



TRANZVOLT 2.0

SURVANCE | JIA | JANG | BUNNER | BAEK | YERRAMILLI

INTERDISCIPLINARY CAPSTONE DESIGN | DR. COLLINS | CAPSTONE TEAM

THE DESIGN PROBLEM

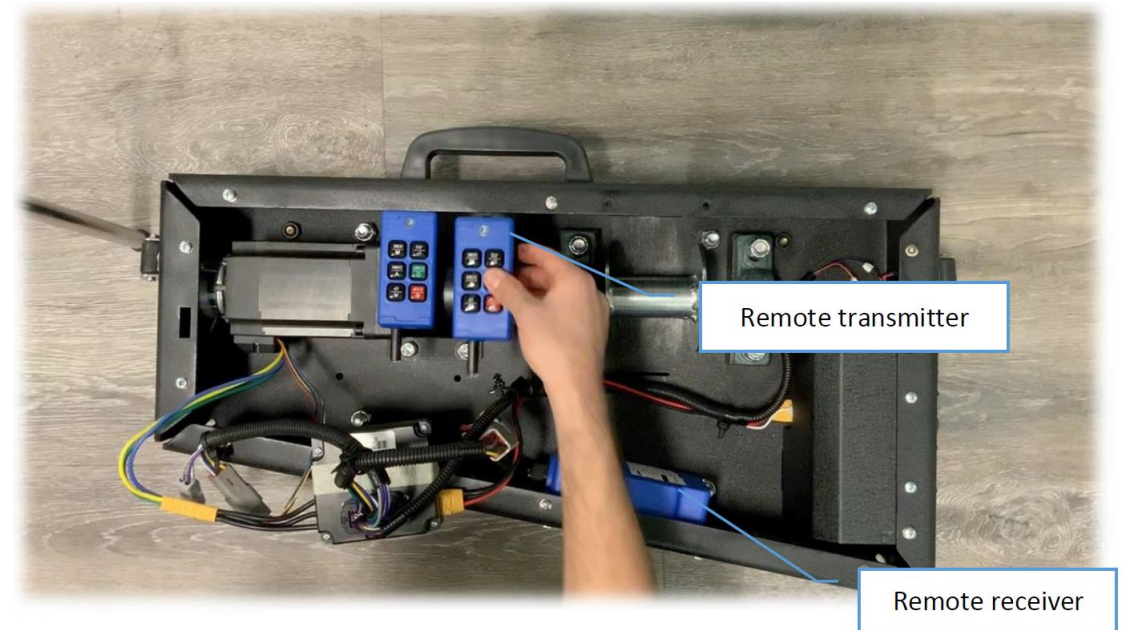


ORIGINAL TRANZVOLT



PROJECT FOCUS

- Develop new motor box
 - Improved Battery Management System
 - Plug-in wired controller with new UI
 - Auto-homing mechanism
 - Bluetooth adaptable controls
- Three Subsystems:
 - Battery Management System (BMS)
 - User Interface (Remote Controller)
 - Microcontroller Unit (MCU)



Current TranzVolt Motor Box



BATTERY MANAGEMENT SYSTEM (BMS)

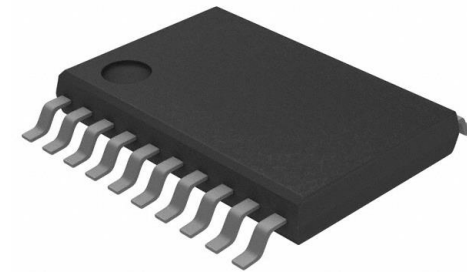


BMS DESIGN

- Batteries:
 - 2x 20V MAX XR Premium Lithium-Ion 5.0Ah Battery Packs
- Existing Problems:
 - Only safety mechanism – Thermal Sensor
- New system: TI BQ77904 IC
 - Voltage Protection
 - Overcurrent Protection



DeWalt 20V Premium Lithium-Ion Batteries



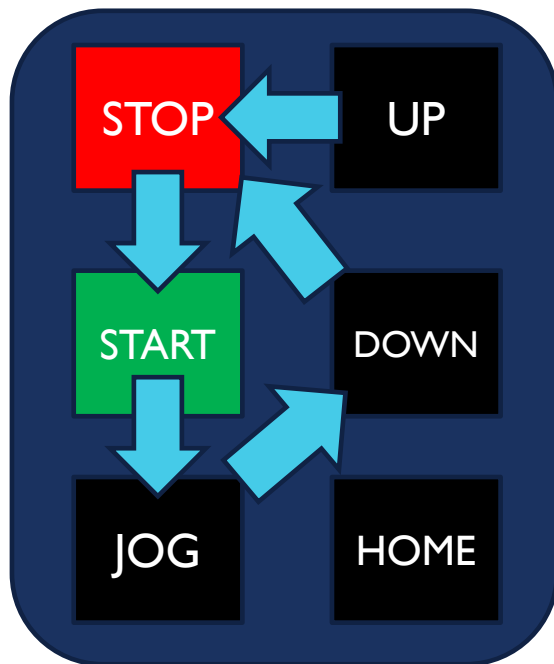
Texas Instruments BQ77904 IC

USER INTERFACE (REMOTE CONTROLLER)



CURRENT REMOTE CONTROLLER ISSUES

Complexity of Interface



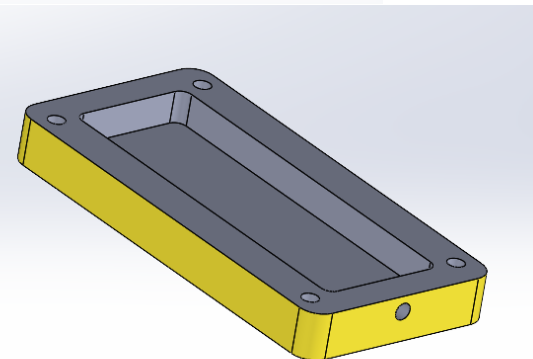
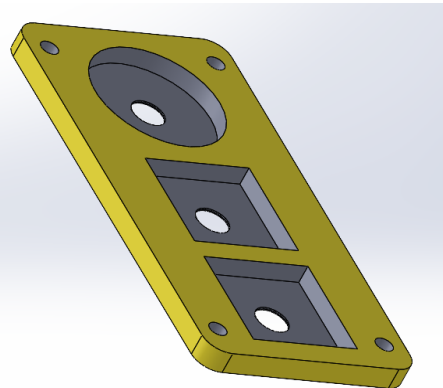
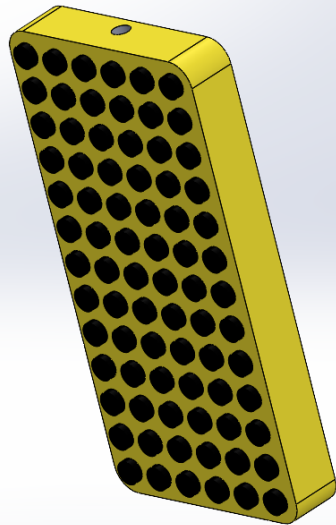
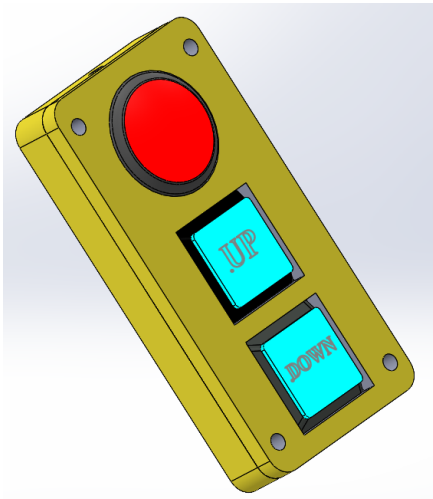
Receiver Redundancy



Battery Dependency



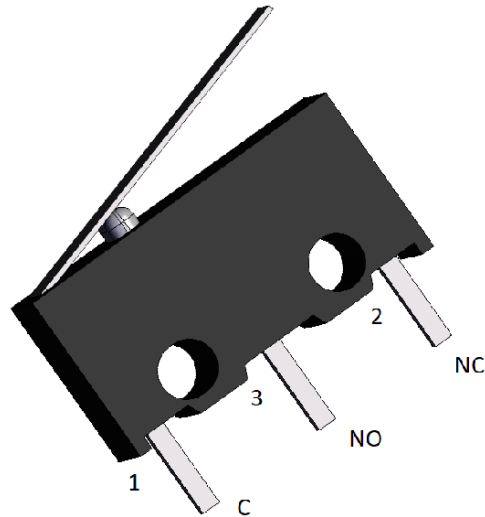
CURRENT TEAM DESIGN



- 3 buttons
- Hole for wires on top
- Two-part case, drilled together using screws
- Outer case to be 3D printed

COMPONENTS

Push Buttons



Electrical Cables



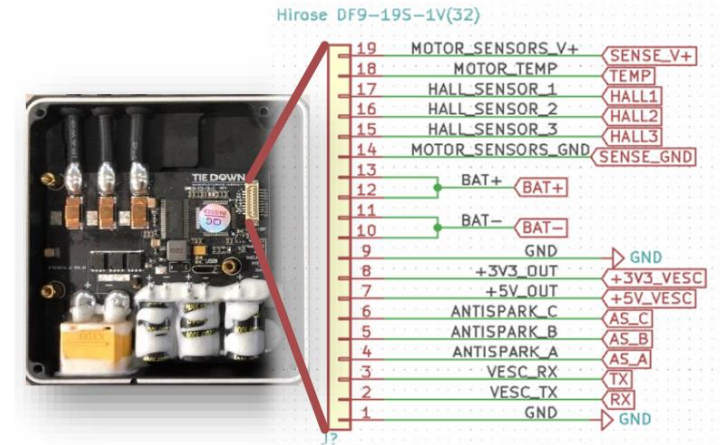


MICROCONTROLLER UNIT (MCU)

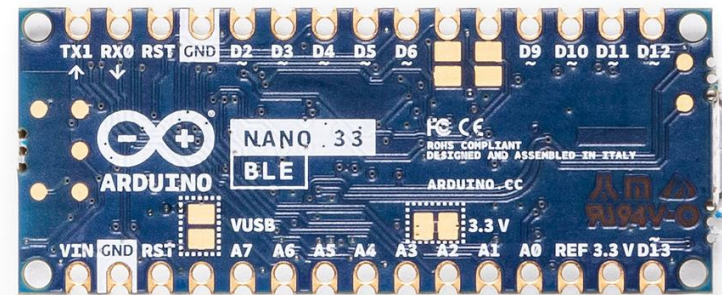


MCU DESIGN

- Existing: Icarus Control Unit (ICU)
 - No BLE
- New: Arduino Nano 33 BLE
 - Bluetooth capability
 - Logic interface with UI system
 - UART interface with motor controller
- Looking Ahead:
 - Homing System

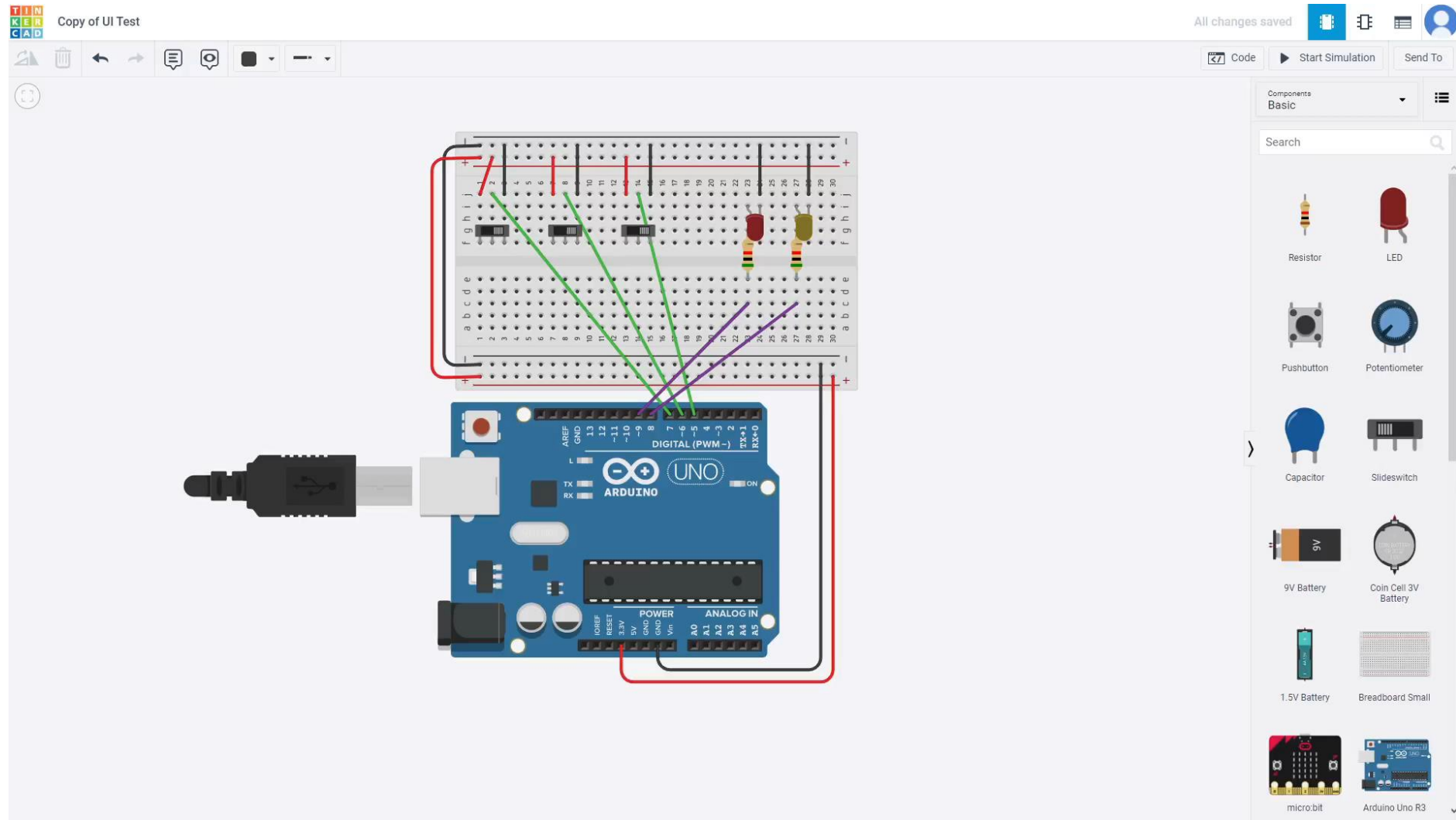


Flipsky Motor Controller Overview and Pinout



Arduino Nano 33 BLE

MCU TINKERCAD SIMULATION



[YouTube Link](#)



FUTURE WORK



FUTURE WORK

TranzVolt 2.0

Company: Tie Down
Project Leader: Dakota Survanice

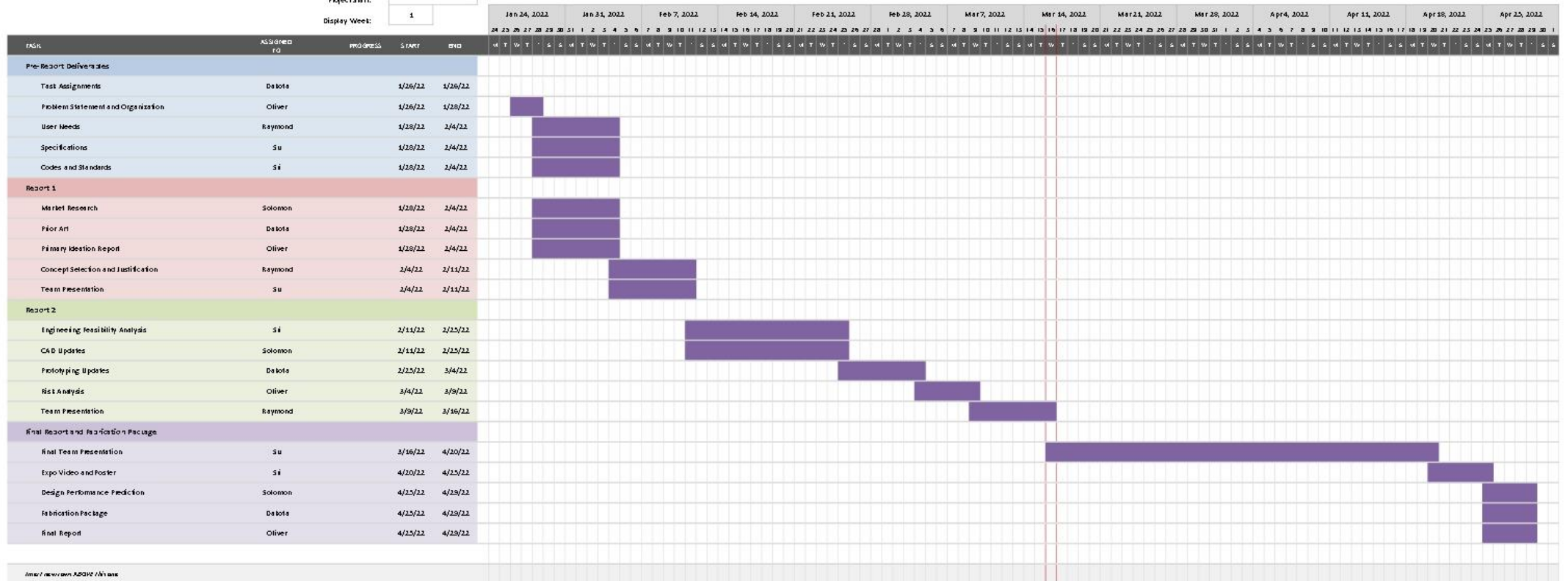
SIMPLE GANTT CHART by Vertex42.com

Project Start:

Wed, 1/26/2022

Display Week:

1



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THANK YOU