STARTUP OF THE PIZZA ROBOT

Password: pizza1

To turn on the robot:
- put the main switch in upright position
- enable the switch box, the signal light will be turned on
- make sure the emergency stop is not pressed down

To start and configure Matlab:
- double click on the Matlab icon
- enter password
- change current directory to: /home/pizza/groupX (where X is your group number)
- open pizza_empty.mdl or your own saved model

To execute the model:
- in the model, type Ctrl+B to build the executable
- open a terminal
- to go to the right directory, type: cd /home/pizza/groupX
- to start the realtime target, type: sudo ./pizza_empty -w
- enter the password if prompted
- in your model, click Simulation -> Connect To Target
- wait a few seconds and then click Simulation -> Start Real-Time Code
- give the red Start/Stop box the value 1 (one)

To stop the model:
- give the red Start/Stop box the value 0 (zero)
- wait until the robot is in its downward position
- click Simulation -> Stop Real-Time Code

To start a file browser:
- double click on the Nautilus icon
- enter password

ABOUT THE MODEL

Simulink model inputs and outputs

In the Figure 1 the inputs and outputs of the model are presented. The units of every input and their minimum and maximum values are presented in the Table 1 meanwhile the Table 2 presents the units for the outputs of the model.

Table 1. Inputs for the model

	Input	Units	Minimum	Maximum
1	Vertical motor	[V]	-6.25	+6.25
2	Horizontal motor	[V]	-6.25	+6.25
3	Rotation motor	[V]	-10	+10
4	translation motor	[V]	-10	+10
5	Start/Stop	binary	0	1

Table 2. Outputs for the model

	Output	Units
1	Vertical position	[m]
2	Horizontal position	[m]
3	Rotational position	[rad]
4	Translational position	[m]
5	Status	Integer
6	Timer after initialization	[s]
7	Output voltage motor 1	[V]
8	Output voltage motor 2	[V]
9	Output voltage motor 3	[V]
10	Output voltage motor 4	[V]

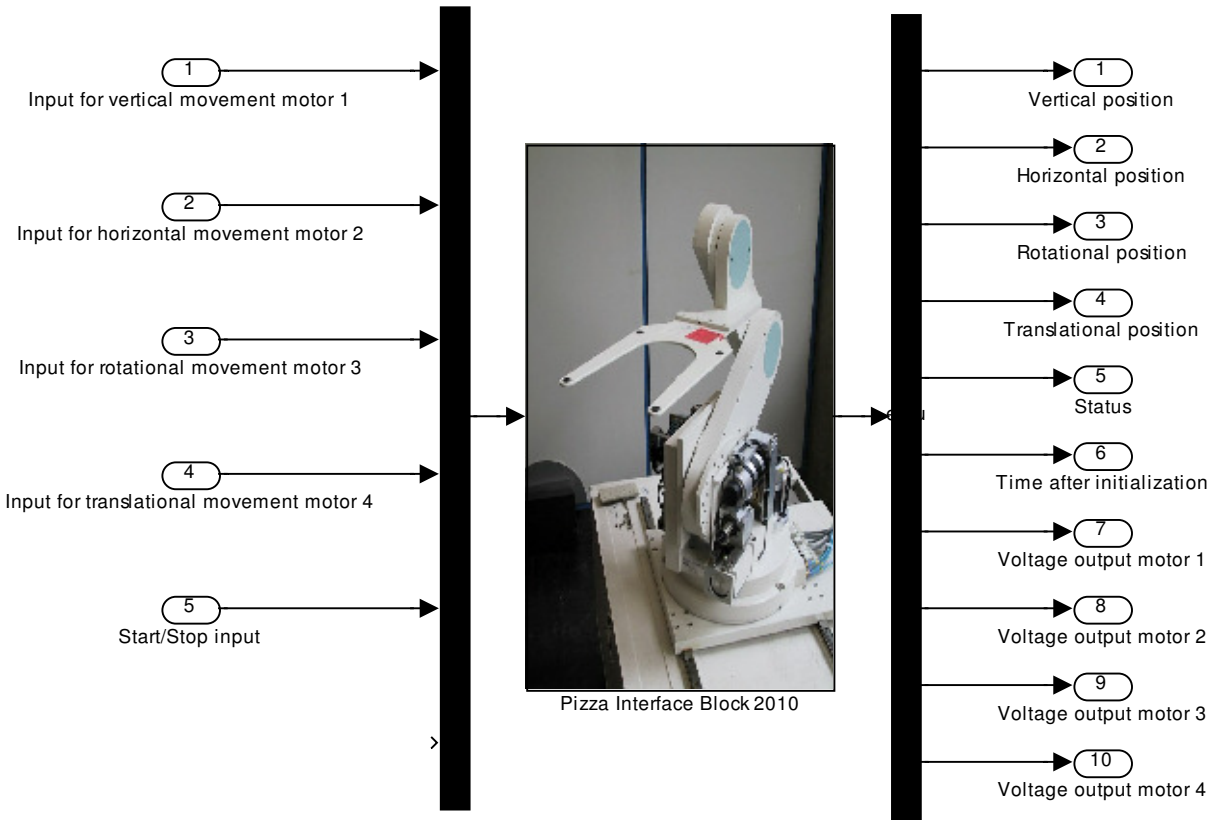**Figure 1. Model inputs and outputs**

The sample frequency of the model is **Fs = 500 Hz** and must not be changed. In order to prevent any damage to the hardware, there are extreme positions defined for each degree of freedom measured relative to each motor, if any of these extreme position is violated, the robot will stop immediately. In the Table 3 those extreme positions are presented. In the Table 4, the meaning of each status value is presented.

Table 3. Extreme positions for each degree of freedom

Degree of freedom	Minimum position	Maximum position
Vertical displacement	-0.2418 [m]	-0.0268 [m]
Horizontal displacement	0.0231 [m]	0.5301 [m]
Rotational displacement	0.0108 [rad]	5.5708 [rad]
Translational displacement	-0.0106 [m]	0.5294 [m]

Table 4. Status values.

STATUS	VALUE
WAITING_FOR_START	0
HOMING	1
MOVING	2
READY	3
P1_POS_VIOLATION	4
P2_POS_VIOLATION	5
P3_POS_VIOLATION	6
P4_POS_VIOLATION	7
P1_VEL_VIOLATION	8
P2_VEL_VIOLATION	9
P3_VEL_VIOLATION	10
P4_VEL_VIOLATION	11

The initial position for each degree of freedom are presented in the Table 5.

Table 5. Initial position for the robot.

Engine	Initial position
Vertical position	-0.1 [m]
Horizontal position	0.1 [m]
Rotational position	2.4 [rad]
Translational position	0.2 [m]