

HEBI

ROBOTICS



Tready - Manual

HEBI Robotics

Version 1.0, 25 Feb, 2023

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Revisions

Rev.	Date	Author	Description
0.1	21 Nov, 2022	A Willig	Initial manual draft.
1.0	25 Feb, 2023	A Willig	Updated Drawings and Manual with newest Tready Design. Dual panel bulkheads front and back, updated bulkhead connectors. Official Release.

1. Overview

This manual documents the setup and operation of the HEBI Tready Mobile Base Kit.

1.1. Videos

- Kit Release Video: <https://www.youtube.com/watch?v=RyusD0KFCp8>
- Inspection Robots Video: <https://www.youtube.com/watch?v=tEoKngE73xk>

1.2. Technical Specifications

Specifications subject to change without notice.

Onboard Computer

Computer Model: Intel NUC NUC10i3FNK

OS: Ubuntu 18.04 Desktop

Username: hebi

Password: hebi1234

VNC password: hebi1234

Ethernet IP Address (assigned by router): 10.10.1.2

Onboard Router

2.4Ghz Wifi Network Name: Tready-<customer-name>

5Ghz Wifi Network Name: Tready-<customer-name>-5

Wifi Password: hebi1234

Router Model: MikroTik hAP ac³ wireless dual-band router

Product Code: RBD53iG-5HacD2HnD

Configuration: Wifi and Ethernet ports bridged, DHCP server on bridge.

Wifi Bands: 2.4Ghz & 5Ghz (802.11n)

IP Address: 10.10.1.1

Router Login: admin

Router Password: hebi1234

https://mikrotik.com/product/hap_ac3

Batteries

4X Grin Technologies LiGo+ battery, 98 Watt Hour

Nominal Voltage: 36V

Discharge current: 5A continuous, 10A max

Operating Time: 2-3 Hours continuous operation

Dimensions: 201 x 74 x 21 mm

Weight: 610 g (1.3lb) per battery

<https://ebikes.ca/36v-ligo-plus-battery.html>

The system uses 4 LiGo batteries (2 on each side in parallel) to provide approximately 400 Wh of energy and a minimum of 2 hours of continuous robot operation on a full charge.

1.3. Main Components and Features

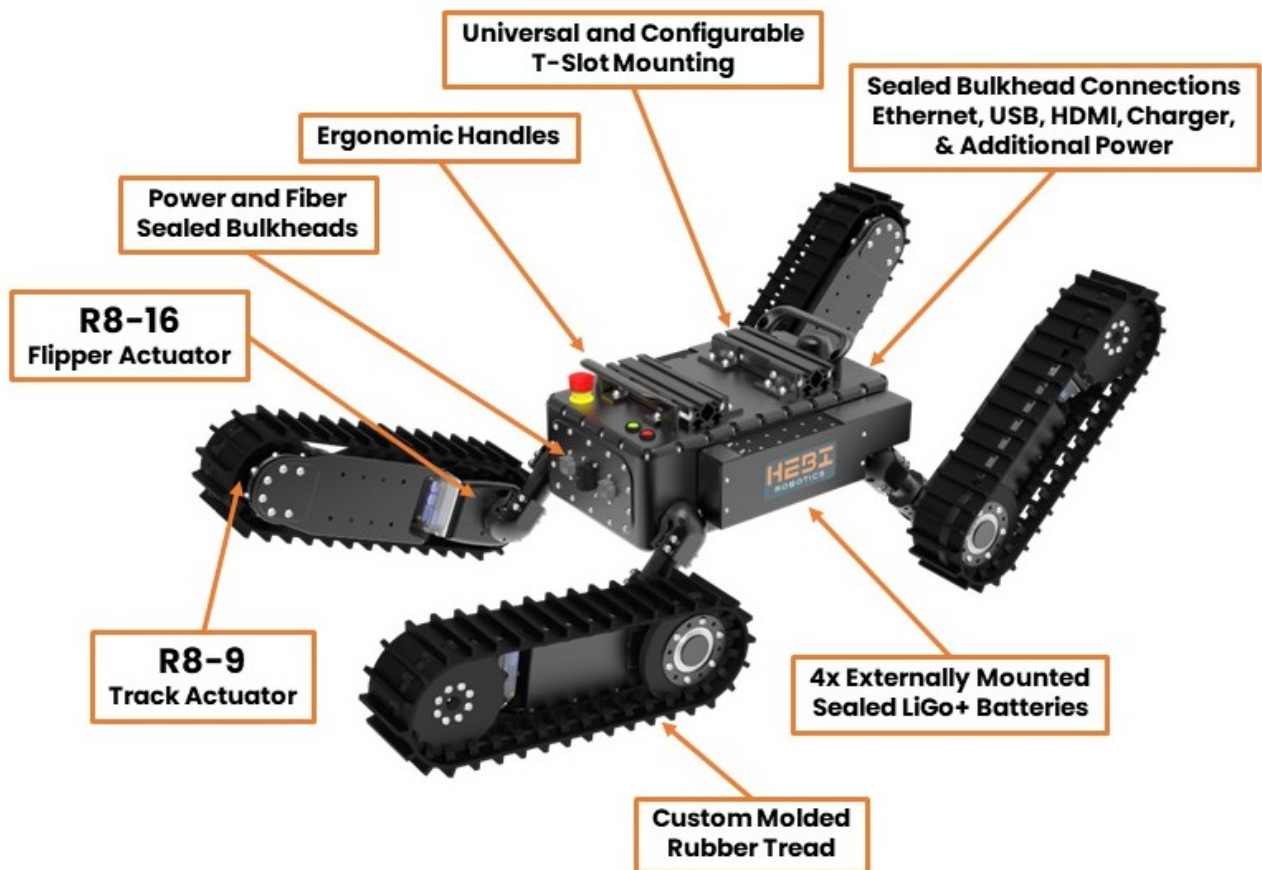
The Tready Mobile Robot Kit comes standard with an IP67 field deployable chassis that includes:

- ergonomic handles to assist with handling the robot
- sealed bulkheads for all connections required for connecting power and communications to additional components or external computers
- universal and configurable T-Slot mounting to the top of the robot using an optical bench style mechanical interface
- 4 externally mounted LiGo batteries that are hot-swappable in the field.

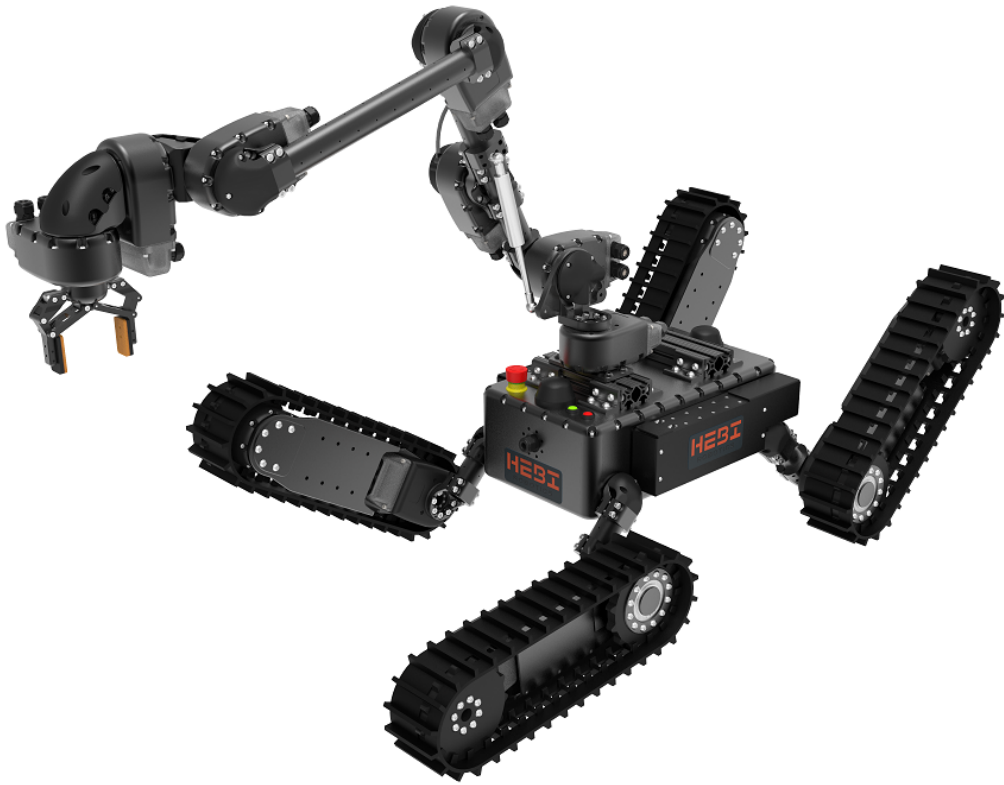
In addition to the field chassis, Tready comes with 4 modular track units that includes:

- an R8-16 Actuator to control the independant flipper motion
- an R8-9 Actuator to control the driving of the track (swappable to R8-3 for higher speed)
- a custom designed molded track.

a. Tready Robot Main Features



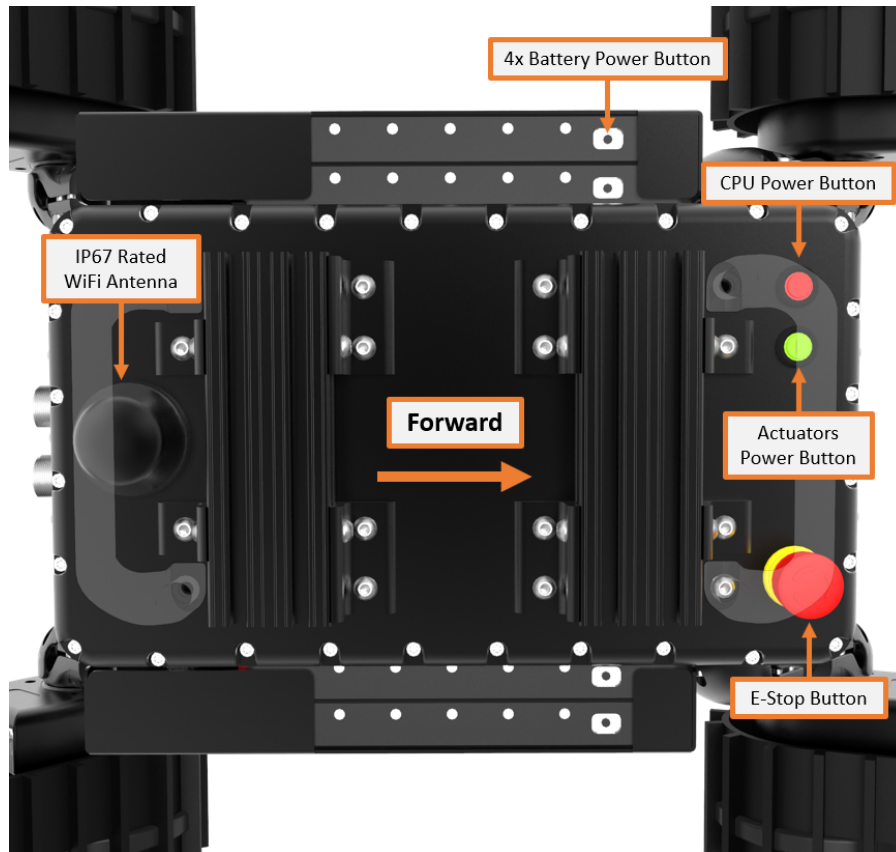
b. Robot optional addition - 6-DoF R-Series Arm with Gripper



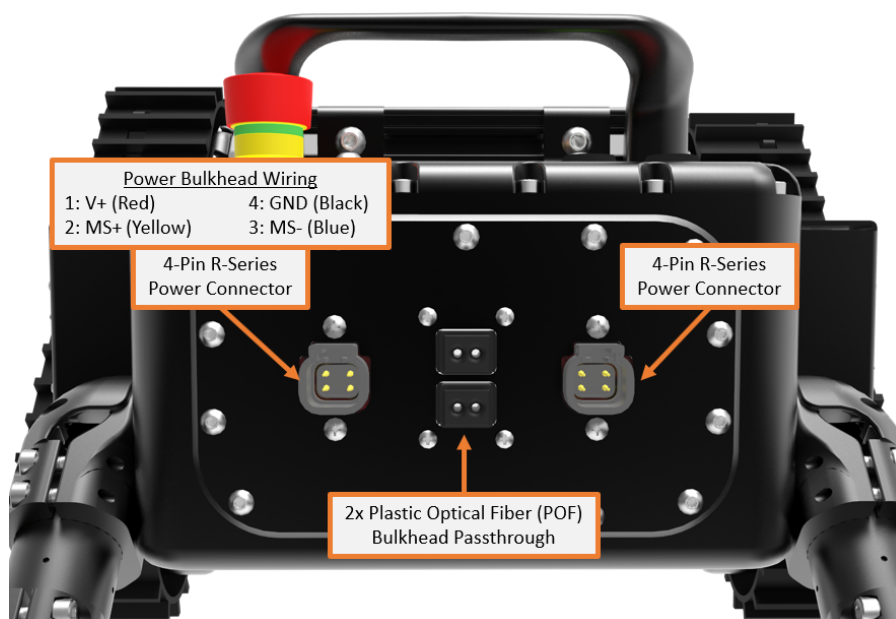
1.4. Buttons and Bulkheads

The following figures depict the various buttons and bulkheads on the main robot chassis and their function. Additionally, Tready's front and rear bulkhead panels can be customized different from the standard configurations shown in this manual to better fit the specific application the platform will be used form. Please contact engineering@hebirobotics.com for more information on customizing these bulkheads.

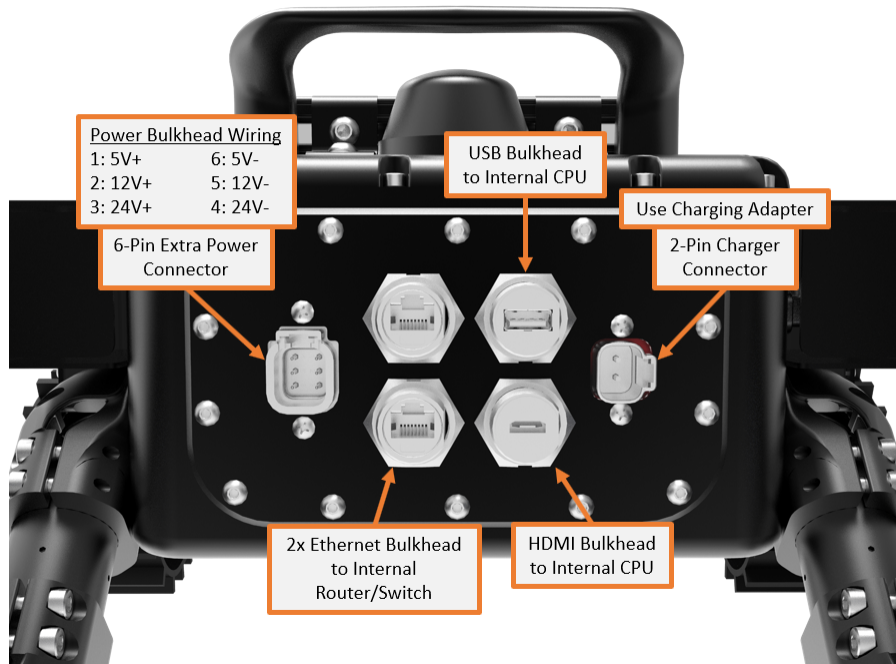
- a. Top view of robot chassis and associated buttons and bulkhead components.



- b. Front view of robot chassis and associated bulkhead components.

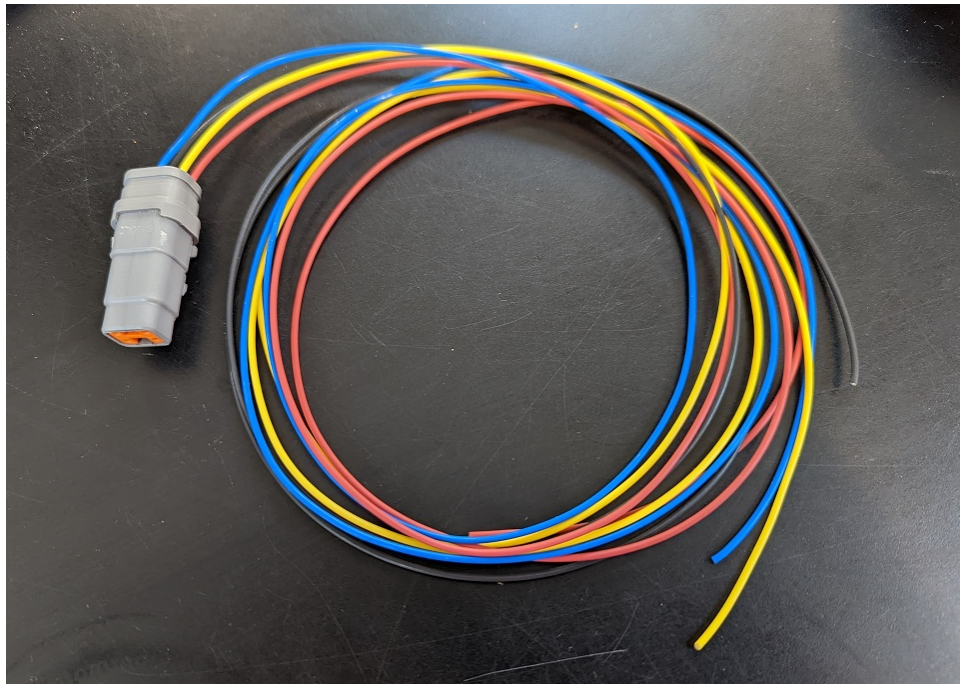


c. Rear view of robot chassis and associated bulkhead components.

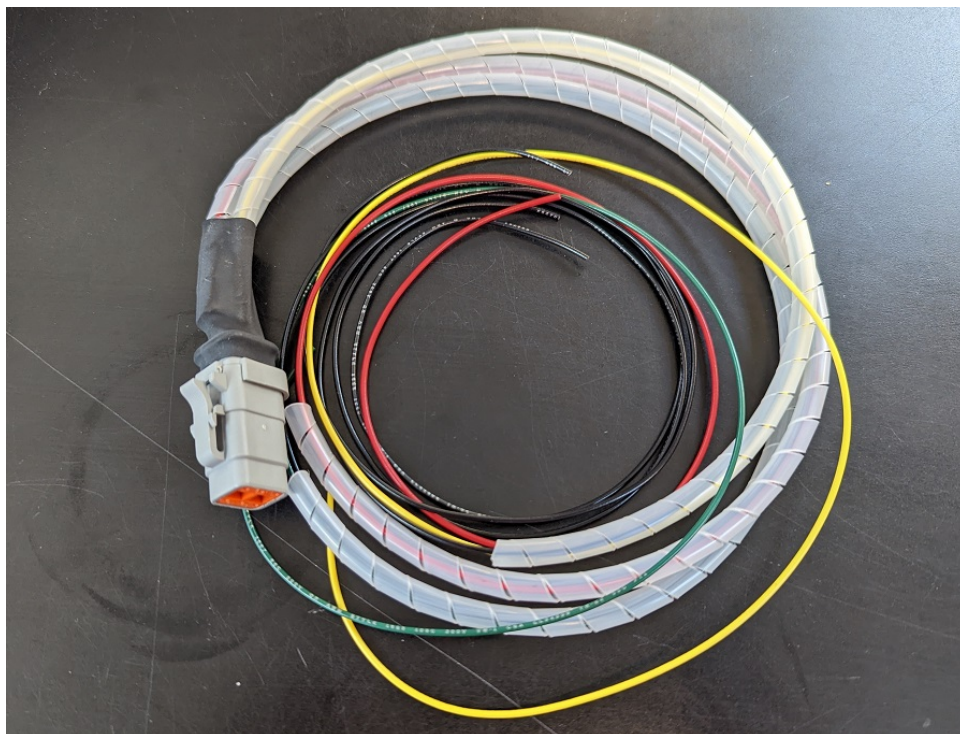


1.5. Accessories

- a. Accessory 4-pin power connection
(Red: V+ | Black: Gnd | Yellow: MS+ | Blue: MS-)
[ATM06-4S Connector Kit](#)



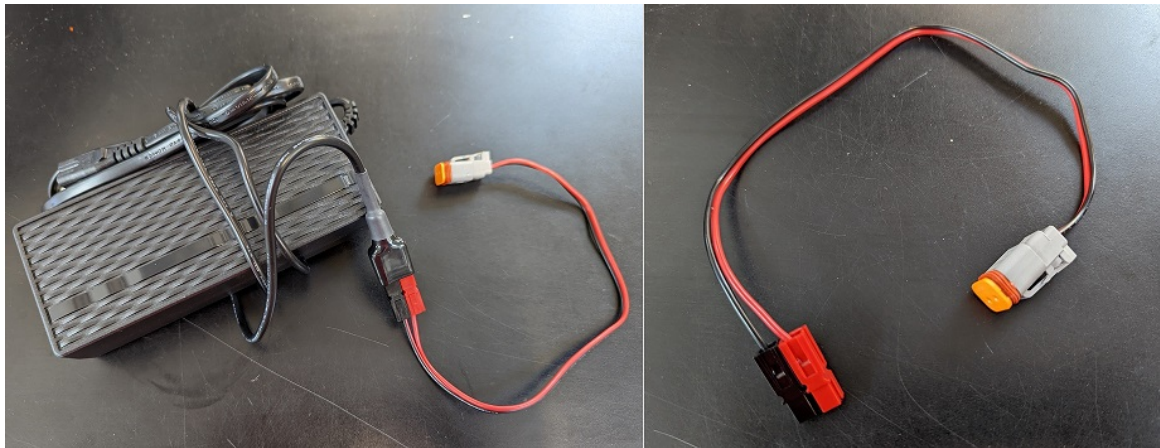
- b. 5V, 12V, 24V power connections for additional sensors/hardware
(Red: 5V | Yellow: 12V | Green: 24V)
[ATM06-6S Connector Kit](#)



c. Battery charging bulkhead adapter & Charger

DT06-2S Connector Kit

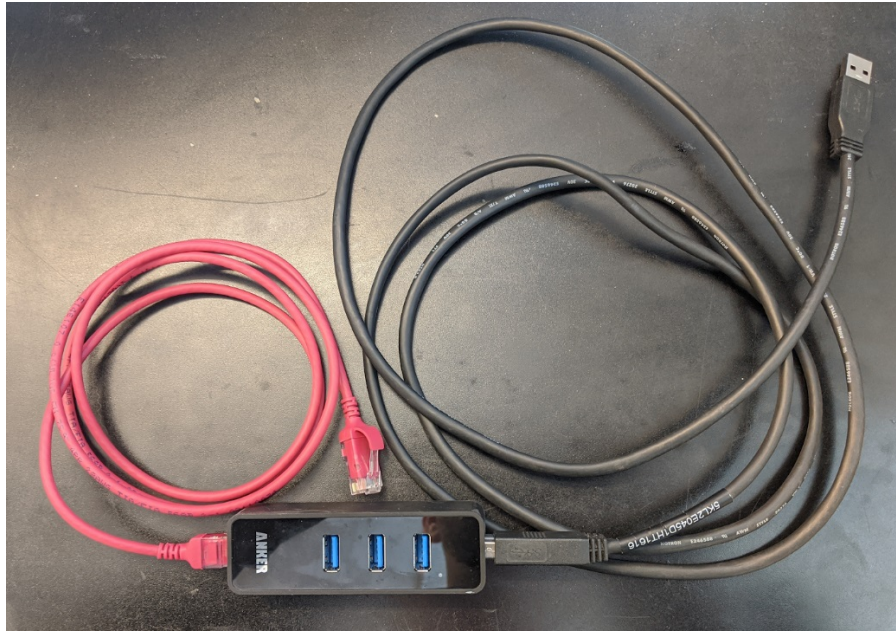
Powerpole Connector Kit



d. Track tensioning tool



- e. Ethernet-to-USB Adapter and USB Hub for Network-to-Computer communications
3-Port USB Hub with Gigabit Ethernet Converter (Amazon)



- f. Connection Toolbox
(Includes tools for both R-Series Actuators and Tready Robot)



1.6. Datasheets and Drawings

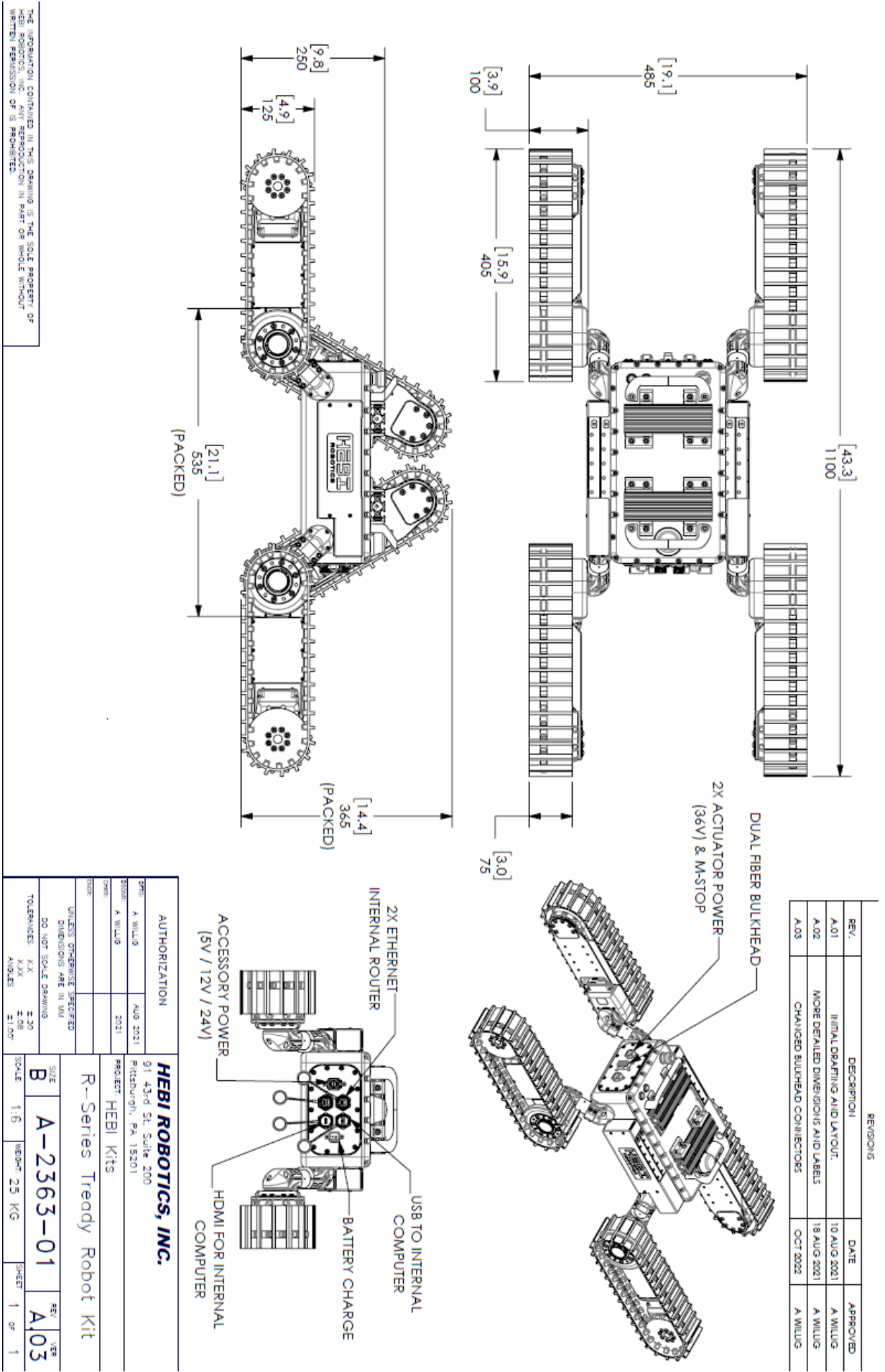
a. R-Series Actuator Datasheet

R-SERIES ACTUATOR — TECHNICAL SPECIFICATIONS

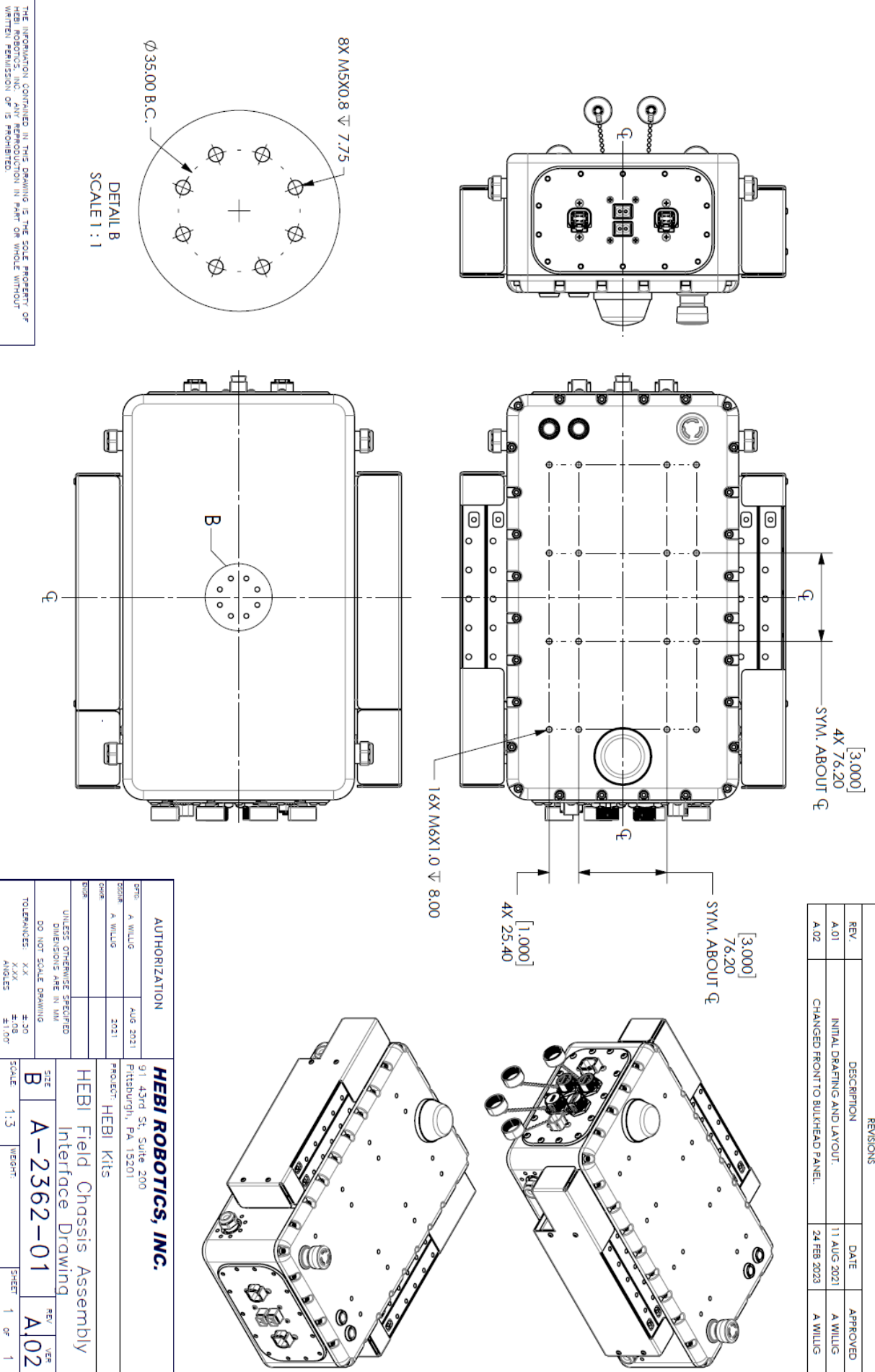
CONFIGURATION	R8-3	R8-9	R8-16
Peak Torque	7 N-m	20 N-m	38 N-m
Cont. Torque	3 N-m	8 N-m	16 N-m
Max Speed	84 RPM	30 RPM	15 RPM
Mass	670g	685 g	715 g
Dimensions	156mm x 78mm x 51mm 15mm hollow bore		
Power	24-48V DC Cont. Current: 1.3 A @ 36V Peak Current: 3.0 A @ 36V		
Environment	-10°C to 50°C Ambient / IP67		
Communication	2X 100 Mbps Plastic Optical Fiber (Optolock®)		
Angular Resolution	0.005°		
Torque Resolution	0.01 Nm		
Backlash	+/- 0.25°		
Sensing	Angular Position (multi-turn absolute, +/- 4 turns) Angular Velocity Output Torque 3-axis Accelerometer / Gyro Temperature Voltage Current Internal Pressure		
API Support	MATLAB (Windows / Linux / OS X) ROS (Linux) Python (Windows / Linux / OS X) C/C++ (Windows / Linux / OS X) C# (Windows)		

Each order of R-Series Actuator includes a standard connection kit.
Additional technical documentation at docs.hebi.us
Updated on October 1, 2021. Specifications subject to change without notice.

b. Tredy robot platform mechanical drawing.

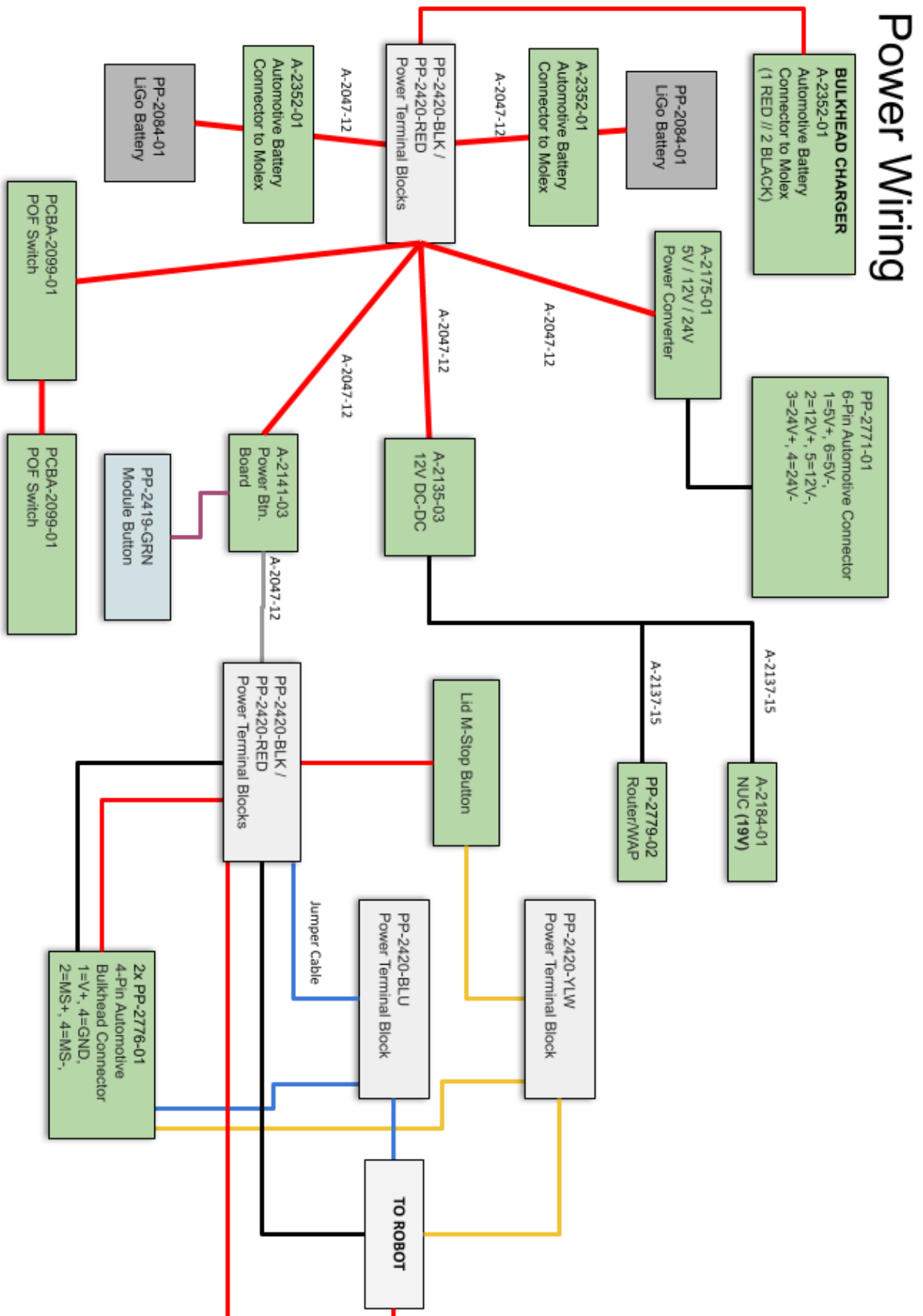


c. Field chassis mechanical drawing.



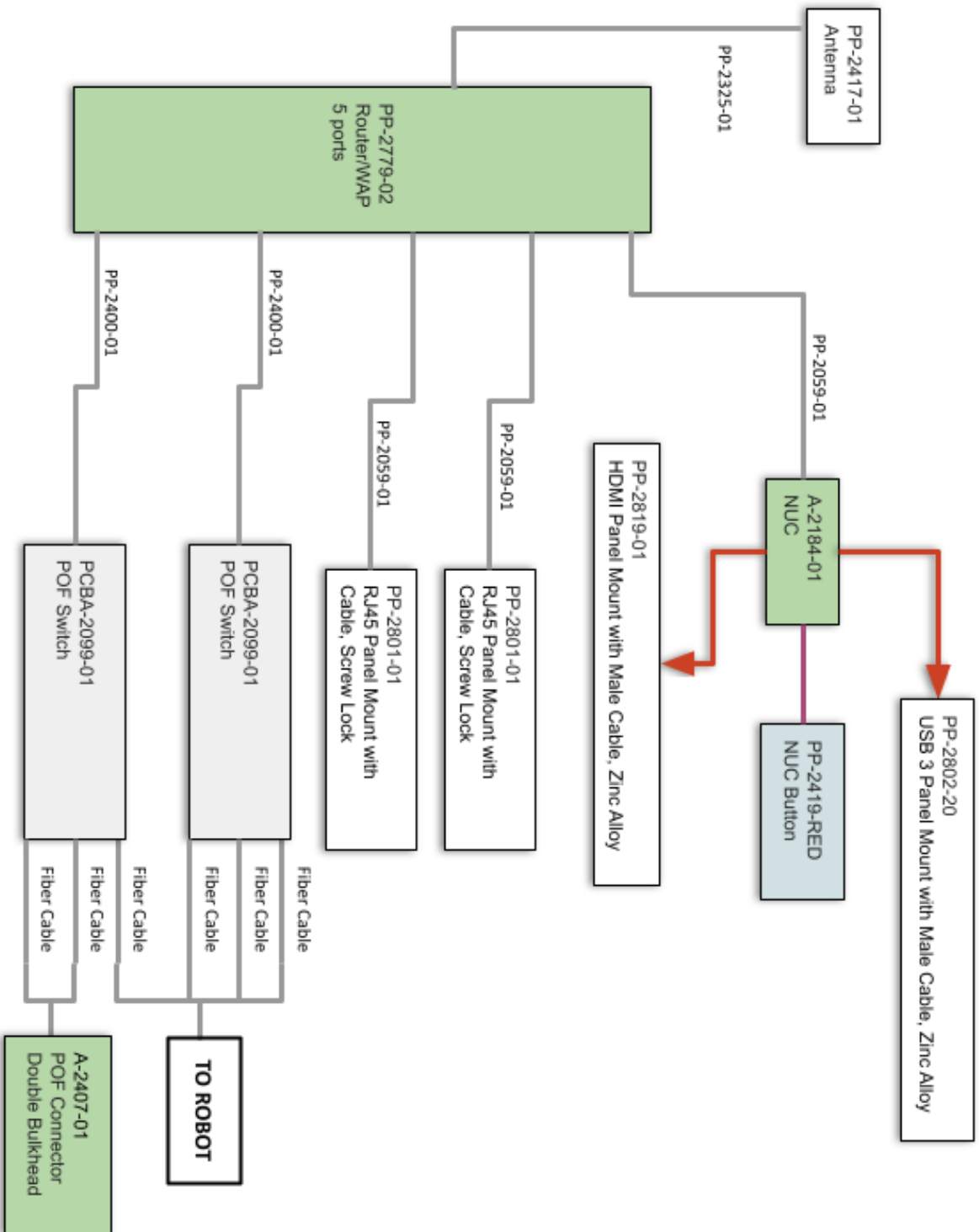
1.7. Wiring Diagrams

a. Power wiring schematic for Tready robot platform.



b. Signal wiring schematic for Tready robot platform.

Signal Wiring



1.8. For More Information

HEBI Documentation ([encodeURI\(docs.hebi.us\)](https://docs.hebi.us))

- Quick-start guides
- Core concepts background information
- Mechanical documentation
- Software walkthroughs
- Downloads

HEBI Community Forum ([encodeURI\(forums.hebi.us\)](https://forums.hebi.us))

- Regularly monitored by HEBI Engineers
- Collaborate with fellow HEBI users
- A platform to share your successes

HEBI CAD Repository ([encodeURI\(cad.hebi.us\)](https://cad.hebi.us))

- CAD files and drawings

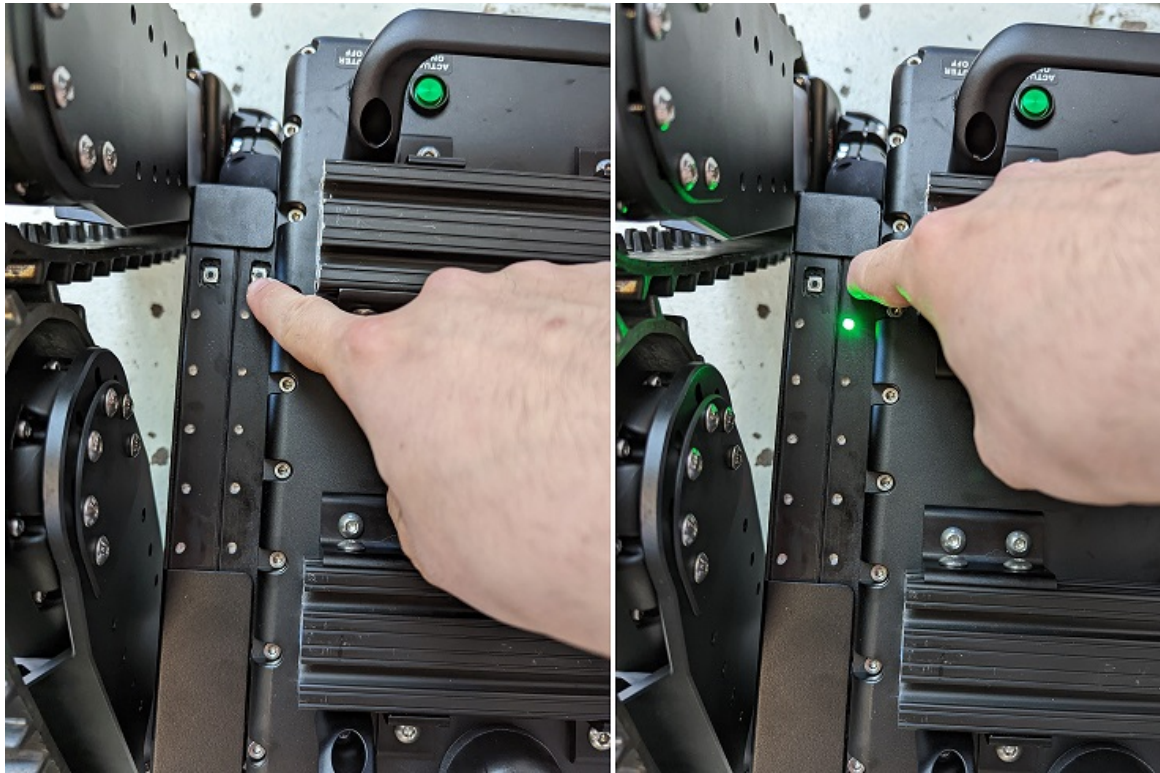
Contact Us

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info@hebirobotics.com

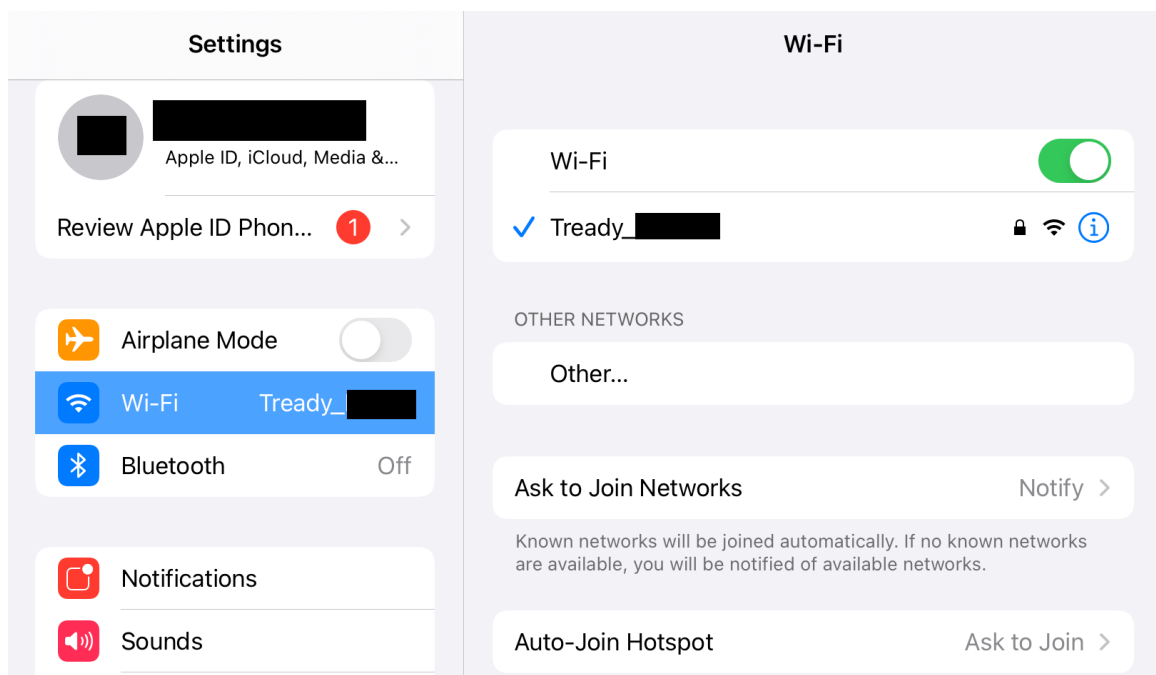
2. Startup

2.1. Power On

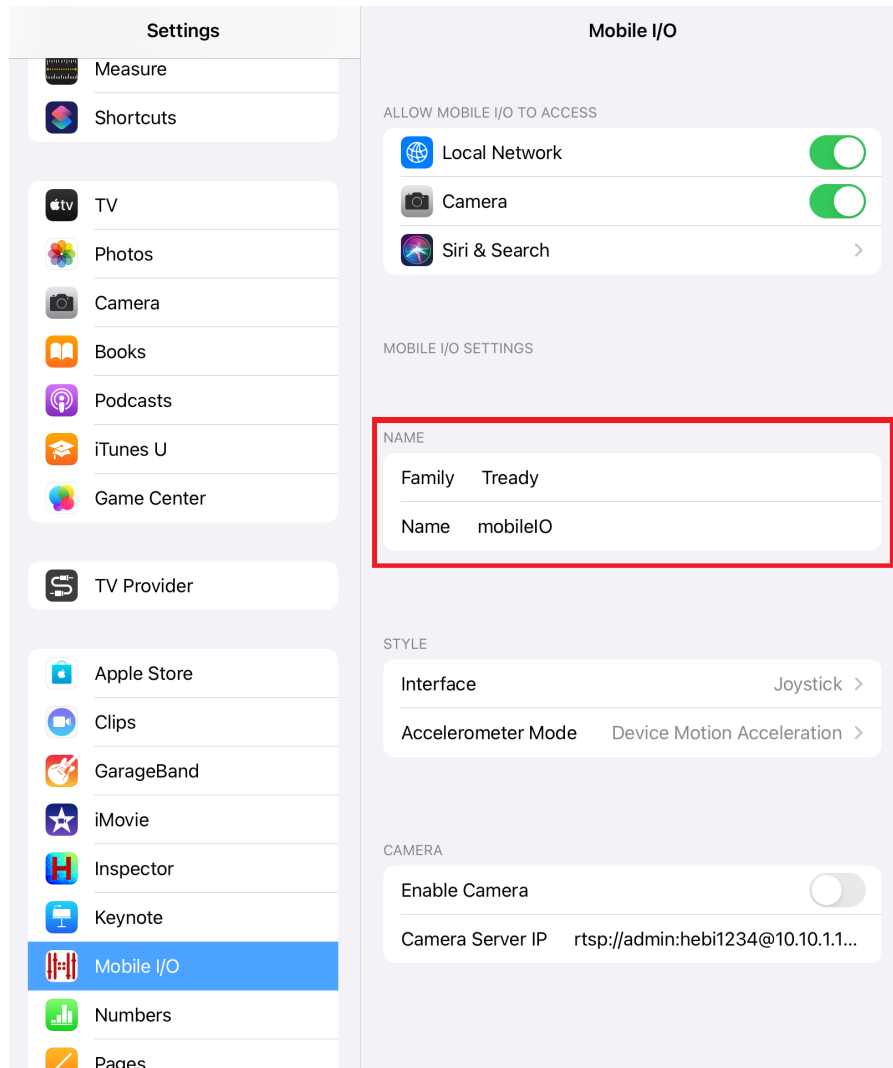
1. Power on the batteries by pressing the buttons on each individual battery. The LED closest to the button will turn green, then let go of the button.



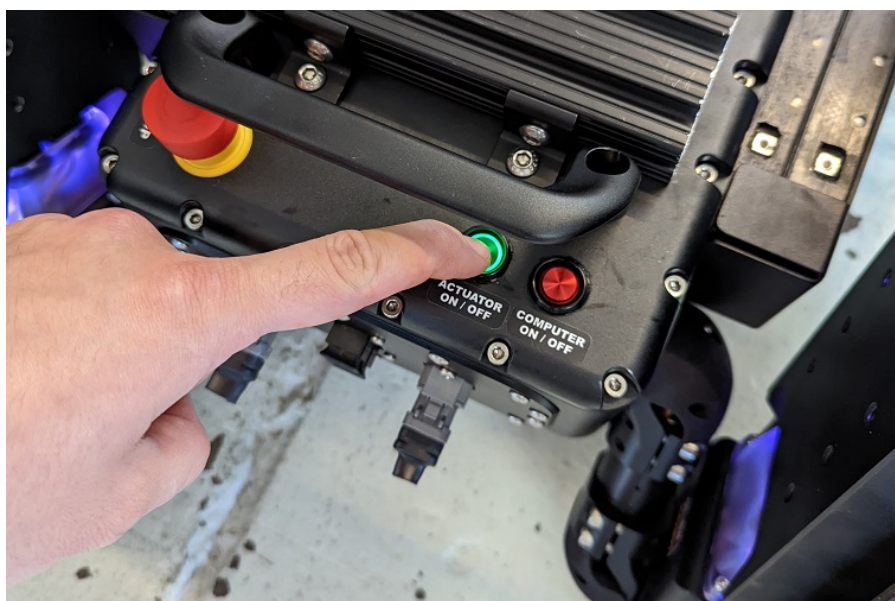
2. On your mobile control device check for Tready's WiFi to appear and connect to it (Password: hebi1234)



3. Make sure that the correct Family and Name are set on your mobile device in the "Mobile I/O" Settings.



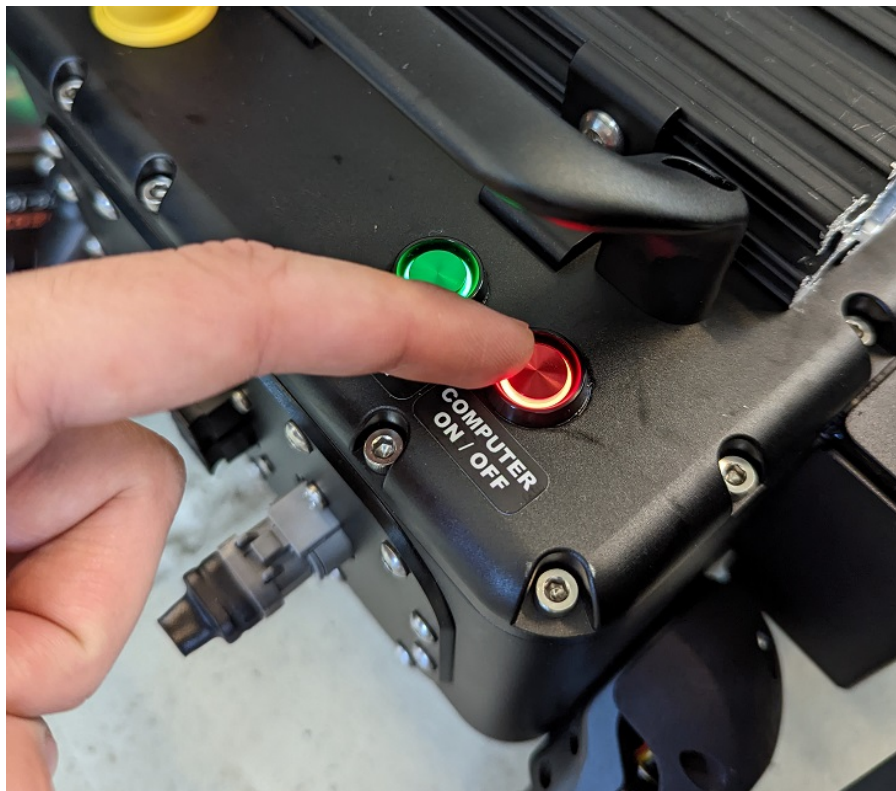
4. Next, turn on Tready's actuators with the Green "Actuator On/Off" button on the chassis.



5. Look for all actuators on Tready to have their LEDs slow fade green. This means all actuators have been given IPs.



6. Last, turn on the internal computer using the Red "Computer On/Off" button on the chassis. The Tready control code will autostart as long as you have the mobile device connected to the robot's WiFi and the HEBI Mobile I/O App open.

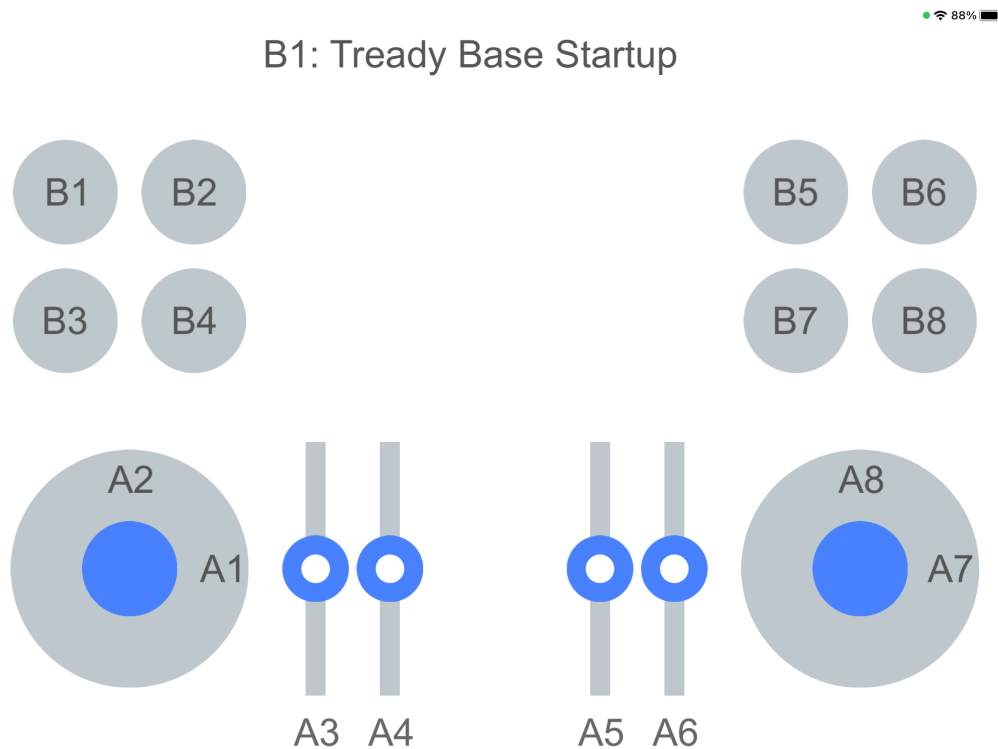


2.2. Control Interface (HEBI Mobile IO App)

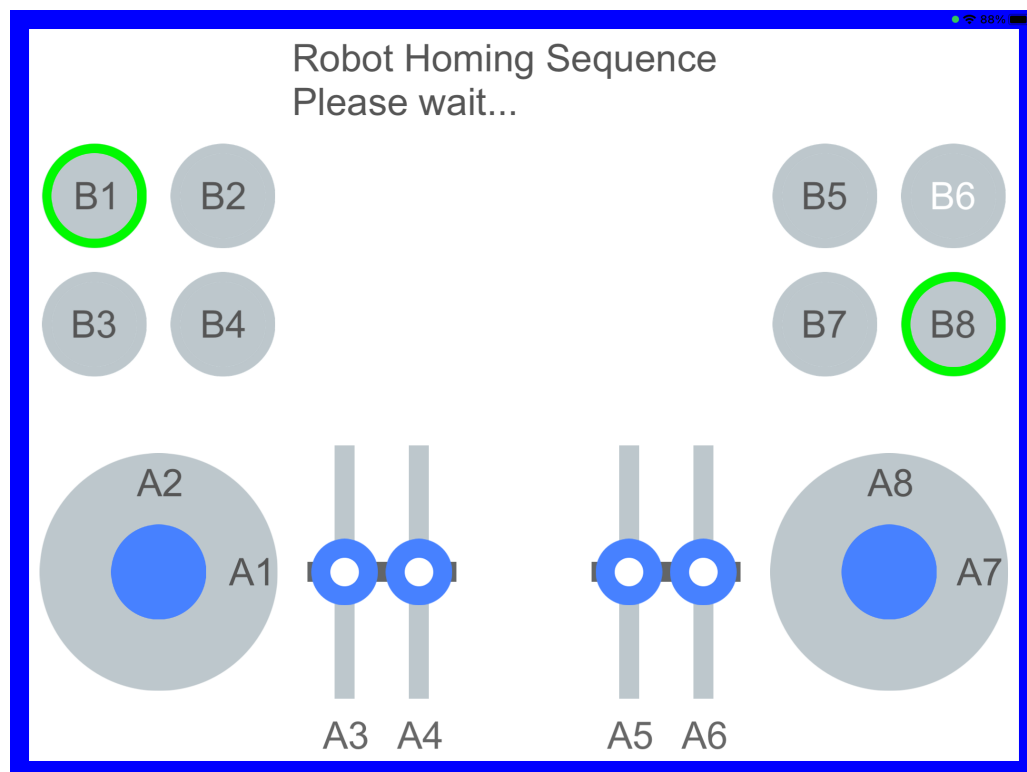
1. Demo Selector Screen

(B1: Tready Base Only | B2: Tready w/ Arm | B3: Tready w/ ARKit Arm Control)

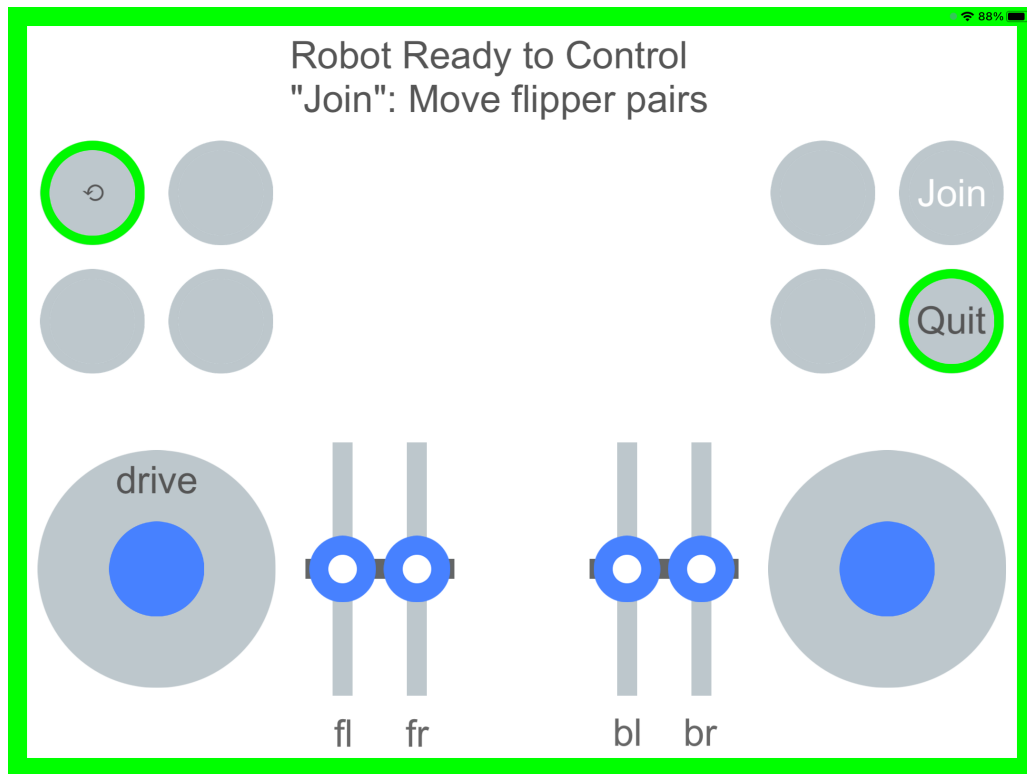
Options can be added or removed based on configuration of Tready



2. Robot Startup / Reset Screen



3. Main Control Screen (Tready Base Only)



4. Demo Quit Screen

