

Tutorial about the communication between a RP6 V2 robot platform and a Beagle Board

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This tutorial acts as a brief introduction to controlling an RP6 V2 robot platform with a BeagleBoard. In this tutorial we assume the propriate software runs on the RP6 V2 system (BeagleConnection.hex). The connection between the BeagleBoard and the RP6 V2 has been established by an USB-RS232 convertor. Make sure the USB cable is connected to the USB-hub and the 10-pin box-header is connected to the grey box-header on the RP6 V2 platform.

1 Connecting the USB Interface - Linux

To find the correct virtual port on the Beagle Board type in the console:

```
cd /dev/  
ls -l | grep ttyUSB
```

When the RP6 V2 platform is powered on and connected to the Beagle Board, a device TTYUSBX should appear:

```
crw-rw----  1 root dialout  188,   0 Feb  8 10:20 ttyUSB0
```

2 Serial port configuration

To communicate with the RP6 V2 the serial port should be configured as follows:

- Baudrate: 38400
- Nr of databits: 8
- Parity bit: none
- Nr of stop bits: 1
- Flow control: none

3 Overview of commands

On the RP6 V2 platform runs software that allows the robot to be controlled by commands obtained from the UART. The following commands are defined:

```
#####
#####          Main Menu          #####
# m - Show Menu                      #
# p - PowerOn Test                   #
# t - LED Test                       #
# v - Voltage Sensor Test            #
# d - Drive at specified speed [direction] [speed 1] [speed 2] #
# e - Drive specified distance [direction] [speed] [distance] #
# r - Rotate [direction] [speed] [degree] #
# s - Stop driving                   #
# l - Light Sensor                   #
# a - ACS [status]                   #
#####
```

In the following chapters we will discuss each of those commands.

!! It's important to mention that each command should be followed by a "CR" character !!

3.1 Show Menu

This command sends an overview of the commands on the serial connection. An illustration of this overview can be found in section 3.

You can call this function by transmitting a single character to the RP6 V2:

m

3.2 PowerOn Test

This command can be used to test the connection between the Beagle Board and the RP6 V2. By calling this function, the yellow LED on the platform will blink a few times. The LED also displays whether the encoders, the IR receiver and the current sensors are activated. Thus when using the robot platform it is normal that the yellow LED lights up. You can call this function by transmitting a single character to the RP6 V2:

p

3.3 LED Test

This command will flash all Status LEDs. Here you can see if all LEDs are working correctly or if one of them is damaged. You can call this function by transmitting a single character to the RP6 V2:

t

3.4 Voltage Sensor Test

This command displays the voltage level of the powersupply. Make sure that the voltage is in the acceptable range of 5.5V up to 9.5V. You can call this function by transmitting a single character to the RP6 V2:

v

Output should look like:

Voltage: 7.06V

3.5 Drive at specified speed

This command makes the robot platform move. Instead of sending a single character as in the case of the previous described cases, this function requires some arguments.

The command to perform this action is:

d

The first argument specifies the driving direction.

- F = Forward
- B = Backward
- L = Right
- R = Left

The second argument specifies the speed of the left motor:

- value in the range between [0-200]

The third argument specifies the speed of the right motor:

- value in the range between [0-200]

An example of this command:

d F 150 150

This example makes the robot move forward with a speed value of 150 for both motors.

3.6 Drive specified distance

This command is similar to the previous, but an additional parameter is attached. This additional parameter is used to define the distance[in mm] the robot platform should drive in a specified direction. The command to perform this action is:

e

The first argument specifies the driving direction.

- F = Forward

- B = Backward

The second argument specifies the speed of both motors:

- value in the range between [0-200]

The third argument specifies the distance the platform should move expressed in mm:

- value in the range between [0-20000]

An example of this command:

```
e B 120 1150
```

This example makes the robot move backwards over a distance of 1150 mm with a speed value of 120 for both motors.

3.7 Rotate

This command makes the robot platform rotate over a specified angle. Although it is possible to specify the rotation angle, some precaution is necessary. The actual rotation angle is influenced by the speed value. Thus using a small speed values causes a rotation that is less than the specified angle. Using a large speed value causes a rotation that is larger than the specified angle. As a result of some tests, we have discovered that a speed value of 60 is appropriate. The command to perform this action is:

```
r
```

The first argument specifies the rotate direction.

- L = Left
- R = Right

The second argument specifies the speed of both motors:

- value in the range between [0-200]

The third argument specifies the rotate angle:

- value in the range between [0-360]

An example of this command:

```
r L 60 90
```

This example makes the robot rotate left over 90 degrees.

3.8 Stop Driving

This command will stop the movement of the robot. You can call this function by transmitting a single character to the RP6 V2:

```
s
```

3.9 Light Sensor

This command will return the value of the two light sensors attached to the front of the RP6 V2. You can call this function by transmitting a single character to the RP6 V2:

1

Output should look like:

L = 0914 | R = 0900

3.10 ACS

This command will activate or deactivate the Anti Collision System of the RP6 V2. The output of this command is whether an object is in front of the object. The RP6 V2 has two sensors, one at the left and one at the right. When an object is in front of the robot, a 'o' character is transmitted according to the position of the object. The command to perform this action is:

a

The first argument specifies the rotate direction.

- on = 1
- off = 0

Output should look like:

L: | R: o

In this case an object is in front of the robot platform at the right side of the robot.

3.11 Bumpers

There's no specific command to capture the values of the bumpers that are attached to the front of the RP6 V2. Nevertheless it's possible to monitor them since they are controlled by an interrupt based system. When one of the bumpers changes value, a message is transmitted towards the Beagle Board. Output should look like:

BPL: o | BPR:

In this case the left bumper is closed.