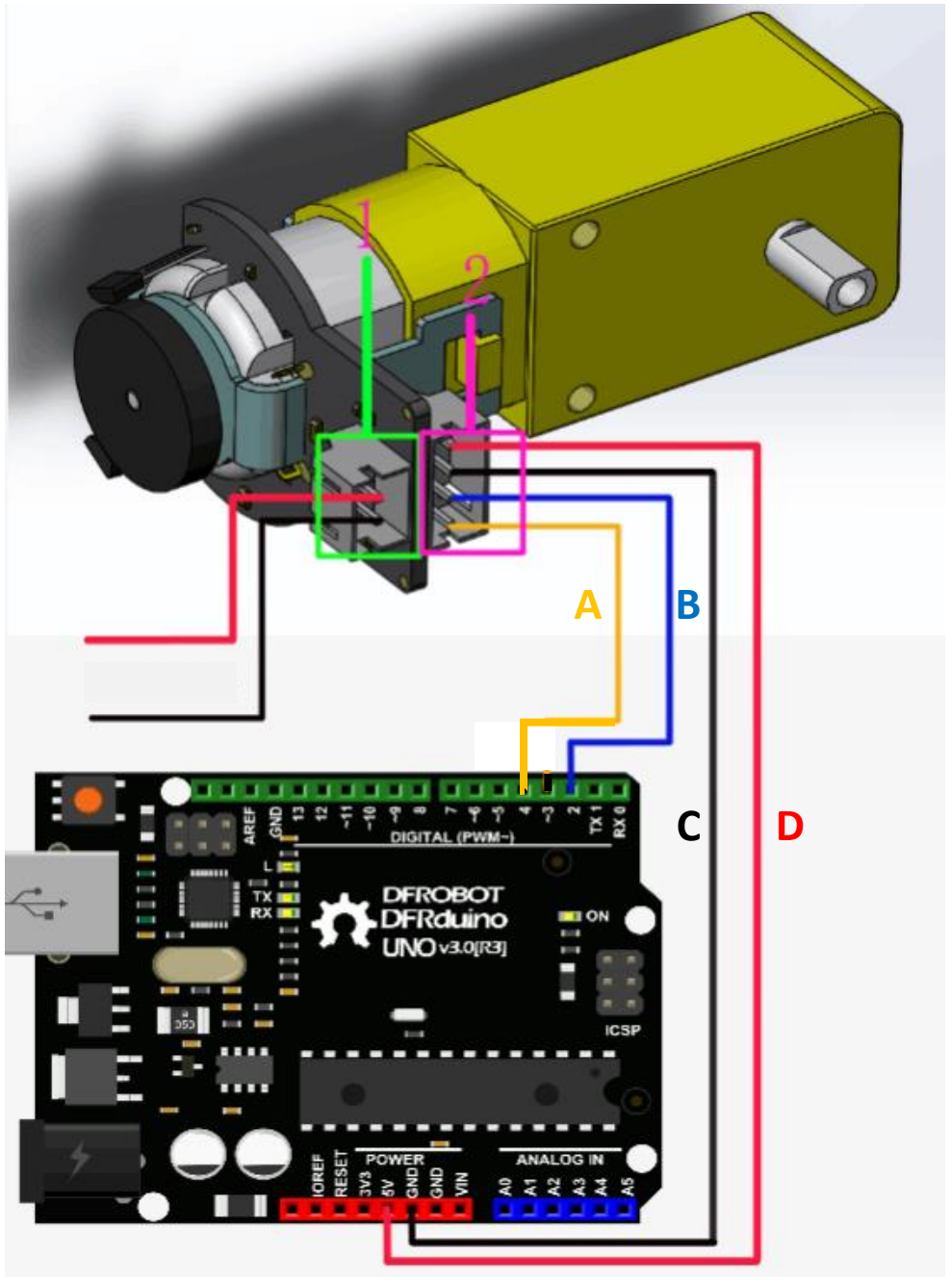
L298n	Arduino
ENA	5
ENA ~~A~~ B	6
IN1	8
IN2	9
IN3	10
IN4	11

Encoder	Arduino
A	4
B	2
C	GND
D	VCC

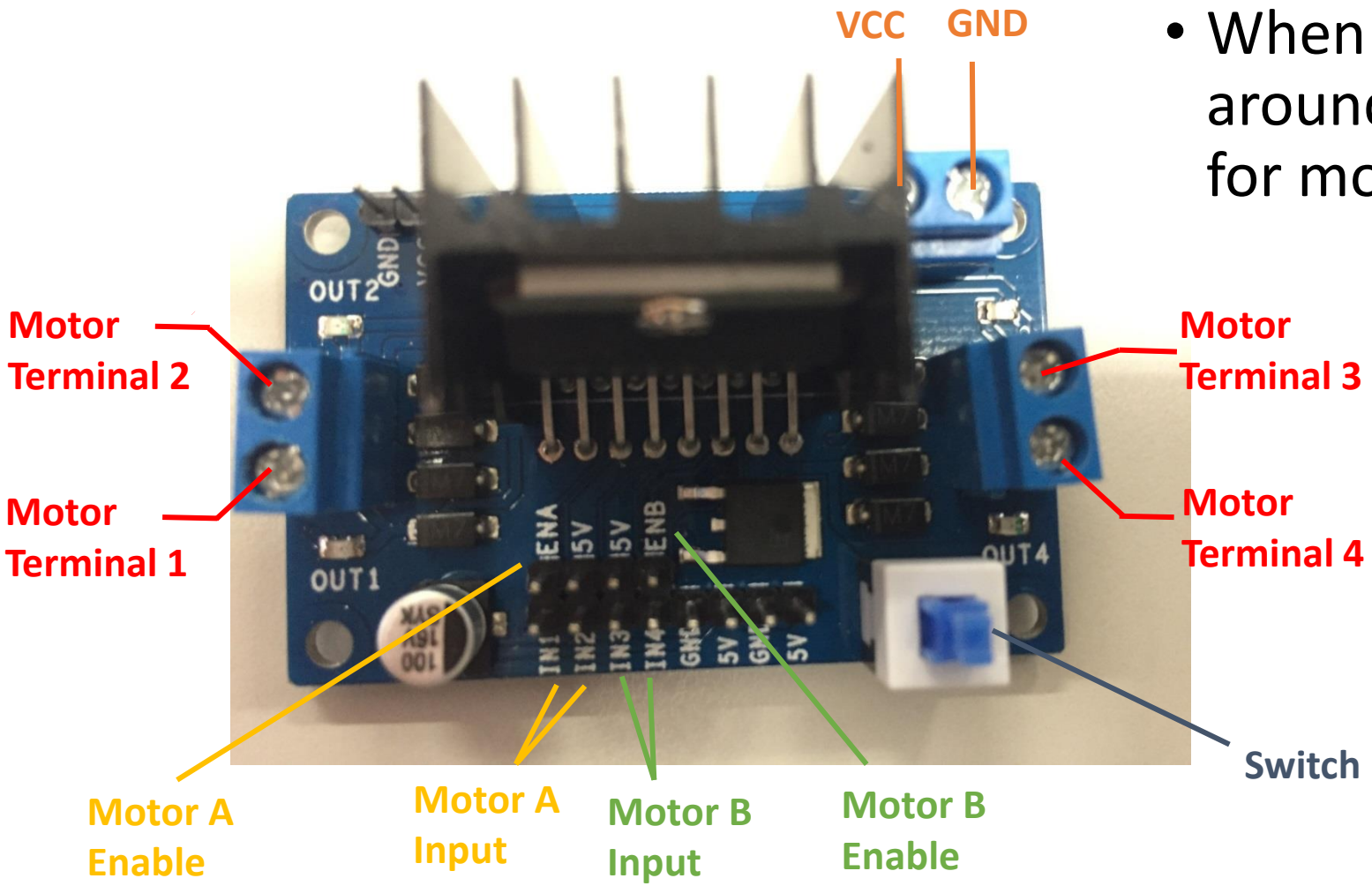
Motor with Encoder

- The motor with a 120:1 gearbox and an integrated quadrature encoder that provides a resolution of 16 pulse single per revolution.
- Pin Description

Pin	Name	Description
A	Encoder A phase output	Changes square wave with the output frequency of Motor speed
B	Encoder B phase output	Changes square wave with the output frequency of Motor speed(interrupt port)
C	Encoder supply GND	
D	Encoder supply +	4.5-7.5V



L298N



- Double H-bridge driver module
- When the input voltage is given around 7V to 12V, can supply 5V for motors

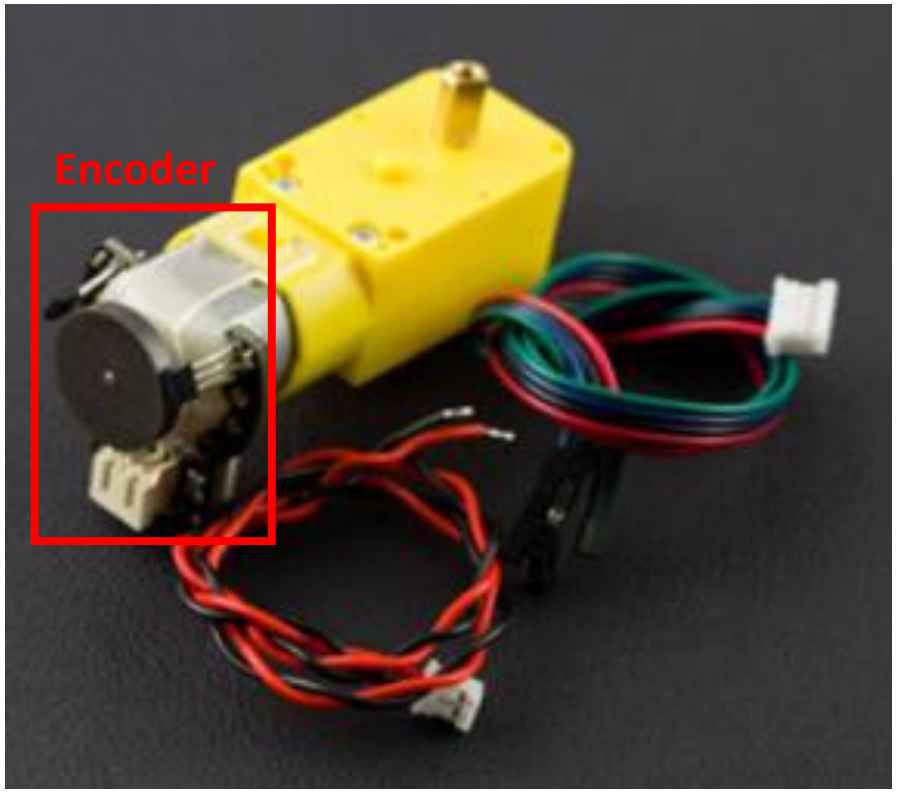
- IN1, IN2, IN3 and IN4 : High/Low pulse for rotation direction
- ENA, ENB: PWM for speed control

Motor with Encoder

- This is the Micro DC geared motor with encoder.

- The motor with a **120:1** gearbox and an integrated quadrature encoder that provides a resolution of **16** pulse single per round.

- So, it can give a maximum output of **1920** within one round.
  - 120 x 16 = 1920



Motor with Encoder

- Interrupts are useful for making things happen automatically in microcontroller programs and can help solve timing problems.

- using an interrupt can free the microcontroller to get some other work done while not missing the input.

- Interrupt Port with Different Board

	Board	Int.0	Int.1	Int.2	Int.3	Int.4	Int.5
attachInterrupt()	**Uno**,Ethernet	2	3				
	Mega2560	2	3	21	20	19	18
	Leonardo	3	2	0	1	7	

Reference

- Micro DC Motor with Encoder
  - https://wiki.dfrobot.com/Micro_DC_Motor_with_Encoder-SJ01_SKU__FIT0450
- L298n
  - https://kknews.cc/zh-tw/education/b5nm256.html
- Digital Pins With Interrupts
  - https://www.arduino.cc/reference/en/language/functions/external-interrupts/attachinterrupt/

Deadline

- Checkpoint#2 Demo : 10/22
- Checkpoint #2 Report : 10/29

CP 1
Demo Timetable

Group A 09:30 ~ 10:30	Group B 10:30 ~ 12:00
Team 1	Team 12
Team 2	Team 13
Team 3	Team 14
Team 4	Team 15
Team 5	Team 16
Team 6	Team 17
Team 7	Team 18
Team 8	Team 19
Team 9	Team 20
Team 10	Team 21
Team 11	Team 22