www.creative-robotics.com
support@creative-robotics.com
Page 1 of 4

HUDL Bot V0.1

13 May 2015

Motor control hardware

The tablet connects to the wheels via an Arduino Pro Micro from Sparkfun Electronics. This board connects to the tablet via a micro USB connector. In order to work correctly a USB OTG cable must be used so that the tablet will recognise the Arduino as an accessory.

The board will appear as a virtual serial port but Android will, by default, interpret it as an external keyboard – This means that the tablets touch screen keyboard will be disabled – To re-enable the keyboard first make sure the correct USB OTG cable is plugged in and the Arduino is connected, then go to Settings->Language and Input->Default and switch the Physical Keyboard to OFF.

Serial port settings

- 115200 baud
- 1 stop bit
- No parity
- No flow control

To verify communication:

1. Plug USB cable into tablet.
2. Start DroidTerm.
3. Click 'USB Virtual Serial Port'
4. Select OK to allow DroidTerm to access the USB device.
5. Select 'Baud Rate' and choose 115200.
6. Click 'Connect'

You should now see data on the screen reflecting the state of the two wheel encoders.

Important!

The Arduino controller board must be switched on for the motors to receive power but the microcontroller will also work if just the USB cable is connected.

When the main power switch is OFF the wheels and encoders will not work, but commands can be sent to the board, and data will be returned.

The tablet will continue to power the Arduino board when asleep so it is essential to remove the USB cable from the tablet when the robot is being stored to prevent the tablet battery draining.

www.creative-robotics.com
support@creative-robotics.com
Page 2 of 4

Serial Command Protocol

Serial commands are sent as a line of ASCII text. Each command line must begin with a line start character '#' and be terminated by a new line character. Any other characters are ignored if they are not contained by the start and end characters.

By default data is streamed from the device and consists of the line start char followed by the left and right motor encoder values and terminating in a line feed character. The encoder values are signed long integers formatted as plain ASCII Text.

There are four commands, each consisting of a single character that follows the line start character (#).

Command List

'm' Set both motor speed valued. This must be followed by two integers, separated by a space. For example send '#m100 100' to set both motors to speed 100. The maximum values allowed are +/- 255.

'r' Reset the encoder counts to zero. Send '#r' to set both encoder counts to zero.

's' Toggle data streaming. Send '#s' to switch the stream off or on. By default encoder data is streamed from the device.

'x' Halt the robot. Send '#x' to stop both motors.

www.creative-robotics.com
support@creative-robotics.com
Page 3 of 4

Power

The Arduino can receive power from the tablet and the main battery pack but the motors and encoders will only receive power from the main battery pack.

When main power is OFF but the tablet is connected it is possible to communicate with the board however the sensors and motors will not receive power so the robot will not respond to any motion commands or return any valid encoder data.

Main power is supplied by 6xAA standard or rechargeable batteries. These must be removed in order to recharge them.

To get at the batteries first disconnect the USB cable from the tablet. The tablet is mounted in a cradle that clips onto the base so to remove the tablet and cradle pull where the cable was connected up and away from the base. It should pop up fairly easily. The other end of the tablet can now be slid out of its locating slots on the base, revealing the batteries underneath.

The tablet will continue to power the Arduino board when it is asleep or otherwise not being used. To prevent the tablet battery being drained when the robot is not in use you must either disconnect the USB cable or instruct the table to power down (NOT just by putting it into sleep mode so the screen goes blank)

A RED led will be illuminated when the Arduino board is receiving power.
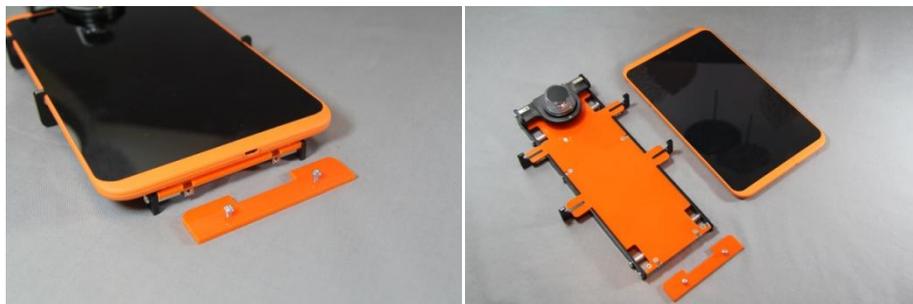
To remove the tablet from its cradle, unscrew the two screws on the cradle at the USB connector end of the tablet. The tablet can now be slid out of the cradle.

To access the batteries remove the tablet by lifting it from the rear of the robot.

www.creative-robotics.com
support@creative-robotics.com
Page 4 of 4

Programming

We have not supplied any software for the Android tablet.

The Arduino board that controls the wheels can be reprogrammed with the Arduino IDE but an additional set of files must first be installed for the Sparkfun Pro Micro board.

Technical details of the board are here:

https://www.sparkfun.com/products/12640

Add on files for the Arduino IDE are available here:

https://github.com/sparkfun/SF32u4_boards/archive/master.zip

The Arduino source code supplied with the robot is available from here:

http://www.creative-robotics.com/hudlbot