Integration of Raspberry Pi on Create

Use this guide in addition to the "Converting Create to Use RealSense.pdf" document by Alec Newport (acn55) & Zhilong Li (zl242).

You will need access to the Lab Admin Folders drive, and the AMR github.

Changes to assembly:

1. Power regulator:
    a. DC to DC adapter
    https://www.amazon.com/dp/B00QTJWRFW?ref_=pe_1815430_211938580
    b. D25 plug connector
    https://www.mcmaster.com/2146t58

    Solder the regulator input wires to the battery power pin and GND pin according to the Create cargo bay connector pinout.

2. Platform:
    Modified by Patrick to leave 4 mounting holes and 2 holes for the camera bracket. The drawing is in …\Lab Admin Folders\MAE 4180\Spring 19 Realsense and RasPi\Platform drawing.
3. Camera bracket:
    Machined by Joe Adas. Drawing in
    …\Lab Admin Folders\MAE 4180\Spring 19 Realsense and RasPi\Camera\Bracket.
4. Pi enclosure:
    https://www.amazon.com/Flirc-Raspberry-Case-Gen2-Model/dp/B07349HT26
5. Pi enclosure and power regulator mounted to the platform

Camera:

1. Update Firmware:
    Firmware Updater, firmware bin file and instructions found in
    …\Lab Admin Folders\MAE 4180\Spring 19 Realsense and RasPi\Camera\Firmware update

Network:

1. TP-Link Access point:
    AP information in …\Lab Admin Folders\Computer Support\TP-LINK Access Point
    SSID = AMR_wifi
    Password = 4180-5180

MicroSD card image:

1. Configure auto login to user ‘create’, so it doesn’t wait before connecting to wifi:
   Edit /usr/share/lightdm/lightdm.conf.d/60-lightdm-gtk-greeter.conf
   Add ‘autologin-user=create’ in the end of the file.
2. Remove password requirement for sudo for user ‘create’:
   sudo visudo (to edit /etc/sudoers)
   Add as the LAST line: ‘create ALL = NOPASSWD : ALL’
3. Disable Bluetooth and keep turbo mode in low voltage:
   Edit /boot/config.txt and add to the end:
   Add ‘dtoverlay=pi3-disable-bt’
   Add ‘avoid_warnings=2’
4. Change account password if needed:
   System – Administration – Users and Groups
   Password is ‘AMRobot’
5. Automatic Wifi connection settings:
   a. Edit /etc/network/interfaces
      Before ‘auto lo’ add
         ‘auto wlan0’
      In the end of the file add
         ‘allow-hotplug wlan0’
         ‘iface wlan0 inet dhcp’
         ‘wpa-conf /etc/wpa_supplicant/wpa_supplicant.conf’
   b. Edit /etc/wpa_supplicant/wpa_supplicant.conf (create the file if it doesn’t exist)
      Add
         network={
            ssid=”AMR_wifi”
            psk=”4180-5180”
         }
6. Disable sound:
   Edit /etc/modprop.d/raspi-blacklist.conf
   Add ‘blacklist snd_bcm2835’
7. Raspi-config settings:
   sudo raspi-config
   Disable camera, SPI, I2C
   Set GPU memory to 16 (it’s the min, all the rest is used by the CPU)
   Disable splash screen
8. Speed boot by disabling slow booting services:
   sudo systemctl disable apt-daily.service
   sudo systemctl disable apt-daily.timer
   sudo systemctl disable apt-daily-upgrade.service
   sudo systemctl disable apt-daily-upgrade.timer
   sudo systemctl disable hciuart.service
   sudo systemctl disable NetworkManager-wait-online.service
9. Only two concurrent logins: add ‘create hard maxlogins 2’ in /etc/security/limits.conf

Python files:

The latest version is on Git: https://github.com/autonomousmobilerobots/RaspberryPi

- The file 'robot' is in create home.
- The file 'debug' is in create home.
- The file 'PyUpdate' is in create home.
- The file 'RSonCreate.py' is in create/apriltag/python/
- The file 'robot_controller.py' is in create/apriltag/python/

There are three ways to get files onto the Pi:

1. Download the files from Git. Collect all the MicroSD cards from the robots, mount them on a Linux machine and copy the files over.
2. Download the files to a USB drive, plug the drive into the Pi on the robots, SSH in and copy the files over.
3. Update directly from Github:
   - SSH with Putty and run './PyUpdate' (in the home directory). It will update the other four files from Git.

Clone the entire MicroSD card:

1. On Windows use Win32DiskImager: https://sourceforge.net/projects/win32diskimager/
2. On the Pi use rpi-clone
3. See How To in
   …\ Lab Admin Folders\MAE 4180\Spring 19 Realsense and RasPi\Raspberry Pi Image