Git Repositories:

ros-node-devel: currently up-to-date
zahedim/pcb-development: hardware revision #1
chris_work_stable: pid control for motors, read odometry data, Teensy++ 2.0 DK

Folder structure:

+ *datasheets*:
    + *amp*: LM324-N, low-power, quad-operational amplifier used in robofriends head
    + *servo*: SD20, 20 channel I²C servo controller used in robofriends head
    + *uc*: data sheet, info, schematics and pin out information for Teensy++ 2.0 DK
    + *usb*: CY7C63743C, USB controller used in robofriends head
+ *documentation*:
    + WS17: master thesis Karima Khlousy-Neirukh
    + WS18: battery value percentage mapping, hardware overview, robofriend overview
+ *pcb*:
    + *bom*: last updated on 17th of May 2019
    + *gerber*: last generated on 17th of May 2019
    + *img*: FH Technikum Wien Logo
    + *kicad*: KiCad project files
    + *lib*: needed libraries and footprints for KiCad
    + *plot*: schematics plotted
    + *track-width*: track widths used for pcb layout
+ *simulation*:
    + *supply*: ltspice simulation files used for power supply pcb
    + *vbat*: ltspice simulation files used for the voltage divider measuring the battery voltage
+ *src*:
    + *Pi*: code used for raspberry pi
    + *TabletGUI*: code used for TabletGUI
    + *Teensy*: code used for Teensy++ 2.0 DK

Schmeatics info:

- <u>Input Filter and Power Plugs</u>:
  - Connect up to three **parallel** 12 V batteries to J2
  - Deep discharge protection:
    - The hysteresis width is designed for 1 V
    - Used formula (see this link):
      $U_{TP} = (R3 / (R3 + R5)) * +V_{CC} = (20\text{ k} / (20\text{ k} + 220\text{ k})) * 12\text{ V} = 1\text{ V}$
      $L_{TP} = (R3 / (R3 + R5)) * -V_{CC} = (20\text{ k} / (20\text{ k} + 220\text{ k})) * 0\text{ V} = 0\text{ V}$
      $V_{HYS} = U_{TP} - L_{TP} = 1\text{ V}$
    - Use RV1 to adjust the V_{REF} (see the simulation files)
  - 12 V supply for robofriend's peripheral:
    - Solder J16 if you are **not** using a buck boost converter, otherwise
    - Use J11 as an unregulated 12 V output for a buck boost converter
    - Connect the regulated 12 V supply to J20
  - Power up an additional raspberry pi via J13 or J14

- <u>Overcurrent Detection/Protection</u>
  - D8 signals that the boost modules are supplied with 12 V

- INA193 is a current shunt monitor with an analog linear output presenting 10 A of current consumption as 2 V at its output ([link](#)).
- Current consumption by a single motor:
  - no-load: 0.18 A
  - rated: 0.35 A
  - max.: 3.50 A
- The analog output signal is used as an input for a comparator (U9) to generate a digital signal which can be registered as an external interrupt
- Use RV2 to adjust V_{REF} (see the simulation files)

- Precision shunt V_{REF}
  - 4.096 V precision shunt used as V_{REF} for ADC measurements (connect JP4)

- Teensy++ 2.0:
  - Connect JP1 when the development kit is placed on the pcb socket
  - Disconnect JP1 when **just** using the USB interface to power up the development kit

- General:
  - Check the logic level before connecting external peripheral to the pcb

Repository Setup/ROS Installation/Setup/Configuration info:

[Link](#) for the project setup.

Robofriend - General info:

[Link](#).