

## Activity 1: Functions and Motion

### 1 Overview

The goal of this activity is to write four functions that allow you to drive your robot forward, backwards, turn left and turn right. All of this code can be written using the following three functions:

1. `behControl.setTv(tv)`: This function moves the robot forwards or backwards at the velocity given by the argument `tv`. The units of `tv` are *mm/sec*, or millimeters per second. Remember,  $1000 \text{ mm} = 1 \text{ meter}$ . Positive values of `tv` will cause your robot to move forwards while negative values will cause it to move backwards.
2. `behControl.setRv(rv)`: This function rotates the robot left or right at the *rotational velocity* given by the argument `rv`. The units of `rv` are *mrad/sec*, or milliradians per second. A radian is another way to measure an angle. A circle has 360 degrees of rotation, which is the same as  $2\pi$  radians. So,  $90 \text{ degrees} = \pi/2 \text{ radians}$ , and  $\pi \text{ radians} \approx 3.142$ . The robots use *milliradians* in their motion functions, where  $1000 \text{ milliradians} = 1 \text{ radian}$ . Positive values of `rv` will cause your robot to rotate left, while negative values will cause it to rotate right.
3. `behControl.runBehFor(time)`: This function lets the behaviors run for the amount of time in the argument `time`.

### 2 Getting Started

#### 2.1 Obtaining Skeleton Files

1. Go to `mrsl.rice.edu`
2. Navigate to Swarm School then download `01-MondayFiles1`
3. Extract `01-MondayFiles1` to a `01-MondayFiles1` folder on the desktop
4. Open the `01-DrivingActivity`

#### 2.2 Running a Program

1. First connect robot then turn it on
2. Then navigate to device manger by opening start bar, clicking control panel, click system link (may need to choose classic view on right hand side), choose hardware tab, then choose device manager
3. From here you will open the ports tab, The `mcu.connect('com#')` will be the robot com-port connect to this computer
4. Now type `import mcu`
5. Then type `mcu.connect('com#')` where `#` is the com port found above
6. Now when you have program a file, you will type `run` then your program name
7. Your program is now ready to run
8. Press the button with red leds circling it, to begin program

### 3 Tasks

#### 3.1 Drive Forward

Write a function `driveForward(time)`.

It should take one argument, `time`. Use `behControl.setTv(tv)` to control the speed of the robot, and `behControl.runBehFor(time)` to control how long you want the robot to drive. Go down to bottom of folder to delete the # in front of `driveForward(time)`

#### 3.2 Drive Backwards

Next, write the function `driveBackwards(time)`.

It should look almost identical to `driveForward(time)`, only `tv` should be negative rather than positive. Remeber to delete the # in front of `driveBackwards(time)`

#### 3.3 Turn Left

Write the function `driveTurnLeft(time)`.

This function will need to call `behControl.setRv(rv)` and `behControl.runBehFor(time)`. Remeber to delete the # in front of `driveBackwards(time)`

#### 3.4 Turn Right

Write the function `driveTurnRight(time)`.

This function will be almost identical to turn left, except you will need to use negative values for `rv`. Remeber to delete the # in front of `driveBackwards(time)`