

# Visionary Course – Energy AI

## Lecture 08

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# Make Your JetRacer Ready for Driving

# Configure Power Mode

- For your safety, it is important to ensure that Jetson Nano doesn't draw more current than the battery pack can supply.
- Place the Jetson Nano in 5W mode by calling the following command

- You need to launch a new Terminal and enter following commands to select 5W power mode

```
sudo nvpmode1 -m1
```

- Check if mode is correct

```
sudo nvpmode1 -q
```

# How to Control Your JetRacer

## Steering – Analog Servo (E6001)



ECHOBBY E6001 Analog Servo 6kg for RC Model Buggy Car Off-Road Truck

[Visit the ECHOBBY Store](#)

★★★★★ ∨ 2 ratings

Price: **\$10.80**

Material	Plastic
Brand	ECHOBBY
Theme	RC HOBBY

### About this item

- Plastic Gear, Splashproof
- Weight: 42.4g
- 0.13sec /60 degree (4.8V)
- 5.2kg\*cm (4.8V)
- Rotation Angle: +/- 60 degree

# How to Control Your JetRacer

IP address: 8888/lab/tree/jetracer/notebooks/basic\_motion.ipynb

## Steering – Analog Servo (E6001)

```
from jetracer.nvidia_racecar import NvidiaRacecar  
  
car = NvidiaRacecar()
```

$$y = \text{car.steering\_gain} \times x + \text{car.steering\_offset}$$

where

$x$ : *car.steering*

$y$ : the value written to the motor driver

**Calibration needed** for `car.steering_gain` and `car.steering_offset`

Make the car move forward with  $x = 0$ , fully right with  $x = 1$ , and fully left with  $x = -1$

# How to Control Your JetRacer

## Throttle – Carbon Brushed Motor



RC380 high speed carbon brushed motor  
Idle speed 15000RPM

### Carbon Brushed Motor

High speed high power carbon  
brushed motor, longer working life,  
stable performance

# How to Control Your JetRacer

## Throttle – Carbon Brushed Motor

$$y = \text{car.throttle\_gain} \times x$$

$$y = \text{car.throttle\_gain} \times x$$

where

$x$  : *car.throttle*

$y$  : the value written to the speed controller

**Calibration needed** for `car.throttle_gain`

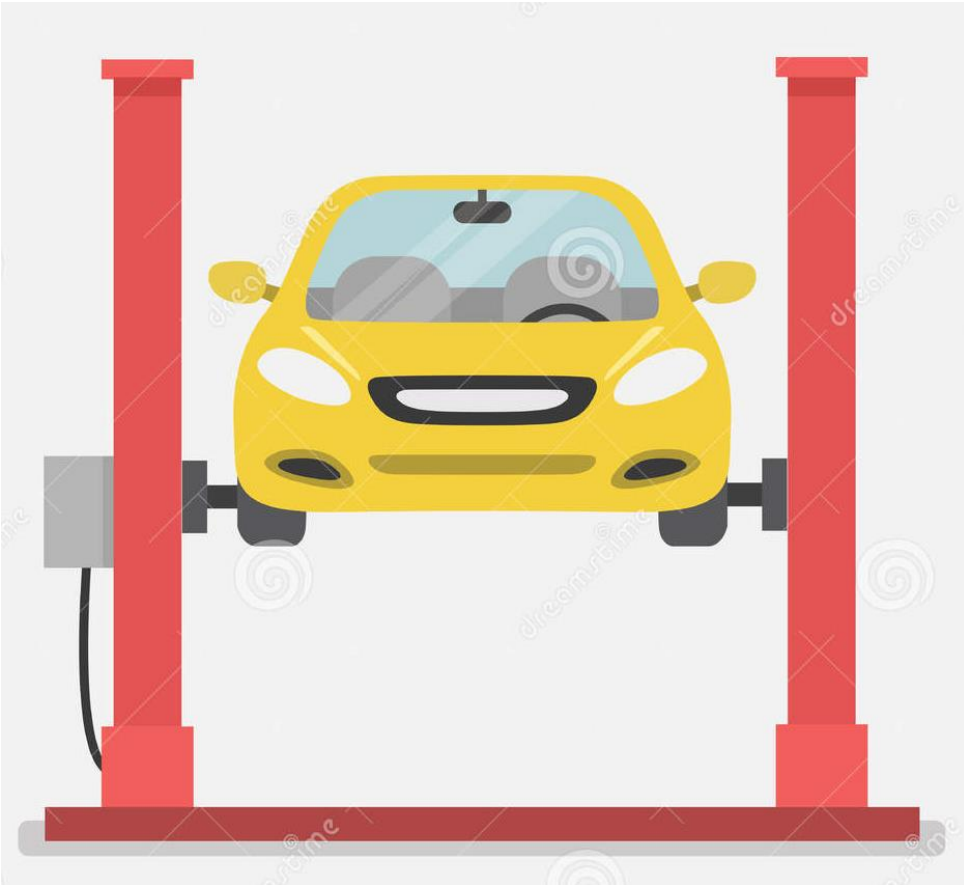
Make the car run forward at a maximum speed with  $x = 1$ , backward at a maximum speed with  $x = -1$

- When the car is stopped and a negative throttle is set, it will reverse.
- If the car is moving forward and a negative throttle is set, it will brake.

# Calibrate Your JetRacer

- Lift your car and find the calibration parameters (through trial and error)

IP address: 8888/lab/tree/jetracer/notebooks/basic\_motion.ipynb



- *car.steering\_gain*
- *car.steering\_offset*
- *car.throttle\_gain*



# Project 1 - Drive Your JetRacer with Gamepad

# Drive Your Car using Gamepad Controller

IP address:8888/lab/tree/jetracer/notebooks/[teleoperation.ipynb](#)



1. Plug the dongle into your **laptop**'s USB port.
2. Execute the Python code below.

```
import ipywidgets.widgets as widgets  
  
controller = widgets.Controller(index=0) # replace with index of your controller  
display(controller)
```

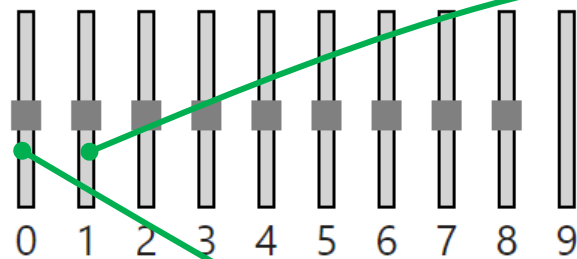
Press any button to find the index for your gamepad!

# Drive Your Car using Gamepad Controller

```
import ipywidgets.widgets as widgets      https://ipywidgets.readthedocs.io/  
controller = widgets.Controller(index=0)  # replace with index of your controller  
display(controller)
```

This script creates interactive HTML widgets

Remember the indexes for the mapping!



Vertical Slider

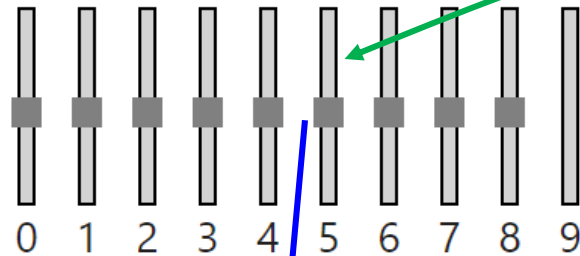


Button

USB WirelessGamepad (Vendor: 2563 Product: 0575)



# How to Change the Control Values?



USB WirelessGamepad (Vendor: 2563 Product: 0575)

Read the value of the slider widget.

Example)

car.steering = 1  
car.throttle = 0.5

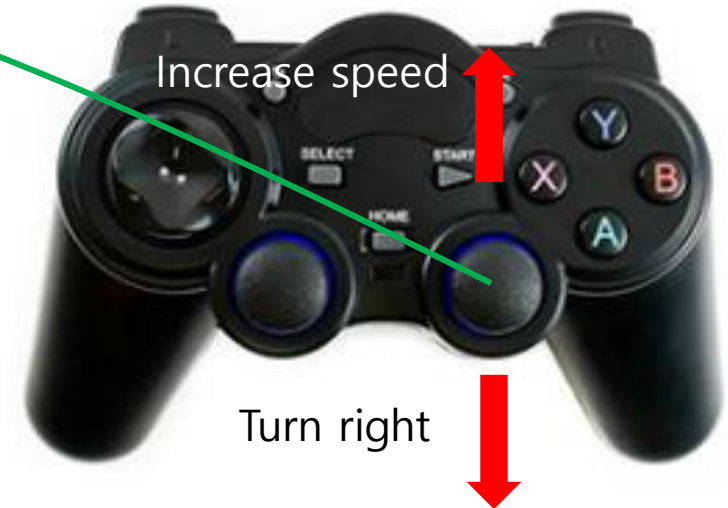
Widget Index

```
left_link = traitlets.dlink((controller.axes[0], 'value'), (car, 'steering'), transform=lambda x: -x)
```

```
right_link = traitlets.dlink((controller.axes[1], 'value'), (car, 'throttle'), transform=lambda x: -x)
```

Conversion using lambda function if needed

Decide your own mapping for driving.



# Drive Your JetRacer

**What is your lap time?**



# Project 1 Report

## Drive Your JetRacer with Gamepad

Due date: Oct. 23

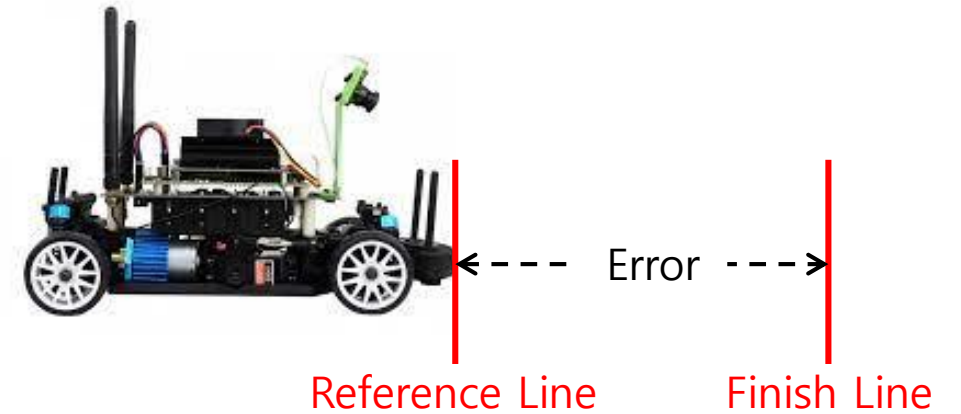
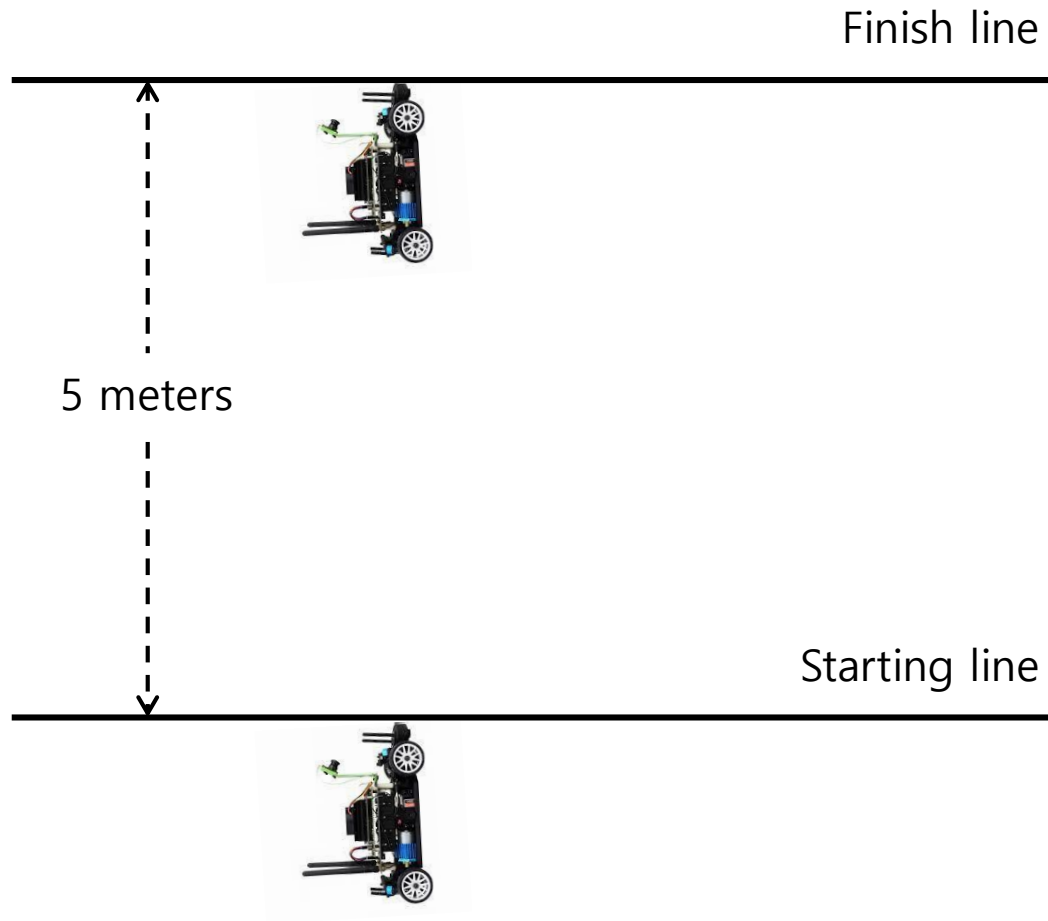
Please, take a video of your driving with the gamepad.

The video should include the stopwatch to measure the lap time. Hand in the video capture through the LMS.

# Project 1 - Fun with JetRacer

# Mission 1

## Go straight and stop!



Write a Python code that achieves the minimum error.

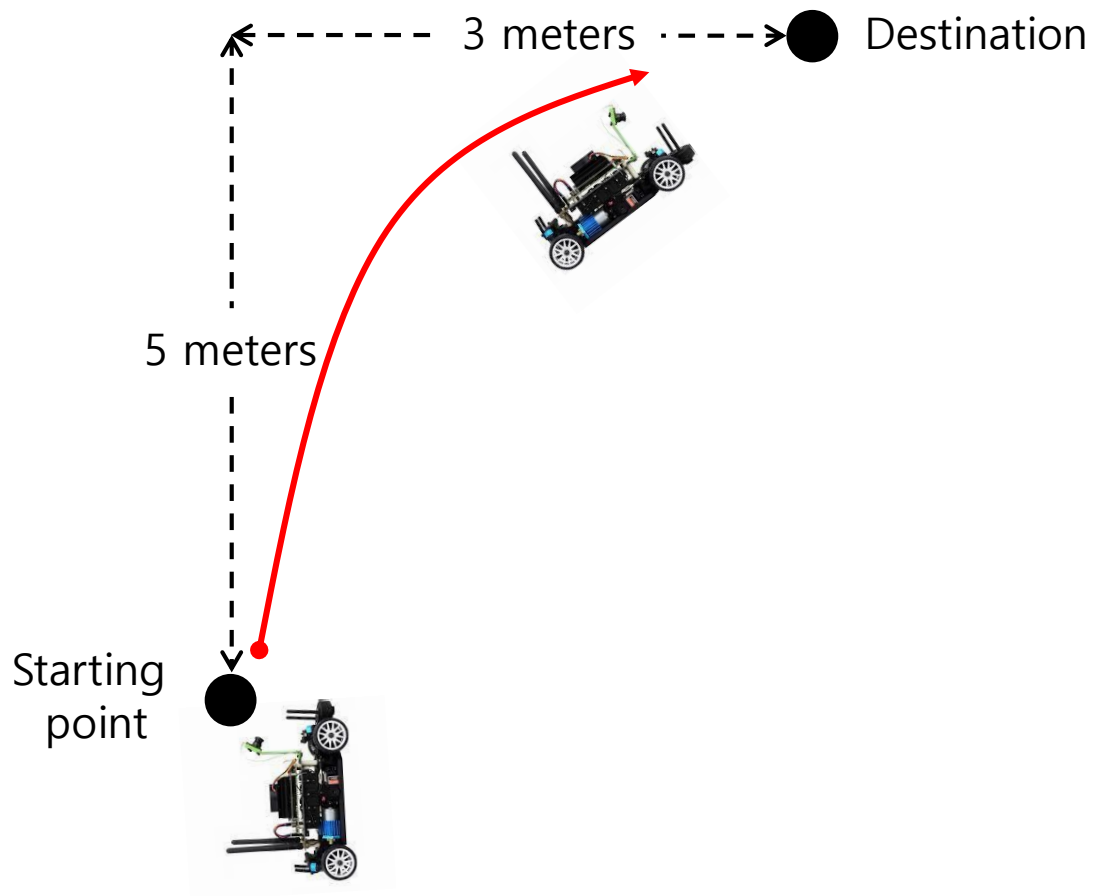
What is your error?

```
import time
...
...
car.throttle=1
time.sleep(10)
car.throttle=0
```



# Mission 2

## Stop by your destination!

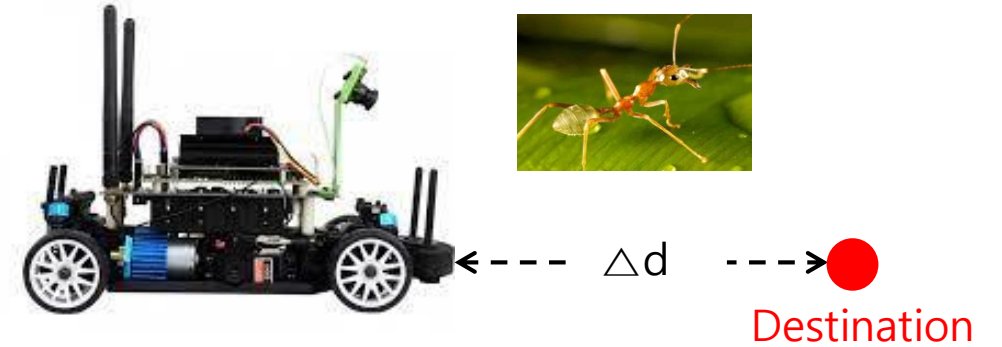
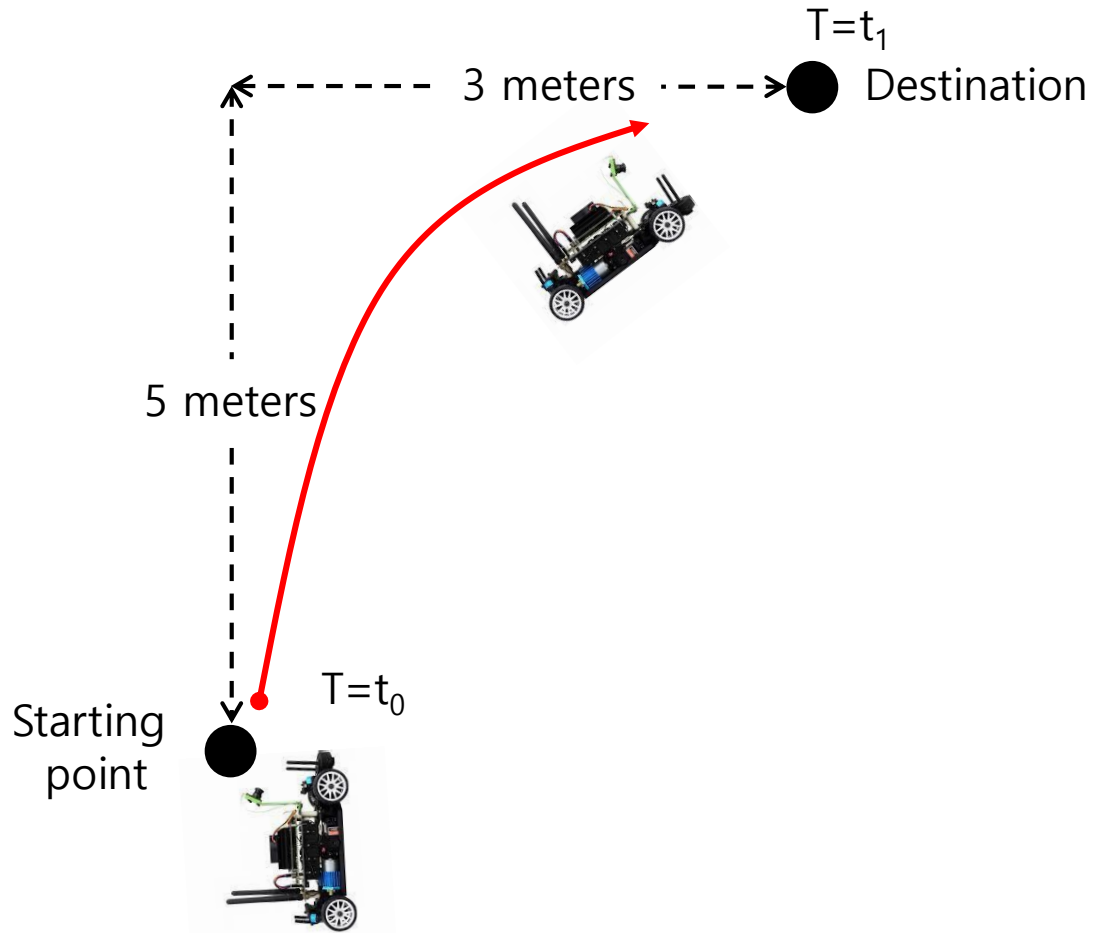


Write a Python code that achieves the minimum error.

What is your error?

# Mission 3

## Get to your destination ASAP!



$$\begin{aligned}\text{Error} &= \Delta T + \Delta d / (\text{Ant's speed} \times 2) \\ &= (t_1 - t_0) + \Delta d / 0.2\end{aligned}$$

Write a Python code that achieves the minimum error.

What is your error?

```
import time
t0=time.time()
...
...
...
t1=time.time()
print(t1-t0)
```

# Project 1 Report

## Fun with JetRacer

Due date: Oct. 23

Please, hand in your report and video through the LMS.

- 2-page experiment report (in pdf filetype only)
- Video capture for mission 3.

# Any Question?

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