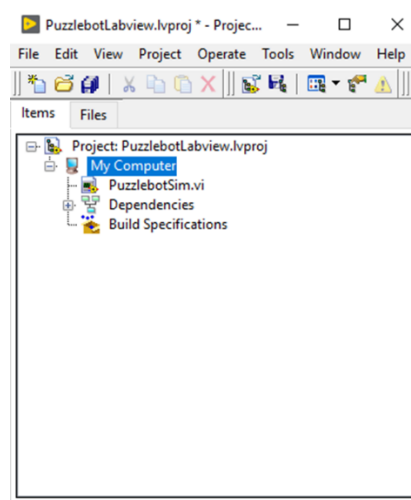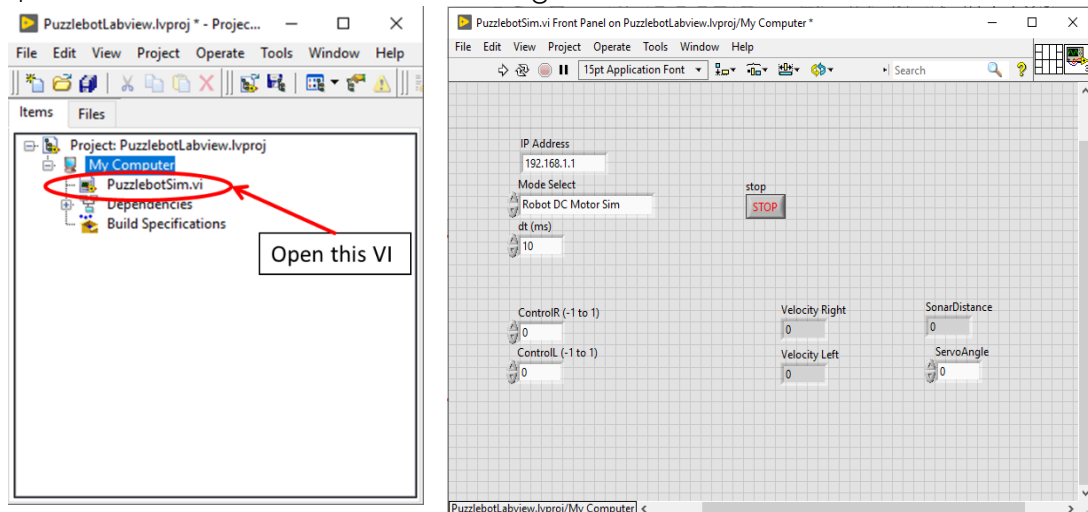# MCR2 - LabVIEW Simulator

LabVIEW Simulator Description

1. <u>Unzip</u> the folder named "PuzzlebotLabviewTemplateV1_2.zip" into a directory.

2. Open the LabView Project called "PuzzlebotLabview.lvproj" you should see the following

3. Open the "PuzzlebotSim.vi", the following screen will be shown

4. Parameters used in Front Panel of the VI

Parameter in LabView	Default Value	Description
IP Address	192.168.1.1	IP Address of the real robot shown on the screen (For this coursework will not be used)
Mode Select	Robot Simulation	Mode Selection Control 1. Robot Simulation: Simulates the real robot, opens a new window that plots the robot movement and the trajectory that follows. 2. Robot DC Motor Sim: Simulates two DC motors. 3. Real Robot: Used to connect to the real robot. (Not used in this coursework)
dt(ms)	50	Sampling time selection in mS (milliseconds)
ControlR	0	PWM signal percentage applied to the right DC motor. The values can vary in the interval [-1, 1], i.e., [-1,...,-0.5,...,0,...,0.5,...1], where 1 is full power to the motor and -1 is full power in reverse direction.
ControlL	0	PWM signal percentage applied to the left DC motor. The values can vary in the interval [-1, 1], i.e., [-1,...,-0.5,...,0,...,0.5,...1], where 1 is full power to the motor and -1 is full power in reverse direction.
Velocity Right		Indicator showing the right motor velocity
Velocity Left		Indicator showing the left motor velocity
Sonar Distance		Indicator showing the distance measured by the Sonar Sensor (Real Robot only, if included)
Servo Angle		Control the Servo Motor angle on the interval [-90, 90] deg
Stop		Stop button (This button must be used to stop simulation and/or real robot usage)

5. Block Diagram description

The block diagram can be divided into three sections, Initialisation, Simulation Execution and Close Communication / Simulation End as follows.
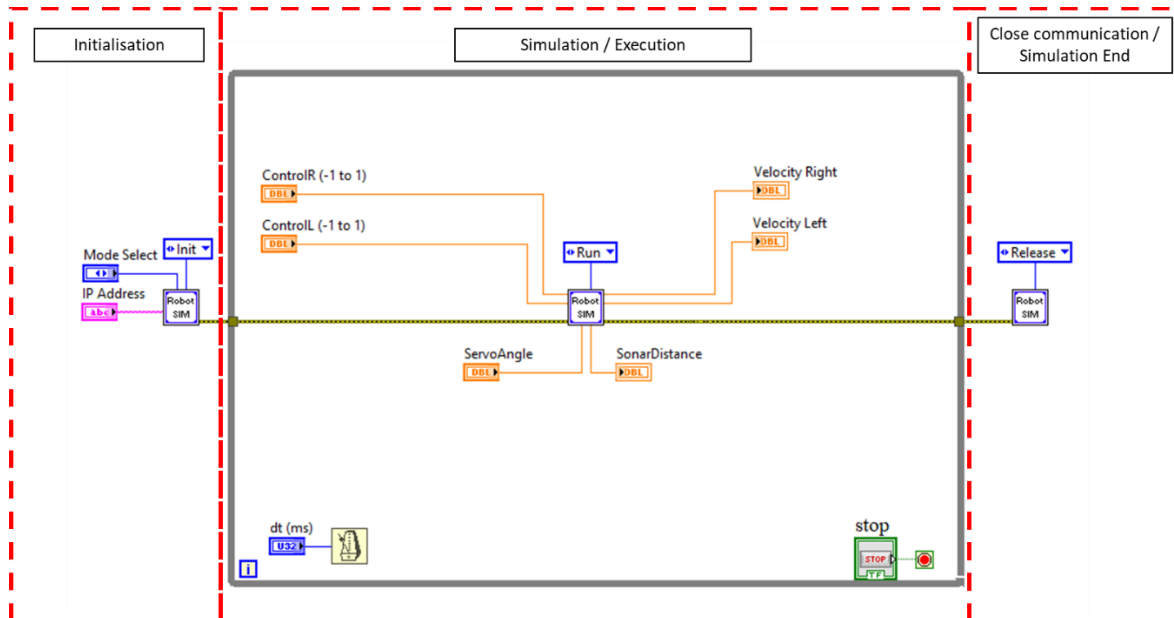
6. The block diagram uses a SubVi called "Robot SIM" that simulates the dynamics of the robots including the motors.
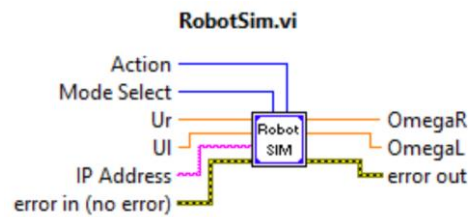
7. The following table will describe the parameters that will be used in this laboratory.

Parameter	Input / Output	Definition
Mode Select	Input	Mode Selection Control 1. Robot Simulation: Simulates the real robot, opens a new window that plots the robot movement and the trajectory that follows. 2. Robot DC Motor Sim: Simulates two DC motors. 3. Real Robot: Used to connect to the real robot.
Action	Input	Define the action of the SubVi to initialise variables, Run the simulation, or finalise "close" the simulation/ communication.
Ur	Input	PWM signal percentage applied to the right DC motor. The values can vary in the interval [-1, 1], i.e., [-1,...,-0.5,...,0,...,0.5,...1], where 1 is full power to the motor and -1 is full power in reverse direction.
Ul	Input	PWM signal percentage applied to the left DC motor. The values can vary in the interval [-1, 1], i.e., [-1,...,-0.5,...,0,...,0.5,...1], where 1 is full power to

		the motor and –1 is full power in reverse direction.
IP Address	Input	IP Address used to communicate with the real robot.
error in	Input	Input error function.
OmegaR	Output	Output the right motor velocity as given by the encoders.
OmegaL	Output	Output of the Left motor velocity as given by the encoders.
error out	Output	Error output.