TranzVolt 2.0

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Background

- Lifting heavy loads onto rooftops is often inconvenient/dangerous
- "Ladder Hoist" – Portable lifting device that lifts loads along a ladder-like track

TranzVolt

- Tie Down – Market leader in ladder hoist space with Lift Hoist and TranzVolt products

Our Goal:
- Improve upon existing TranzVolt design

Wired User Interface

TranzVolt 1.0

- Complexity of interface: Combinations of buttons needed for operation
- Redundancy: Button functions not optimized
- Receiver Dependency: A bulky receiver unit installed inside the motor box, moving with the hoist itself
- Battery Dependency: Two AAA batteries needed for use

Figure 1. TranzVolt 1.0 Remote Control User Interface

TranzVolt 2.0

- Simplicity of use: No button combinations
- Reduced Number of Buttons: Pre-Existing button functionality preserved
- Receiver Independency: Incorporated within the microcontroller
- Battery Independency: Power drawn from the microcontroller

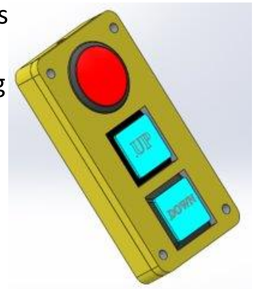

Figure 2. TranzVolt 2.0 Remote Control User Interface

Microcontroller Replacement

TranzVolt 1.0

- Motor: BG Motor BGDC86BL130
- Motor Controller: Flipsky FTESC 6.6
- Microcontroller: In-house Icarus Control Unit (ICU)
- Bulky wireless transmission system
- Lacking standard Bluetooth wireless transmission capabilities

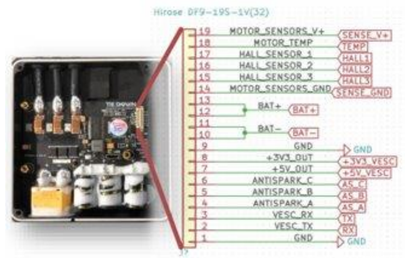

Figure 3. Flipsky Motor Controller and Pinout

TranzVolt 2.0

- Replace ICU with Arduino Nano 33 BLE
  - On-board Bluetooth capabilities
  - Wired user interface option as backup controls

Tasks:
- Integrate with new User Interface and existing motor controller system
- Perform auto homing via RPM and current measurements

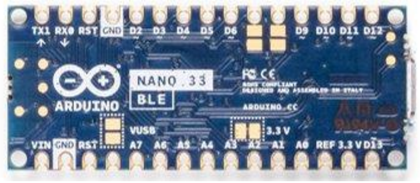

Figure 4. Arduino Nano 33 BLE ICU Replacement

Battery Management

- Battery Over-charge and Over-discharge Protection for 2x DeWalt DCB205 batteries
  - S-8245AAC-FGT1U Battery Protection IC for 3-5 Cell Pack
  - Device includes shut down to prevent over-discharge

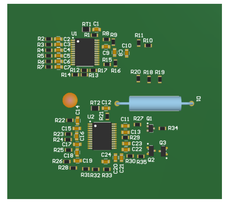

Figure 5. 10-Serial Cell BMS PCB Layout

Figure 6. Two Dewalt DCB205 Batteries

Future Work

- Incorporate Bluetooth capability to enable wireless usage
- Design a mobile app for TranzVolt to further improve user interface
- Add new and improved homing system

Figure 7. Tranzvolt mobile app and bluetooth connection

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