Floor plan EE632

TA

1

2

3

10

9

8

7

13

12

11

4

5

6

EECN30169/535307

Robot Hockey Arena

Checkpoint #3
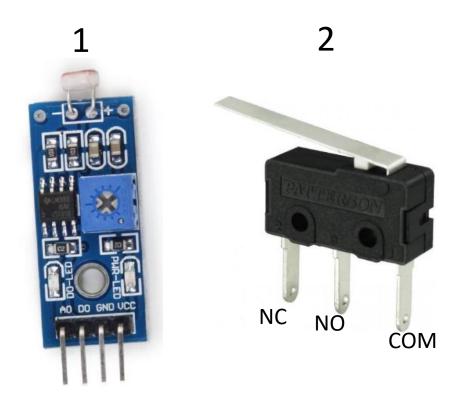## Obstacle Avoidance

Demo Due : 11/11/2022

Report Due：11/18/2022

Outline

- CP 3 Supplies

- Checkpoint #3 Assignment

- Hardware Configuration

- GPIO of Raspberry Pi

- Light Sensor and Touch Sensor

CP 3 Supplies

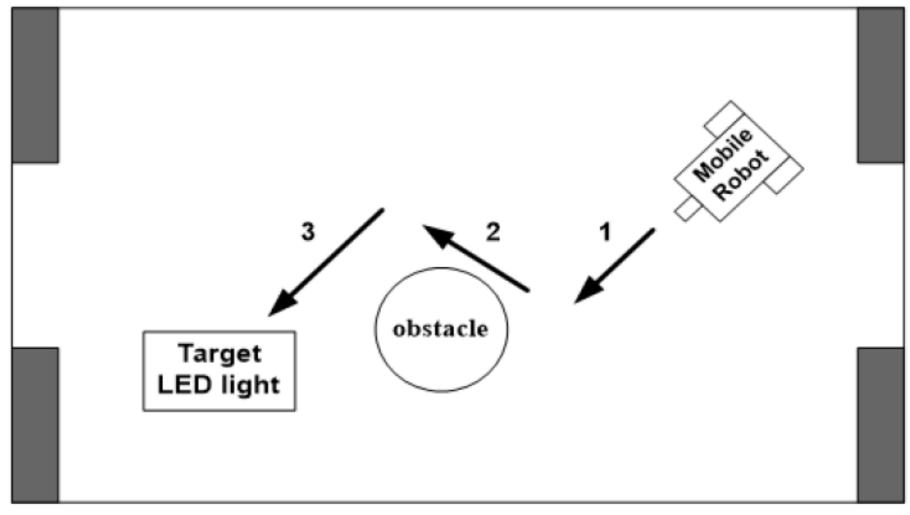| Checkpoint#3 Material List	
1	Photo resistor sensor x1
2	Touch sensors x3
3	47KΩ resistance x3
4	Breadboard
Team _____	

1

2

NC   NO   COM

Checkpoint #3 Assignment

- The purpose of this checkpoint is to make sure you can control your robot to move in the arena. The mobile robot needs to detect an obstacle in front of it and take action to avoid the obstacle in order to continue its motion.

- Finally, your robot can find the assigned target. In this checkpoint, the target is a ring of LED lights.
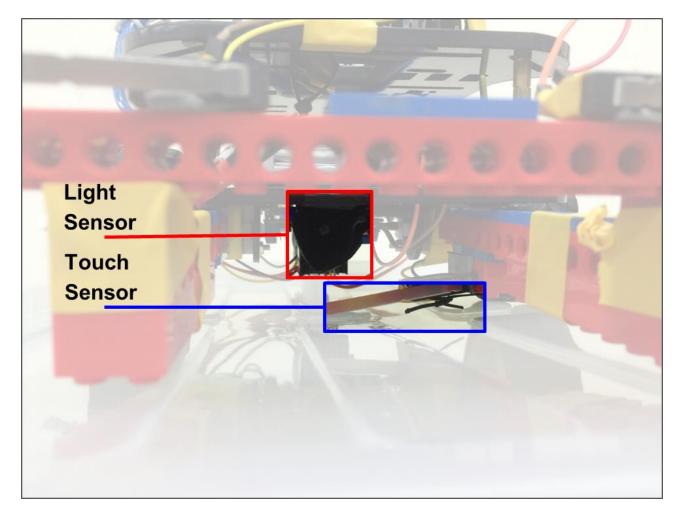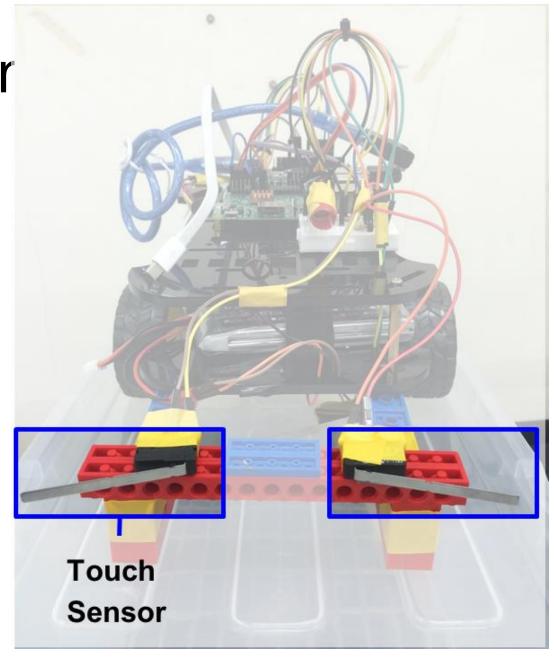
Checkpoint #3 Grading Policy

1. Please start to arrange the space configuration of your robot, make sure every and each component such as circuit boards and sensors is settled **firmly and stable** on the chassis and all the robot functions will not be affected by wires. **(15%)**

2. Make sure that your robot can move freely. It means that you do not need to use keyboard to control it anymore. **(20%)**

3. Integrate a light sensor and three touch sensors to the robot and program your robot to find and move toward the LED light. **(30%)**

4. The time for you robot to find and touch the LED light (in 90 sec). **(35%)**
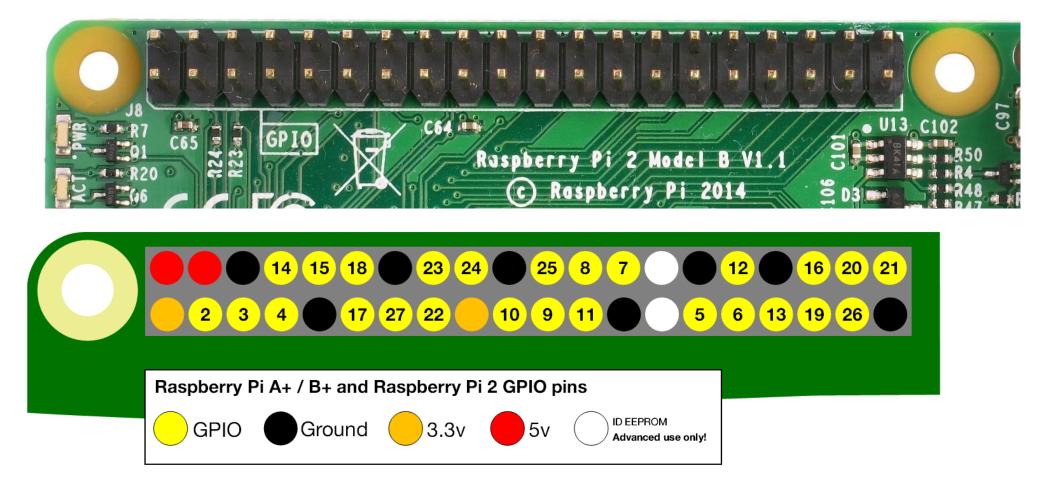
Checkpoint #3

Arena

Hardware Configuration

GPIO of Raspberry Pi

- GPIO: General-Purpose Input/Output

Raspberry Pi A+ / B+ and Raspberry Pi 2 GPIO pins

⬤ GPIO　⬤ Ground　⬤ 3.3v　⬤ 5v　○ ID EEPROM Advanced use only!

Wiring Pi: GPIO interface library

- WiringPi is an attempt to bring Arduino-wiring-like simplicity to the Raspberry Pi.

- The goal is to have a single common platform and set of functions for accessing the Raspberry Pi GPIO across multiple languages.

- Installation:

  - C: **$ sudo apt-get install wiringpi**

    $ sudo apt-get install libwiringpi2-dev

  - Python: **$ sudo pip install wiringpi2**

- Check：
  - **$ gpio -v**
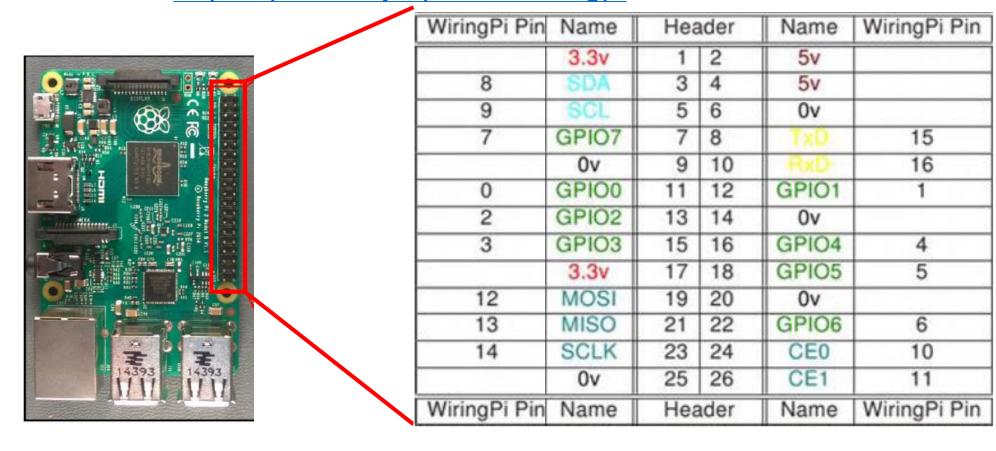
- Reference: http://wiringpi.com/download-and-install/

WiringPi's Pin number

- Prints a table of WiringPi's Pin number on terminal.
    $ gpio readall

- Website Reference: https://pinout.xyz/pinout/wiringpi

WiringPi Pin	Name	Header		Name	WiringPi Pin
	3.3v	1	2	5v	
8	SDA	3	4	5v	
9	SCL	5	6	0v	
7	GPIO7	7	8	TxD	15
	0v	9	10	RxD	16
0	GPIO0	11	12	GPIO1	1
2	GPIO2	13	14	0v	
3	GPIO3	15	16	GPIO4	4
	3.3v	17	18	GPIO5	5
12	MOSI	19	20	0v	
13	MISO	21	22	GPIO6	6
14	SCLK	23	24	CE0	10
	0v	25	26	CE1	11
WiringPi Pin	Name	Header		Name	WiringPi Pin

Example Code

- Sensor's pin is connected to Header pin 15 and the WiringPi pin is 3.

- Include the Head file

  #include <wiringPi.h>

- Library setup function.

  wiringPiSetup () ;

- Setup pin mode

  int sensor_pin = 3;   //wiringpi's pin

  pinMode (sensor_pin, INPUT) ;

- Read pin's data

  sensor_data = digitalRead(sensor_pin) ;

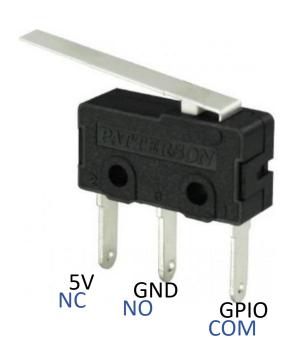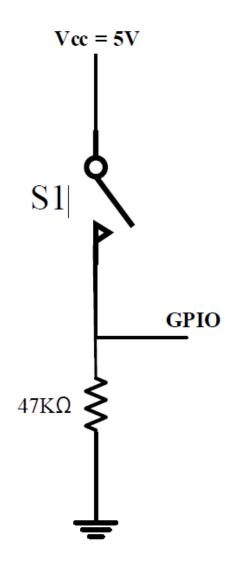| WiringPi Pin	Name	Header		Name	WiringPi Pin
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	0v	9	10	RxD	16
0	GPIO0	11	12	GPIO1	1
2	GPIO2	13	14	0v	
3	GPIO3	15	16	GPIO4	4
	3.3v	17	18	GPIO5	5
12	MOSI	19	20	0v	
13	MISO	21	22	GPIO6	6
14	SCLK	23	24	CE0	10
	0v	25	26	CE1	11
WiringPi Pin	Name	Header		Name	WiringPi Pin

Photo resistor sensor

- Use Photo resistor sensor to detect the LED light.
- V_{cc} connect to Pi3's 5V.
- GND connect to Pi3's GND.
- D_0 connect to GPIO Pin.
- You can change the Variable Resistor to increase the sensitivity of the sensor. If the brightness is bright enough, D_0 will be 0.

Touch sensor

- Integrate touch sensors to avoid an obstacle and walls of the area.

Vcc = 5V

S1|

GPIO

47KΩ

5V
NC

GND
NO

GPIO
COM

Demo Time

Group A 09:30 ~ 10:30	Group B 10:30 ~ 11:30
Team 13	Team 7
Team 12	Team 6
Team 11	Team 5
Team 10	Team 4
Team 9	Team 3
Team 8	Team 2
	Team 1