
pyCreate2 Documentation

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pyCreate2 is a package to control an iRobot Create2 robot. It supports seamless integration with the V-REP robotics simulator. Scripts can be run without any changes in simulation and on the physical robot. The iCreate2 robot is extended with an embedded computer, allowing fully autonomous operation.

Simulation

1. Download pyCreate2 from the github repository
2. Download [V-REP](#)
3. Open example1.ttt in V-REP
4. Execute:

```
python3 run.py example1 --sim
```

Physical Robot

1. Modify your robot by following this section [Hardware](#)
2. Install Ubuntu on the ODROID
3. Copy the python files to the ODROID
4. Execute:

```
python3 run.py example1
```

Contents:

Software

Contents:

pyCreate2

pyCreate2 package

Subpackages

pyCreate2.robot package

Submodules

pyCreate2.robot.create2_driver module

pyCreate2.robot.gpio module

Module to use ODROID's GPIOs.

class `pyCreate2.robot.gpio.Gpio(number)`

Bases: `object`

Class to use general purpose input/output (GPIO) pins.

This class specifically targets the standard linux support for GPIO as provided by ODROID. More details can be found here: http://odroid.com/dokuwiki/doku.php?id=en:c1_hardware_pwm. The sysfs interface is described here: <https://www.kernel.org/doc/Documentation/gpio/sysfs.txt>. It supports setting the value and waiting for a hardware interrupt.

set_direction (*direction*)

Set the direction (input/output) of the pin.

Parameters **direction** (*string*) – One of “in”, “out”, “low”, “high”.

set_edge (*edge*)

Set the edge trigger for HW interrupt support. Use *wait_for_interrupt* to wait for an interrupt afterwards.

Parameters **edge** (*string*) – One of “none”, “rising”, “falling”, “both”

set_value (*value*)

Set the current value of the pin (only valid if configured as output.)

Parameters **value** (*integer*) – 0 or 1.

wait_for_interrupt (*timeout_in_ms=1000*)

Waits until timeout or interrupt occurs.

Parameters **timeout_in_ms** (*integer*) – maximum time to wait for an interrupt

Returns None if timeout occurred or the current value of the pin in case the interrupt was triggered.

pyCreate2.robot.pwm module

Module to use ODROID's HW PWM.

class `pyCreate2.robot.pwm.Pwm(number=0)`

Bases: `object`

Class to use general pulse-width-modulation.

This class specifically targets the standard linux support for PWM as provided by ODROID. More details can be found here: http://odroid.com/dokuwiki/doku.php?id=en:c1_hardware_pwm. The sysfs interface is described here: <https://www.kernel.org/doc/Documentation/pwm.txt>. It supports setting the value and waiting for a hardware interrupt.

disable()

Disables PWM.

enable()

Enables PWM.

set_duty_cycle(*duty_in_percent*)

Set the duty cycle of the pulse width

Parameters **duty_in_percent** (*float*) – duty signal in percent (i.e. 0.0 to 100.0)

set_frequency(*frequency_in_hertz*)

Set the frequency of the pulse width

Parameters **frequency_in_hertz** (*integer*) – frequency in Hertz.

pyCreate2.robot.servo module

pyCreate2.robot.sonar module

Module to interface a PING Sonar connected via GPIO

class `pyCreate2.robot.sonar.Sonar`(*pin*)

Bases: `object`

Class to use the PING Sonar

This class assumes that the PING sonar is connected using a GPIO pin. It implements the protocol specified in <https://www.parallax.com/sites/default/files/downloads/28015-PING-Documentation-v1.6.pdf> using hardware interrupts.

Parameters **pin** – GPIO pin number where the sonar is connected to.

get_distance()

Queries the current distance from the sonar.

Starts a new measurement cycle (which takes up to 19 ms) and returns the measured distance in m.

Returns Distance in m. If there was an error, it returns 3.3 m.

Module contents

pyCreate2.simulation package

Submodules

pyCreate2.simulation.create2_vrep module

pyCreate2.simulation.kuka_lbr4p_vrep module

Module to control the KUKA LBR4+ in V-REP.

```
class pyCreate2.simulation.kuka_lbr4p_vrep.KukaLBR4PlusVrep(client_id)
```

Bases: object

Class to control the KUKA LBR4+ Manipulator in V-REP.

disable_painting()

Disable spray painting end-effector.

enable_painting()

Enable spray painting end-effector.

go_to(joint, angle)

Go to specified target angle.

Parameters

- **joint** (*int*) – number of joint to change (0 to 7)
- **angle** (*float*) – radians

set_color(r, g, b)

Set spray painting color (RGB).

Parameters

- **r** (*float*) – red component (0 to 1)
- **g** (*float*) – green component (0 to 1)
- **b** (*float*) – blue component (0 to 1)

pyCreate2.simulation.servo module

Module to control a virtual Servo.

```
class pyCreate2.simulation.servo.Servo(client_id)
```

Bases: object

Class to control a virtual servo in V-REP. The servo is modeled as joint, using an integrated position controller in V-REP.

go_to(angle)

Go to specified target angle.

Parameters **angle** (*float*) – -90 - 90 degrees. 0 means facing forward. Negative numbers turn to the left.

pyCreate2.simulation.sonar module

Module to control a virtual Sonar.

```
class pyCreate2.simulation.sonar.Sonar(client_id)
```

Bases: object

Class to control a virtual sonar.

get_distance()

Queries the current distance from the sonar.

We use a proximity sensor in V-REP to model the sonar.

Returns Distance in m. If there was an error, it returns 3.3 m.

pyCreate2.simulation.time_helper module

Module to deal with simulation time.

class pyCreate2.simulation.time_helper.**TimeHelper** (*client_id*)

Bases: object

This class is similar to the default time module of python, however it uses V-REPs simulation time rather than real time.

sleep (*wait_in_sec*)

Wait for the specified number of seconds (simulation time).

The simulation will continue making progress.

Parameters **wait_in_sec** (*float*) – time (in seconds) to continue simulation.

time ()

Query current time. Simulation starts at time 0.

Returns Elapsed simulated seconds.

Module contents

pyCreate2.visualization package

Submodules

pyCreate2.visualization.virtual_create module

Module to control a virtual create

class pyCreate2.visualization.virtual_create.**VirtualCreate** (*client_id*)

Bases: object

Class to control a virtual create in V-REP.

class **Button**

Bases: enum.Enum

An enumeration.

MoveForward = 3

Sense = 6

TurnLeft = 4

TurnRight = 5

VirtualCreate.disable_buttons ()

VirtualCreate.enable_buttons ()

VirtualCreate.get_last_button ()

VirtualCreate.set_point_cloud (*data*)

VirtualCreate.set_pose (*position*, *yaw*)

Module contents

class `pyCreate2.visualization.VirtualCreate` (*client_id*)

Bases: `object`

Class to control a virtual create in V-REP.

class `Button`

Bases: `enum.Enum`

An enumeration.

MoveForward = 3

Sense = 6

TurnLeft = 4

TurnRight = 5

`VirtualCreate.disable_buttons()`

`VirtualCreate.enable_buttons()`

`VirtualCreate.get_last_button()`

`VirtualCreate.set_point_cloud(data)`

`VirtualCreate.set_pose(position, yaw)`

pyCreate2.vrep package

Submodules

pyCreate2.vrep.vrep module

`pyCreate2.vrep.vrep.simxAddStatusbarMessage` (*clientID, message, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxAppendStringSignal` (*clientID, signalName, signalValue, operation-Mode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxAuxiliaryConsoleClose` (*clientID, consoleHandle, operation-Mode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxAuxiliaryConsoleOpen` (*clientID, title, maxLines, mode, position, size, textColor, backgroundColor, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxAuxiliaryConsolePrint` (*clientID, consoleHandle, txt, operation-Mode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxAuxiliaryConsoleShow` (*clientID, consoleHandle, showState, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxBreakForceSensor` (*clientID, forceSensorHandle, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxClearFloatSignal (clientId, signalName, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxClearIntegerSignal (clientId, signalName, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxClearStringSignal (clientId, signalName, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxCloseScene (clientId, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxCopyPasteObjects (clientId, objectHandles, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxCreateBuffer (bufferSize)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxCreateDummy (clientId, size, color, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxDisplayDialog (clientId, titleText, mainText, dialogType, initialText, titleColors, dialogColors, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxEndDialog (clientId, dialogHandle, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxEraseFile (clientId, fileName_serverSide, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxFinish (clientId)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetAndClearStringSignal (clientId, signalName, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetArrayParameter (clientId, paramIdentifier, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetBooleanParameter (clientId, paramIdentifier, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetCollisionHandle (clientId, collisionObjectName, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetConnectionId (clientId)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetDialogInput (clientId, dialogHandle, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetDialogResult (clientId, dialogHandle, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetDistanceHandle (clientId, distanceObjectName, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetFloatSignal (clientId, signalName, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetFloatingParameter (clientId, paramIdentifier, operationMode)`
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetInMessageInfo (clientID, infoType)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetIntegerParameter (clientID, paramIdentifier, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetIntegerSignal (clientID, signalName, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetJointForce (clientID, jointHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetJointMatrix (clientID, jointHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetJointPosition (clientID, jointHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetLastCmdTime (clientID)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetLastErrors (clientID, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetModelProperty (clientID, objectHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjectChild (clientID, parentObjectHandle, childIndex, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjectFloatParameter (clientID, objectHandle, parameterID, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjectGroupData (clientID, objectType, dataType, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjectHandle (clientID, objectName, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjectIntParameter (clientID, objectHandle, parameterID, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjectOrientation (clientID, objectHandle, relativeToObjectHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjectParent (clientID, childObjectHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjectPosition (clientID, objectHandle, relativeToObjectHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjectSelection (clientID, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjectVelocity (clientID, objectHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetObjects (clientID, objectType, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetOutMessageInfo` (*clientID, infoType*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetPingTime` (*clientID*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetStringParameter` (*clientID, paramIdentifier, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetStringSignal` (*clientID, signalName, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetUIButtonProperty` (*clientID, uiHandle, uiButtonID, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetUIEventButton` (*clientID, uiHandle, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetUIHandle` (*clientID, uiName, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetUISlider` (*clientID, uiHandle, uiButtonID, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetVisionSensorDepthBuffer` (*clientID, sensorHandle, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxGetVisionSensorImage` (*clientID, sensorHandle, options, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxJointGetForce` (*clientID, jointHandle, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxLoadModel` (*clientID, modelPathAndName, options, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxLoadScene` (*clientID, scenePathAndName, options, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxLoadUI` (*clientID, uiPathAndName, options, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxPackFloats` (*floatList*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxPackInts` (*intList*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxPauseCommunication` (*clientID, enable*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxPauseSimulation` (*clientID, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxQuery` (*clientID, signalName, signalValue, retSignalName, timeOutInMs*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxReadCollision` (*clientID, collisionObjectHandle, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxReadDistance` (*clientID, distanceObjectHandle, operationMode*)
Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxReadForceSensor (clientID, forceSensorHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxReadProximitySensor (clientID, sensorHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxReadStringStream (clientID, signalName, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxReadVisionSensor (clientID, sensorHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxReleaseBuffer (buffer)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxRemoveModel (clientID, objectHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxRemoveObject (clientID, objectHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxRemoveUI (clientID, uiHandle, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetArrayParameter (clientID, paramIdentifier, paramValues, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetBooleanParameter (clientID, paramIdentifier, paramValue, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetFloatSignal (clientID, signalName, signalValue, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetFloatingParameter (clientID, paramIdentifier, paramValue, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetIntegerParameter (clientID, paramIdentifier, paramValue, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetIntegerSignal (clientID, signalName, signalValue, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetJointForce (clientID, jointHandle, force, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetJointPosition (clientID, jointHandle, position, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetJointTargetPosition (clientID, jointHandle, targetPosition, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetJointTargetVelocity (clientID, jointHandle, targetVelocity, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetModelProperty (clientID, objectHandle, prop, operationMode)`

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetObjectFloatParameter` (*clientID, objectHandle, parameterID, parameterValue, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetObjectIntParameter` (*clientID, objectHandle, parameterID, parameterValue, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetObjectOrientation` (*clientID, objectHandle, relativeToObjectHandle, eulerAngles, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetObjectParent` (*clientID, objectHandle, parentObject, keepInPlace, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetObjectPosition` (*clientID, objectHandle, relativeToObjectHandle, position, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetObjectSelection` (*clientID, objectHandles, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetSphericalJointMatrix` (*clientID, jointHandle, matrix, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetStringSignal` (*clientID, signalName, signalValue, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetUIButtonLabel` (*clientID, uiHandle, uiButtonID, upStateLabel, downStateLabel, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetUIButtonProperty` (*clientID, uiHandle, uiButtonID, prop, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetUISlider` (*clientID, uiHandle, uiButtonID, position, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSetVisionSensorImage` (*clientID, sensorHandle, image, options, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxStart` (*connectionAddress, connectionPort, waitUntilConnected, doNotReconnectOnceDisconnected, timeOutInMs, commThreadCycleInMs*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxStartSimulation` (*clientID, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxStopSimulation` (*clientID, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSynchronous` (*clientID, enable*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxSynchronousTrigger` (*clientID*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxTransferFile` (*clientID, filePathAndName, fileName_serverSide, timeOut, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxUnpackFloats` (*floatsPackedInString*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxUnpackInts` (*intsPackedInString*)

Please have a look at the function description/documentation in the V-REP user manual

`pyCreate2.vrep.vrep.simxWriteStringStream` (*clientID, signalName, signalValue, operationMode*)

Please have a look at the function description/documentation in the V-REP user manual

pyCreate2.vrep.vrepConst module

Module contents

Submodules

pyCreate2.create2 module

Helper enumerations which are both used for simulation and driver.

class `pyCreate2.create2.ChargingState`

Bases: `enum.Enum`

An enumeration.

ChargingFaultCondition = 5

ChargingStateWaiting = 4

FullCharging = 2

NotCharging = 0

ReconditioningCharging = 1

TrickleCharging = 3

class `pyCreate2.create2.InfraredCharacter`

Bases: `enum.Enum`

An enumeration.

DockForceField = 242

DockGreenBuoy = 244

DockGreenBuoyAndForceField = 246

DockRedBuoy = 248

DockRedBuoyAndForceField = 250

DockRedBuoyAndGreenBuoyAndForceField = 254

DockRedBuoyGreenBuoy = 252

class `pyCreate2.create2.Mode`

Bases: `enum.Enum`

An enumeration.

Full = 3

Off = 0

Passive = 1

Safe = 2

class `pyCreate2.create2.Op`

Bases: `object`

Baud = 129

Buttons = 165

Clean = 135

Control = 130

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class pyCreate2.create2.Specs
    Bases: object

    CountsPerRev = 508.8
    WheelDiameterInMM = 72.0
    WheelDistanceInMM = 235.0

class pyCreate2.create2.State
    Bases: object
```

pyCreate2.factory module

Module with factory methods for different objects (either real or simulation)

```
class pyCreate2.factory.FactoryCreate
    Bases: object

    Class to create objects which are related to the physical iRobot Create2 robot.

    close ()
        Clean-up

    create_create ()
        Instantiates a new create robot (only a single one is supported!)

        Returns (robot.Create2Driver) instance of robot.Create2Driver

    create_pen_holder ()
        Instantiates a new pen holder (only a single one is supported!)

        Returns (robot.PenHolder) instance of robot.PenHolder

    create_servo ()
        Instantiates a new servo (only a single one is supported!)

        Returns (robot.Servo) instance of robot.Servo
```

create_sonar()

Instantiates a new sonar (only a single one is supported!)

Returns (robot.Sonar) instance of robot.Sonar

create_time_helper()

Instantiates a new time object.

Returns (time) instance of time

create_tracker (*tag_id, sd_x=0, sd_y=0, sd_theta=0*)

create_virtual_create (*hostname*)

Instantiates a new virtual create for visualization (only a single one is supported!)

Returns (visualization.VirtualCreate) instance of visualization.VirtualCreate

class pyCreate2.factory.**FactorySimulation**

Bases: object

Class to create objects which are simulated.

close()

Clean-up

create_create()

Instantiates a new create robot (only a single one is supported!)

Returns (simulation.Create2Vrep) instance of simulation.Create2Vrep

create_kuka_lbr4p()

Instantiates a new robotic arm (only a single one is supported!)

Returns (simulation.KukaLBR4PlusVrep) instance of simulation.KukaLBR4PlusVrep

create_pen_holder()

Instantiates a new pen holder (only a single one is supported!)

Returns (simulation.PenHolder) instance of simulation.PenHolder

create_servo()

Instantiates a new servo (only a single one is supported!)

Returns (simulation.Servo) instance of simulation.Servo

create_sonar()

Instantiates a new sonar (only a single one is supported!)

Returns (simulation.Sonar) instance of simulation.Sonar

create_time_helper()

Instantiates a new time object.

Returns (simulation.TimeHelper) instance of simulation.TimeHelper

create_tracker (*tag_id, sd_x=0.01, sd_y=0.01, sd_theta=0.01*)

create_virtual_create()

Instantiates a new virtual create for visualization (only a single one is supported!)

Returns (visualization.VirtualCreate) instance of visualization.VirtualCreate

Module contents

class `pyCreate2.FactoryCreate`

Bases: `object`

Class to create objects which are related to the physical iRobot Create2 robot.

close ()

Clean-up

create_create ()

Instantiates a new create robot (only a single one is supported!)

Returns (`robot.Create2Driver`) instance of `robot.Create2Driver`

create_pen_holder ()

Instantiates a new pen holder (only a single one is supported!)

Returns (`robot.PenHolder`) instance of `robot.PenHolder`

create_servo ()

Instantiates a new servo (only a single one is supported!)

Returns (`robot.Servo`) instance of `robot.Servo`

create_sonar ()

Instantiates a new sonar (only a single one is supported!)

Returns (`robot.Sonar`) instance of `robot.Sonar`

create_time_helper ()

Instantiates a new time object.

Returns (`time`) instance of `time`

create_tracker (*tag_id, sd_x=0, sd_y=0, sd_theta=0*)

create_virtual_create (*hostname*)

Instantiates a new virtual create for visualization (only a single one is supported!)

Returns (`visualization.VirtualCreate`) instance of `visualization.VirtualCreate`

class `pyCreate2.FactorySimulation`

Bases: `object`

Class to create objects which are simulated.

close ()

Clean-up

create_create ()

Instantiates a new create robot (only a single one is supported!)

Returns (`simulation.Create2Vrep`) instance of `simulation.Create2Vrep`

create_kuka_lbr4p ()

Instantiates a new robotic arm (only a single one is supported!)

Returns (`simulation.KukaLBR4PlusVrep`) instance of `simulation.KukaLBR4PlusVrep`

create_pen_holder ()

Instantiates a new pen holder (only a single one is supported!)

Returns (`simulation.PenHolder`) instance of `simulation.PenHolder`

create_servo()

Instantiates a new servo (only a single one is supported!)

Returns (simulation.Servo) instance of simulation.Servo

create_sonar()

Instantiates a new sonar (only a single one is supported!)

Returns (simulation.Sonar) instance of simulation.Sonar

create_time_helper()

Instantiates a new time object.

Returns (simulation.TimeHelper) instance of simulation.TimeHelper

create_tracker (*tag_id, sd_x=0.01, sd_y=0.01, sd_theta=0.01*)

create_virtual_create()

Instantiates a new virtual create for visualization (only a single one is supported!)

Returns (visualization.VirtualCreate) instance of visualization.VirtualCreate

example1 module

Example to move robot forward for 10 seconds Use “python3 run.py [-sim] example1” to execute

class example1.**Run** (*factory*)

Bases: object

run ()

run module

Actual helper script to execute code. It takes care of proper error handling (e.g. if you press CTRL+C) and the difference between running code on the robot vs. in simulation.

Usage: python3 run.py -sim lab1 [for simulation] python3 run.py lab1 [to run on a robot]

Hardware

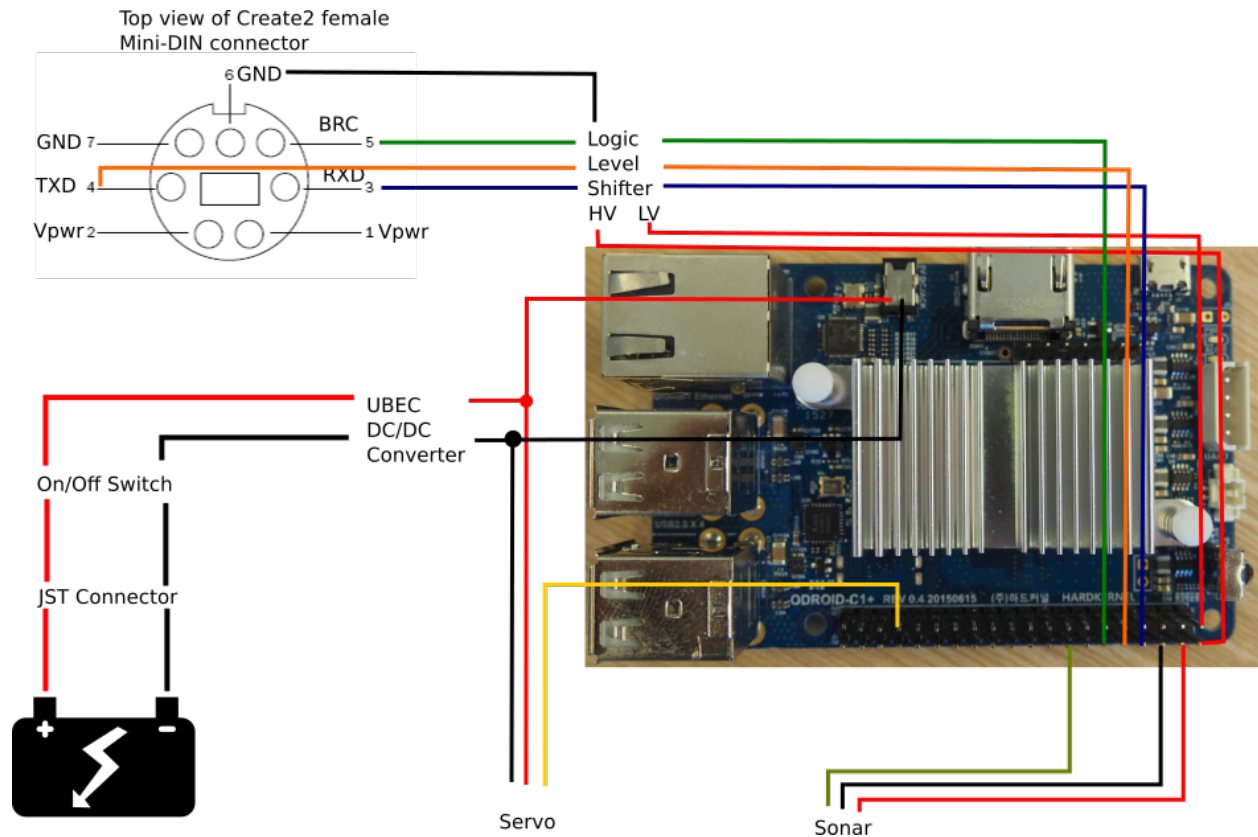
Components

(prices in USD and links as of spring 2016)

Table 1.1: Part List

| Name | Link | Distributor | Price | Notes |
|--|---|-------------|--------|--------------------------|
| iRobot Create2 | https://www.adafruit.com/products/2388 | Adafruit | 199.99 | |
| Mini-DIN Connector Cable for iRobot Create 2 - 7 Pins - 6 feet | https://www.adafruit.com/products/2438 | Adafruit | 6.95 | |
| 4-channel I2C-safe Bi-directional Logic Level Converter - BSS138 | https://www.adafruit.com/products/757 | Adafruit | 3.95 | |
| UBEC DC/DC Step-Down (Buck) Converter - 5V @ 3A output | https://www.adafruit.com/products/1385 | Adafruit | 9.95 | |
| Rugged Metal On/Off Switch with Green LED Ring - 16mm Green On/Off | https://www.adafruit.com/products/482 | Adafruit | 4.95 | |
| Silicone Cover Stranded-Core Wire - 25ft 26AWG - Red | https://www.adafruit.com/products/2513 | Adafruit | 4.95 | For several Robots |
| Silicone Cover Stranded-Core Wire - 25ft 26AWG - Black | https://www.adafruit.com/products/2517 | Adafruit | 4.95 | For several Robots |
| Premium Female/Female Jumper Wires - 40 x 6" | https://www.adafruit.com/products/266 | Adafruit | 3.95 | For several Robots |
| Multi-Colored Heat Shrink Pack - 3/32" + 1/8" + 3/16" Diameters | https://www.adafruit.com/products/1649 | Adafruit | 4.95 | For several Robots |
| Panel Mount USB Cable - A Male to A Female | https://www.adafruit.com/products/908 | Adafruit | 3.95 | |
| Odroid C1+ | http://ameridroid.com/products/odroid-c1 | AmeriDroid | 38.95 | |
| WiFi Module 3 | http://ameridroid.com/products/wifi-module-3 | AmeriDroid | 9.95 | |
| DC Plug and Cable Assembly 2.5mm L-Type | http://ameridroid.com/products/dc-plug-and-cable-assembly-2-5mm-l-type | AmeriDroid | 9.95 | |
| Aluminum Standoff: 1/2" Length, 4-40 Thread, F-F (4-Pack) | https://www.pololu.com/product/2091 | Pololu | 1.39 | For 2 robots each |
| Machine Screw: #4-40, 1/4" Length, Phillips (25-pack) | https://www.pololu.com/product/1960 | Pololu | 0.99 | For up to 12 robots each |
| Machine Screw: #4-40, 5/16" Length, Phillips (25-pack) | https://www.pololu.com/product/1961 | Pololu | 0.99 | For up to 12 robots each |
| JST RCY Connector Pack, Female | https://www.pololu.com/product/1934 | Pololu | 1.75 | For up to 3 robots each |
| JST RCY Connector Pack, Male | https://www.pololu.com/product/1935 | Pololu | 1.75 | For up to 3 robots each |
| Parallax Standard Servo | https://www.parallax.com/product/900-00005 | Parallax | 12.99 | Optional |
| PING))) Ultrasonic Distance Sensor | https://www.parallax.com/product/28015 | Parallax | 29.99 | Optional |

Wiring



Software

Basic

- Download http://odroid.in/ubuntu_16.04/ubuntu-16.04-mate-odroid-c1-20160727.img.xz
- Extract:

```
unxz ubuntu-16.04-mate-odroid-c1-20160727.img.xz
```

- Verify MD5:

```
md5sum ubuntu-16.04-mate-odroid-c1-20160727.img
f5dfee4a8ea919dd8afc4384431574e5  ubuntu-16.04-mate-odroid-c1-20160727.img
```

- Copy to SD-Card:

```
sudo dd if=ubuntu-16.04-mate-odroid-c1-20160727.img of=/dev/path/of/card bs=1M
↳ conv=fsync
sync
```

Network

- Add `/etc/wpa_supplicant/wpa_supplicant.conf` with following content:

```
network={
    ssid="<SSID>"
    psk="<password>"
    id_str="wifi"
}
```

- Update `/etc/network/interfaces`:

```
# interfaces(5) file used by ifup(8) and ifdown(8)
# Include files from /etc/network/interfaces.d:
source-directory /etc/network/interfaces.d

auto lo
iface lo inet loopback

auto wlan0
# allow-hotplug wlan0
iface wlan0 inet manual
wpa-roam /etc/wpa_supplicant/wpa_supplicant.conf
iface wifi inet dhcp
iface default inet dhcp
```

- Disable persistent network (so that SD-card can be used with any WiFi dongle):

```
sudo ln -s /dev/null /etc/udev/rules.d/80-net-setup-link.rules
```

PWM

- Update `/etc/modules`:

```
# /etc/modules: kernel modules to load at boot time.
#
# This file contains the names of kernel modules that should be loaded
# at boot time, one per line. Lines beginning with "#" are ignored.
# Parameters can be specified after the module name.

# ODROID HW PWM support (see http://odroid.com/dokuwiki/doku.php?id=en:cl_
↪hardware_pwm)
pwm-meson
pwm-ctrl
```

GPIO Support

- Add udev-rule: `/etc/udev/rules.d/90-gpio.rules`:

```
SUBSYSTEM=="gpio", KERNEL=="gpiochip*", ACTION=="add", PROGRAM="/bin/sh -c 'chown_
↪root:gpio /sys/class/gpio/export /sys/class/gpio/unexport ; chmod 222 /sys/
↪class/gpio/export /sys/class/gpio/unexport'"
SUBSYSTEM=="gpio", KERNEL=="gpio*", ACTION=="add", PROGRAM="/bin/sh -c 'chown_
↪root:gpio /sys%p/active_low /sys%p/direction /sys%p/edge /sys%p/value ; chmod_
↪660 /sys%p/active_low /sys%p/direction /sys%p/edge /sys%p/value'"
```

- Create GPIO group:

```
sudo groupadd gpio
```

- Add user to group:

```
sudo adduser odroid gpio
```

- Reboot

Additional Software

- Update the system:

```
sudo apt update
sudo apt upgrade
```

- Install additional packages:

```
sudo apt install python3 python3-serial python3-scipy python3-numpy python3-
↳matplotlib
```

Add User

- Add user and assign groups:

```
sudo adduser csci445
sudo adduser csci445 gpio
sudo adduser csci445 dialout
```

Debugging

You can use the USB UART Kit for debugging, see http://odroid.com/dokuwiki/doku.php?id=en:usb_uart_kit for more details. This will allow you to gain access to a shell using UART.

- On you host PC, add `/etc/udev/rules.d/99-odroiduart.rules` with the following content:

```
SUBSYSTEM=="usb", ATTRS{idVendor}=="10c4", ATTRS{idProduct}=="ea60", MODE="0664",
↳GROUP="plugdev"
```

Make sure that your user is member of the *plugdev* group.

- To connect, use:

```
picocom --baud 115200 /dev/ttyUSB0
```

You can end the session by pressing Ctrl+A followed by Ctrl+X.

CHAPTER 2

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