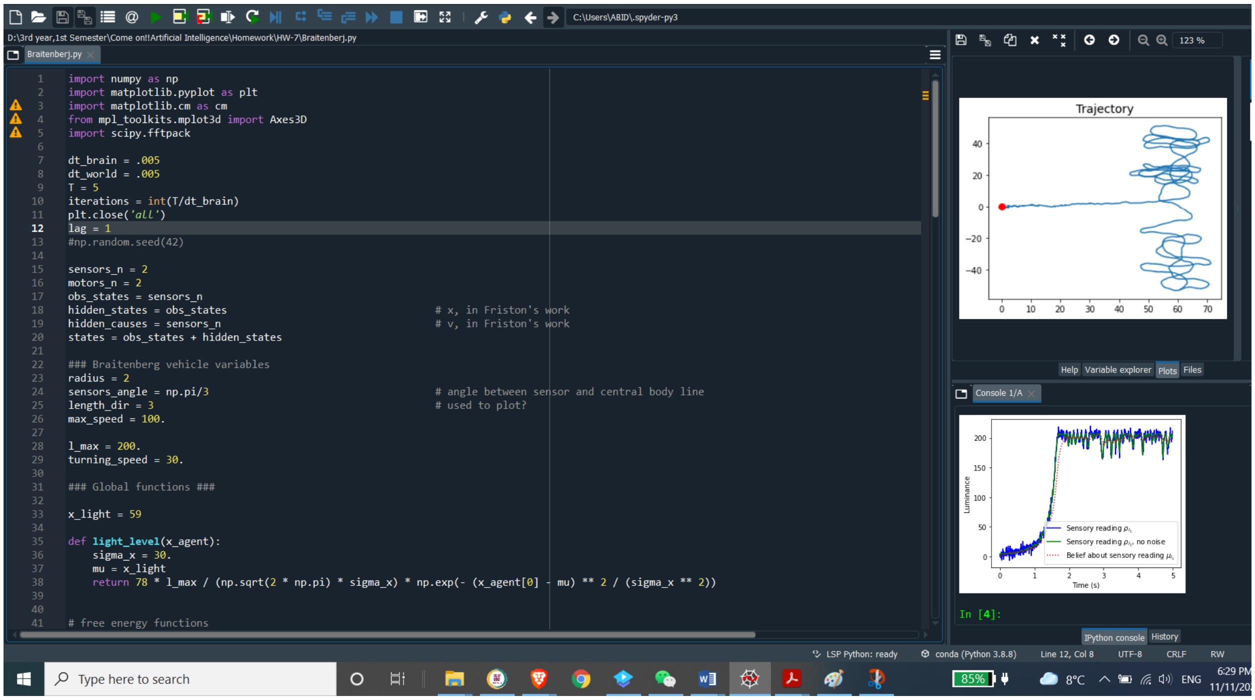
Name : ABID ALI
Student_No : 2019380141

Exercise 3* :training a neuro controller for the robot "Braitenberj vehicle" mentioned in our course,and give one answer

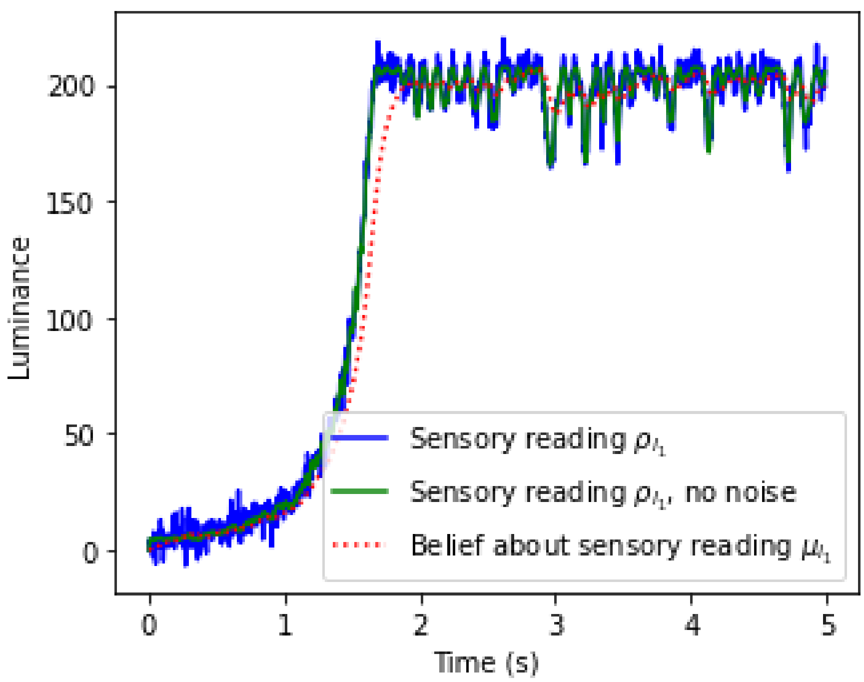
Solution:

Training of the Braitenberg Vehicle for Path Tracking

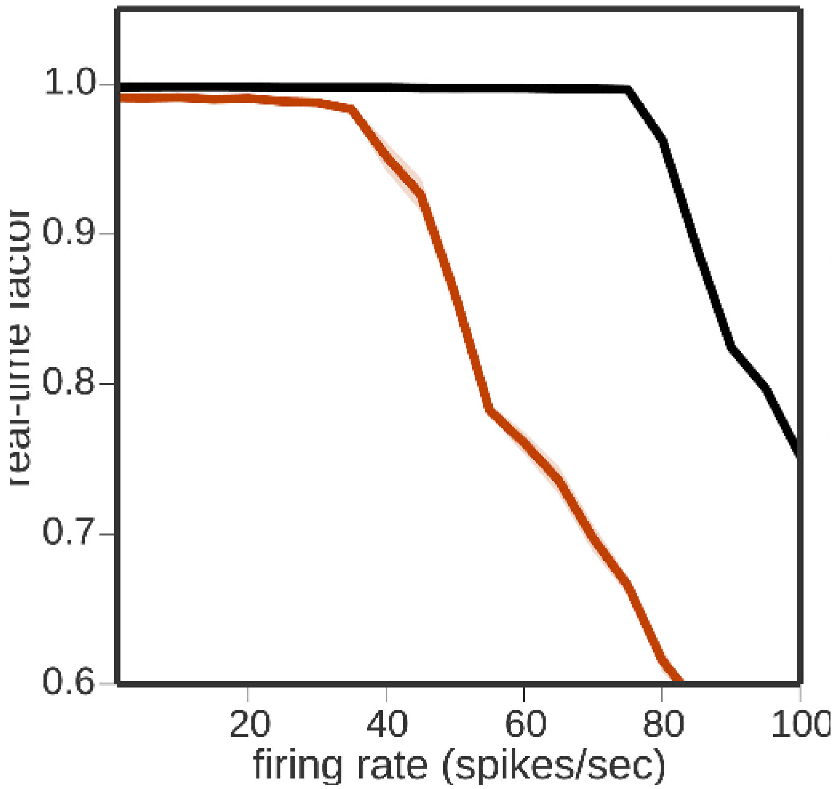
The locomotion mechanism of the Braitenberg vehicle is determined by the neuron interconnections. By changing the connections, the Braitenberg vehicle exhibits different and complex behaviors under same stimulus. Therefore, the capability of learning and adapting to the varying environment is crucial for the practical application of the vehicle based on memristive neuromorphic architecture. The weight in the artificial neural network would be updated according to the punishment or reward feedback instructed by the supervisor, which is based on different response behaviors of the vehicle to input signals. After a few iterations of the feedback loop, a new mapping relationship between the input signals and output behaviors would be established, which indicates that the vehicle acquires a new skill. Traditionally, weight-update process of the memristive neural network is controlled by the software in a digital controller, such as a personal computer or microcontroller unit (MCU).



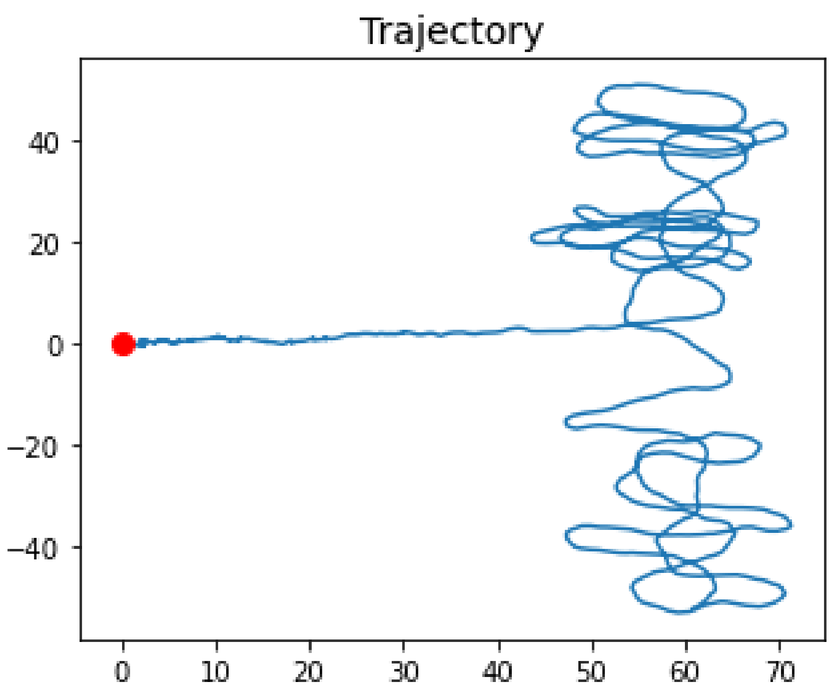
I used python spyder IDE to simulate this program.I am familiar with python language.So,I choose Python language to simulate this program.



The reading from the environment .We can see ,when there is no noise present ,how does it respond and another line when it’s moving in natural environment.



We can see the firing rate here.



We can see the movement pattern of the vehicle.From the observation of the movement of the car ,we can see mostly the car moves in round circle,trying to avoid the obstacles .Later ,when it moves all the obstacles it moves straight and roaming in that area.

Attachments:

1) Braitenberj.py