

Main challenges:

Current limiting

- 40W limit from ref sys
- Needs regulation, probably feedback

Capacitor selection

- There are a lot of caps out there
- We looked on DigiKey
- $E = .5C \cdot V^2$

Output regulation

- HKUST: uses no output regulation. HKUST has a 10kJ, 30V cap bank
 - Extremely simple
 - As voltage drops, the ESCs drop out and motor speed limit decreases
 - V proportional to angular velocity
 - I proportional to torque

HKUST uses

Battery → PDM → buck converter → capacitors → ESCs (motors)

UW uses

Battery → PDM → current controller → capacitors → boost converter → ESCs (motors)

This is good for controls loops and getting extra energy out of the caps

This is extremely complicated

Our system precludes regenerative braking

Validate the power draw of robots at high speed with different field materials?

Capacitor failure modes:

- Overheating
 - Ripple current
- Overvoltage
 - Dielectric breakdown
- It explodes and ejects oil/particles. If it explodes it is because the oil is really really hot.