Standalone Simulations

Standalone Simulations (Optional)

The standalone version of the simulator will allow you to test some of the controllers discussed in the video lectures without any programming in MATLAB. The simulator will run on its own, and you will be able to tune controllers by editing a XML file.

Requirements

The standalone versions of the simulator require the MATLAB Compiler Runtime (MCR), which can be downloaded from Mathworks for free. Navigate to http://www.mathworks.com/products /compiler/mcr/ and follow the instructions to download and install the MATLAB Compiler Runtime (MCR) for your 64-bit OS. Make sure to download MCR for Release **R2012b** and not R2012a.

Instructions

Windows (tested on Windows 7 64-bit)

1. Download the .zip (simiam-standalone-windows-week-X.zip).
2. Run the included executable *simiam.exe*.

Mac OSX (tested on 10.6 "Snow Leopard" 64-bit)

1. Download the .zip (simiam-standalone-macosx-week-X.zip).
2. Open a terminal and browse to the unzipped directory.
3. Run the command: ./run_simiam.sh PATH-TO-MCR-INSTALLATION

For example, PATH-TO-MCR-INSTALLATION may be /Applications/MATLAB /MATLAB_Compiler_Runtime/v80 depending on where it was installed.

Linux (tested on Ubuntu 12.10 64-bit)

1. Download the .zip (simiam-standalone-linux-week-X.zip).
2. Open a terminal and browse to the unzipped directory.
3. Run the command: ./run_simiam.sh PATH-TO-MCR-INSTALLATION

For example, PATH-TO-MCR-INSTALLATION may be /usr/local/MATLAB /MATLAB_Compiler_Runtime/v80 depending on where it was installed.

Week 2

This week's standalone simulator will allow you tune a PID regulator that steers the robot to some desired orientation.

1. Download the standalone simulator for your OS (64-bit only!):

   - simiam-standalone-windows-week-2.zip (Updated: 2013-02-04)
   - simiam-standalone-macosx-week-2.zip (Updated: 2013-02-04)
   - simiam-standalone-linux-week-2.zip (Updated: 2013-02-04)

2. Download the XML configuration file: parameters.xml

```
<pid>
    <angle theta="0.7854" />
    <velocity v="0.1" />
    <gains kp="5" ki="0.1" kd="0.01" />
</pid>
```

You may use this file to change the desired angle (`theta`) that the robot should steer to, the linear velocity (`v`) of the robot, and the gains for the proportional (`kp`), integral (`ki`), and derivative (`kd`) terms of the PID regulator.

3. After you launch the standalone executable, if you press *Play* you should be prompted to select a *parameters.xml* file. By default, the one bundled with the simulator is selected (it is the one provided in the code block above). If you want to use your own, make sure to select it using the file selection dialog that appears.

Week 3

This week's standalone simulator will allow you tune a PID regulator that drives the robot to some desired goal location.

1. Download the standalone simulator for your OS (64-bit only!):

   - simiam-standalone-windows-week-3.zip (Updated: 2013-02-08)
   - simiam-standalone-macosx-week-3.zip (Updated: 2013-02-08)
   - simiam-standalone-linux-week-3.zip (Updated: 2013-02-08)

2. Download the XML configuration file: parameters-week-3.xml

```
<pid>
    <goal x_g="-1" y_g="0.5" d_stop="0.02" />
    <velocity v="0.1" />
    <gains kp="5" ki="0.1" kd="0.01" />
</pid>
```

You may use this file to change the goal location (`x_g` and `y_g`) that the robot should drive to, the stopping distance (`d_stop`), the linear velocity (`v`) of the robot, and the gains for the proportional (`kp`), integral (`ki`), and derivative (`kd`) terms of the PID regulator.

3. After you launch the standalone executable, if you press *Play* you should be prompted to select a *parameters.xml* file. By default, the one bundled with the simulator is selected (it is the one provided in the code block above). If you want to use your own, make sure to select it using the

file selection dialog that appears.

Week 4

This week's standalone simulator will allow you tune a controller that avoids obstacles.

1. Download the standalone simulator for your OS (64-bit only!):

   - simiam-standalone-windows-week-4.zip (Updated: 2013-02-16)
   - simiam-standalone-macosx-week-4.zip (Updated: 2013-02-16)
   - simiam-standalone-linux-week-4.zip (Updated: 2013-02-16)

2. Download the XML configuration file: parameters-week-4.xml

```
<pid>
    <sensorgains s1="1" s2="1" s3="1" s4="1" s5="1" s6="1" s7="1" s8="1" s9="1"
 />
    <velocity v="0.1" />
    <gains kp="5" ki="0.1" kd="0.01" />
</pid>
```

You may use this file to change the sensor gains (`s1` through `s2`) that the robot should drive to, the linear velocity (`v`) of the robot, and the gains for the proportional (`kp`), integral (`ki`), and derivative (`kd`) terms of the PID regulator.

3. After you launch the standalone executable, if you press *Play* you should be prompted to select a *parameters.xml* file. By default, the one bundled with the simulator is selected (it is the one provided in the code block above). If you want to use your own, make sure to select it using the file selection dialog that appears.

Week 5

This week's standalone simulator will allow you tune the blending and switching arbitration mechanisms that allow the robot to avoid obstacles while driving to a goal.

1. Download the standalone simulator for your OS (64-bit only!):

   - simiam-standalone-windows-week-5.zip (Updated: 2013-02-23)
   - simiam-standalone-macosx-week-5.zip (Updated: 2013-02-23)
   - simiam-standalone-linux-week-5.zip (Updated: 2013-02-23)

2. Download the XML configuration file: parameters-week-5.xml

```
<pid>
    <arbitration type="switching" />
    <alpha value="0.25" />
    <thresholds d_stop="0.02" d_at_obs="0.13" d_unsafe="0.1" />
    <goal x="1" y="1" />
    <velocity v="0.1" />
```

```
        <gains kp="5" ki="0.1" kd="0.01" />
    </pid>
```

You may use this file to change the arbitration mechanism (either `blending` or `switching`) that the robot should use, the blending factor (weight on go-to-goal is `alpha`, weight on avoid-obstacles is 1- `alpha`), the thresholds in meters for the distance to stop from the goal (`d_stop`), the distance to start avoiding obstacles (`d_at_obs`), and the distance at which the robot is too close to an obstacle (`d_unsafe`), the linear velocity (`v`) of the robot, and the gains for the proportional (`kp`), integral (`ki`), and derivative (`kd`) terms of all PID regulators.

3. After you launch the standalone executable, if you press *Play* you should be prompted to select a *parameters.xml* file. By default, the one bundled with the simulator is selected (it is the one provided in the code block above). If you want to use your own, make sure to select it using the file selection dialog that appears.

Week 6

This week's standalone simulator will allow you tune the wall following behavior robot that can follow the contour of an obstacle.

1. Download the standalone simulator for your OS (64-bit only!):

   - simiam-standalone-windows-week-6.zip (Updated: 2013-03-02)
   - simiam-standalone-macosx-week-6.zip (Updated: 2013-03-02)
   - simiam-standalone-linux-week-6.zip (Updated: 2013-03-02)
2. Download the XML configuration file: parameters-week-6.xml

```
<pid>
    <direction dir="right" />
    <threshold d_fw="0.1"  />
    <gains kp="5" ki="0.1" kd="0.01" />
</pid>
```

You may use this file to change the wall following direction (either `right` or `left`) that the robot should use, the threshold in meters for the distance at which to follow the wall (`d_fw`), and the gains for the proportional (`kp`), integral (`ki`), and derivative (`kd`) terms of all PID regulators.

3. After you launch the standalone executable, if you press *Play* you should be prompted to select a *parameters.xml* file. By default, the one bundled with the simulator is selected (it is the one provided in the code block above). If you want to use your own, make sure to select it using the file selection dialog that appears.

Week 7

This week's standalone simulator will allow you tune the full navigation system of the robot that will

allow it to drive to a wall point without colliding with any of the complex obstacle that clutter the environment.

1. Download the standalone simulator for your OS (64-bit only!):

   - simiam-standalone-windows-week-7.zip (Updated: 2013-03-10)
   - simiam-standalone-macosx-week-7.zip (Updated: 2013-03-10)
   - simiam-standalone-linux-week-7.zip (Updated: 2013-03-10)

2. Download the XML configuration file: parameters-week-7.xml

```
<pid>
    <goal x="1" y="1" />
    <threshold d_fw="0.1" d_stop="0.05" d_at_obs="0.13" d_unsafe="0.03"  />
    <gains kp="5" ki="0.1" kd="0.01" />
</pid>
```

You may use this file to change the goal location, the threshold in meters for the distance at which to follow the wall (`d_fw`), the distance to stop from the goal (`d_stop`), the distance to start avoiding obstacles (`d_at_obs`), and the distance at which the robot is too close to an obstacle (`d_unsafe`), as well as, the gains for the proportional (`kp`), integral (`ki`), and derivative (`kd`) terms of all PID regulators.

3. After you launch the standalone executable, if you press *Play* you should be prompted to select a *parameters.xml* file. By default, the one bundled with the simulator is selected (it is the one provided in the code block above). If you want to use your own, make sure to select it using the file selection dialog that appears.

Created Fri 1 Feb 2013 4:09 PM PST -0800

Last Modified Sun 10 Mar 2013 12:52 PM PDT -0700