Camduino

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Contents

1 Main Page

Camduino is an interface to speak with Arduino over I2C. You can get a red ball position and state of proximity sensors. The main goal of this project is to supply an easy-to-use interface to communicate with Arduino as part of ImpRo project demonstrator.

I2C bus is also called Two Wire Interface (TWI) as in the Arduino reference/librairy.

Online doc

Download librairy

Arduino setup

Arduino board must be connected to CMUcam4 and five presence sensors on pins 3 to 7 and run `CMU_Tracker_I2C.ino`. The Arduino program is supplied with the librairy in *Arduino program* folder.

You can compile and upload the program to the board using Arduino IDE. You must intall `CMUcam4 Arduino library` first. If you can not reprogram your Arduino when the CMUcam4 is connected to your Arduino you can either disconnect the CMUcam4 from your Arduino or you can put the CMUcam4 into halt mode :

- Press and hold the reset button on the CMUcam4
- Press and hold the user button on the CMUcam4
- Release the reset button (do not release the user button)
- Wait until the red auxiliary LED turns on (2 seconds)
- Release the user button
- The CMUcam4 is now halted indefinitely

Press the reset button to exit halt mode.

Connect NXT and Arduino

The communication is based on I2C bus, so you have to connect them with a wire but such wires does not exist. Make your own RJ12 *NXT to Arduino* wire, it's easy. Here there is some help to do so.

NXT uses RJ12 wires made like this :

- white : analog
- black : ground
- red : ground
- green : 4.3V
- yellow : I2C clock line
- blue : I2C data line

Connect the red or the black wire to Arduino ground pin, the yellow to A5 pin and the blue one to A4.

Be carefull, NXT can not supply enought power to Arduino, CMUcam4 and five presence sensors, so use an external source for the board.

Trampoline settings

The Trampoline revision running on the NXT must use the custom I2C driver "from Armel". This driver is supplied with the Camduino library in *I2C driver* folder.

Modifying the driver at your own risk.

Arduino port and NXT

When calling `init_camduino(NXT_PORT_S#)` if you do **NOT** use **NXT_PORT_S4**, you should change it on the driver file i2c.c in *Trampolie_folder*/machines/arm/nxt/drivers/lejos_nxj/src/nxtvm/platform/nxt/i2c.c

Usage

- First, include `camduino.h` in your oil and C files.
- Initiate the driver library by calling `init_camduino(NXT_PORT_S4)`, eventualy, initiate other I2C devices and finally call `i2c_init()`.
- Then you get data from `Camduino`.
- Code and think hard. Good luck!

2 Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

3 File Index

3.1 File List

Here is a list of all documented files with brief descriptions:

4 Data Structure Documentation

4.1 position Struct Reference

```
#include <camduino.h>
```

Data Fields

- int x
- int y

4.1.1 Detailed Description

store ball position

4.1.2 Field Documentation

4.1.2.1 int position::x

x coordinate of the ball

4.1.2.2 int position::y

y coordinate of the ball

The documentation for this struct was generated from the following file:

- camduino.h

5 File Documentation

5.1 camduino.c File Reference

```
#include "camduino.h"
#include "nxt_avr.h"
```

Functions

- void init_camduino (int i2c_port)
- void get_ball_position (struct position *ball)
- int object_detected ()
- int get_pstate (enum psensor sensor)

5.1.1 Detailed Description

5.1.2 File description

Librairy to get some data from an Arduino over I2C. CMUcam4 must be connect on it and Arduino must run "CM↩U_Tracker_I2C" program, distance sensors must be connected to the board too.

5.1.3 Copyright

5.1.4 File informations

Date

2014/07/21

Author

Benjamin Sientzoff

Version

0.1

5.1.5 Function Documentation

5.1.5.1 void get_ball_position (struct position * *ball*)

Fill a position strucuture to get ball position

Parameters

in	*ball*	A reference to the struct to fill

5.1.5.2 int get_pstate (enum psensor *sensor*)

Get an given presence sensor state

Parameters

in	*sensor*	Name of the presence sensor to examine
out	*int*	state of the sensor, return 0 if no detected object, else 1

5.1.5.3 void init_camduino (int *i2c_port*)

Initiate Arduino driver, don't forget to call i2c_init() after. Set up i2c port, tram communication and *power* supply.

Parameters

in	*i2c_port*	NXT port where Arduino is connected

5.1.5.4 int object_detected ( )

Get global presence sensors state

Parameters

out	*int*	State of the presence sensors, equals to NO_DETECTED_OBJECT if an object is not detected, else return a different value

5.2 camduino.h File Reference

```
#include "i2c.h"
```

Data Structures

- struct position

Macros

- #define NO_DETECTED_OBJECT 31

Enumerations

- enum psensor {
  PSENSOR_A = 0x1, PSENSOR_B = 0x2, PSENSOR_C = 0x4, PSENSOR_D = 0x8,
  PSENSOR_E = 0x10 }

Functions

- void init_camduino (int)
- void get_ball_position (struct position *)
- int object_detected ()
- int get_pstate (enum psensor)

Variables

- u8 i2c_data [I2C_PORT_N][I2C_DATA_N]
- int arduino_port
- int pstate = NO_DETECTED_OBJECT

5.2.1 Detailed Description

5.2.2 File description

Librairy to get some data from an Arduino over I2C. CMUcam4 must be connected on it and Arduino must run "CMU_Tracker_I2C" program, distance sensors must be connected to the board too.

5.2.3 Copyright

5.2.4 File informations

Date

2014/07/18

Author

Benjamin Sientzoff

Version

0.1

5.2.5 Macro Definition Documentation

5.2.5.1 #define NO_DETECTED_OBJECT 31

state of (all) presence sensors when there is no object

5.2.6 Enumeration Type Documentation

5.2.6.1 enum psensor

list of presence sensors connected to the Arduino board

Enumerator

PSENSOR_A the first presence sensor on the left

PSENSOR_B the second presence sensor on the left

PSENSOR_C presence sensor on the middle

PSENSOR_D the second sensor of the right

PSENSOR_E the last sensor (on the right)

5.2.7 Function Documentation

5.2.7.1 void get_ball_position (struct position * *ball*)

Fill a position strucuture to get ball position

Fill a position strucuture to get ball position

Parameters

in	*ball*	A reference to the struct to fill

5.2.7.2 int get_pstate (enum psensor *sensor*)

get an given presence sensor state

Get an given presence sensor state

Parameters

in	*sensor*	Name of the presence sensor to examine
out	*int*	state of the sensor, return 0 if no detected object, else 1

5.2.7.3 void init_camduino (int *i2c_port*)

Initiate Arduino driver

Initiate Arduino driver, don't forget to call i2c_init() after. Set up i2c port, tram communication and *power* supply.

Parameters

in	*i2c_port*	NXT port where Arduino is connected

5.2.7.4 int object_detected ( )

Get global presence sensors state, consider the five sensors as one

Get global presence sensors state

Parameters

out	*int*	State of the presence sensors, equals to NO_DETECTED_OBJECT if an object is not detected, else return a different value

5.2.8 Variable Documentation

5.2.8.1 int arduino_port

NXT port connected to Arduino board

5.2.8.2 u8 i2c_data[I2C_PORT_N][I2C_DATA_N]

buffers storing I2C data

5.2.8.3 int pstate = NO_DETECTED_OBJECT

global state of presence sensors

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