

Task 1 - Biped Patrol (BP)

Read Me

Greetings from e-Yantra!

Welcome to Task 1 of theme Biped Patrol.

This task is divided into two parts:

- ◆ Task 1.1
- ◆ Task 1.2

You will find the following files/folders in Task 1 folder along with this Read Me file.

● **Task 1.1**

You will find the following files in **Task 1.1** folder

1. Task_Theory.pdf
2. Task_Instructions.pdf
3. read_write.m
4. sensor_data.csv
5. MPU-6050_DataSheet.pdf
6. MPU-6050-Register-Map.pdf

In this task you will learn about the concept of frequency filters and you will write code for those filters in Octave.

Task_Theory.pdf - This file contains the study material about the topics to be covered in this task. Read and understand the related theory completely.

Task_Instructions.pdf - Open this file and read instruction and description of the functions to write code for the **read_write.m** file.

read_write.m - Write your code in this file. **Do not add or remove any function other than those already present in this file.**

sensor_data.csv - This file contains 8000 readings of 12 registers of a sensor module named GY-87. These readings are taken at a time interval of 10 milliseconds each. Read **Task_Instructions.pdf** carefully to understand the meaning of the data of this csv file. **Do not open or edit this csv file.**

MPU-6050_DataSheet.pdf & MPU-6050-Register-Map.pdf - These files contains details related to MPU-6050 which is mounted on GY-87 sensor module. Use these files to understand the configuration of the sensor, which will help you to find out the scaling factors for the sensor readings given in **sensor_data.csv**.

● Task 1.2

You will find the following files/folders in **Task 1.2** folder

1. Task 1.2 Theory
 - a) 1_Mathematical_Modelling_of_System.pdf
 - b) 2_Introduction_to_State_Space_Analysis.pdf
 - c) 3_Controller_Design.pdf
2. Task 1.2 Practical
 - a) Task_Instructions.pdf
 - b) Think_and_Answer.docx
 - c) Cart_Pendulum.m
 - d) Complex_Pulley.m
 - e) Mass_Spring_System.m
 - f) Simple_Pendulum.m
 - g) Simple_Pulley.m

You need to read all the theory documents first in **Task 1.2 Theory** folder. There are 5 Octave (.m) scripts in the **Task 1.2 Practical** folder. You need to complete the code in each of these scripts. You will find the instructions on how to do that in the *Task_Instructions.pdf*. The *Think and Answer.docx* is a set of questions you need to answer based on your understanding of the task.

Submission Instructions

Task 1.1

In Task 1.1, if you have successfully written and run the code in **read_write.m** file you will have an auto-generated file named as **output_data.csv**.

The teams are expected to upload the solutions as follows:

- Login to the **eYRC Portal**
- Go to Task 1.1 tab
- Upload the **read_write.m & output_data.csv** file in their respective sections.

Task 1.2

In Task 1.2, after you have completed and successfully run the code in all 5 Octave (.m) scripts, you need to do the following:

- Create a new folder and name it **eYRC#<Team-id>#Task1.2** . For example if your Team Id is 5233 then the folder should be named **eYRC#5233#Task1.2** .
- Copy the following completed octave scripts in this folder. **Do not rename any of the files.**
 - ✓ Cart_Pendulum.m
 - ✓ Complex_Pulley.m
 - ✓ Mass_Spring_System.m
 - ✓ Simple_Pendulum.m
 - ✓ Simple_Pulley.m
- Copy the completed **Think_and_Answer.docx** in this folder. **Do not rename the file.**
- Convert the folder into .zip format.
- Login to your eYRC portal.
- Navigate to Task 1.2 tab.
- Upload your zip file on the portal.

Submission Deadlines

Deadline for Task 1.1 - November 18th 2019, 11:59PM

Deadline for Task 1.2 - November 26th 2019, 11:59PM

We would recommend you to start doing the tasks right away and not wait till the last moment. Task 1.1 and Task 1.2 are independent of each other. Hence, you can attempt Task 1.2 without completing Task 1.1 first. Hence, it would be prudent to divide the tasks to be done among team members to ensure that you get enough time to complete both tasks.

Best of Luck!!