To Predict ▶ To Design ▶ To Perform

College of Engineering
Department of Mechanical & Industrial Engineering

ME, ECE, IE Capstone Design Programs

Champions of the First Bengal Bot Brawl

Project #17: Combat Robot #1 – "Goliath"

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VALERO

Objective:
Design and build a robot to compete in the Robot Battles competition
- Electrically powered and safely controlled
- Weight Class: 12-30 lbs (±2.5%)
- 16 ft x 16 ft combat area
- Victory Conditions:
  - Ring out – Push opponent out of combat area
  - Disable/destroy opponent

Design Goals:

Highly Mobile Durable Powerful Efficient Safe

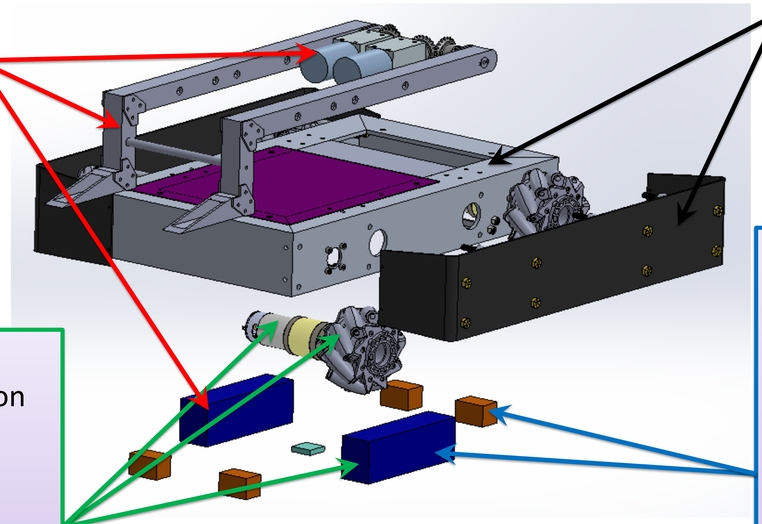
Testing and Validation:
- Drive: Speed and torque tests
- Weapon: Weight lifting capacity
- Frame and Armor: Impact testing
- Electronics : Current-voltage tests, signal analysis, control test model

Manufacturing:
- Ordered stock material and off-the-shelf components
- Hand machined parts to specification in the AMMF

Safety:
- Operational safety
- Kill switch functionality on robot included
- Delicate components housed appropriately
- Proper use of manufacturing and testing equipment

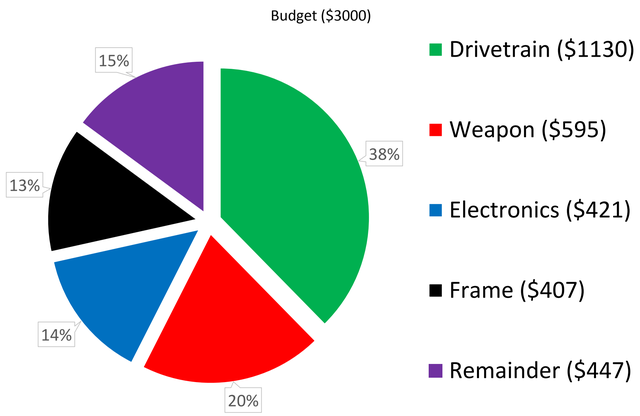
Weapon (Flipper):
- Motor provides 188lb-ft. of torque to weapon via miter gears
- Weapon arm used to upend opponents of up to 30lb and self-right
- Materials:
  - Al 6061-T6
  - Al 7075-T6
  - Steel Miter Gears
  - Banebots RS-550
  - Turnigy 5000mAh 3s 30C LiPo pack

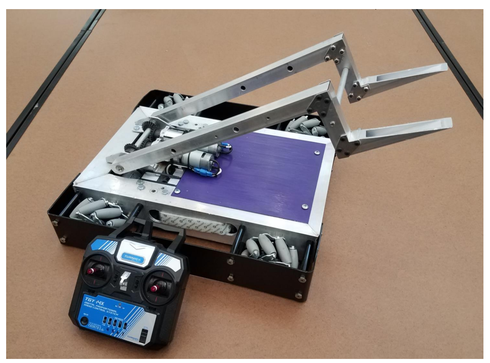
Drivetrain (DT):
- Omnidirectional propulsion at speeds up to 10ft/s
- Materials:
  - 4" steel mecanum wheels
  - Andymark 9015 DC Brushless Motor
  - Turnigy 5000mAh 3s 30C LiPo pack



Frame and Armor:
- Frame provides structural support and place to mount components
- Armor provides defense from impacts
- Materials:
  - 6061-T6 Al Angle (frame)
  - 7075-T6 Al (armor)

Control:
- ESCs (x6) scale input voltage from battery to motors according to receiver + mixer input signal
- Receiver + mixer: receives and interprets servo signal from controller for mecanum drive operation
- Materials:
  - Mecanum Mixer
  - 320A 7.2V-16V High Voltage ESC
  - Axial AX24259 ESC
  - Turnigy TGY-i4X
  - RC Turnigy 2300mAh NiMh receiver pack





	Design Specifications	Tested Specifications
Weight	30 lbs	30.55 lbs
Dimensions	24"x17"x5"	26"x17"x5"
Maximum Speed	7 ft/s	10 ft/s
Lifting Capability	30 lbs	30 lbs
Battery Life	40 min	40 min

Brainstorming (Sept. 2016) → Research (Sept. 2016-Oct. 2016) → Design (Oct. 2016-Dec. 2016) → Manufacturing & Testing (Jan. 2017-Apr. 2017) → In House Competition (Apr. 4, 2017) → Final Testing (Apr. 2017-May. 2017) → National Competition (May. 2017)

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