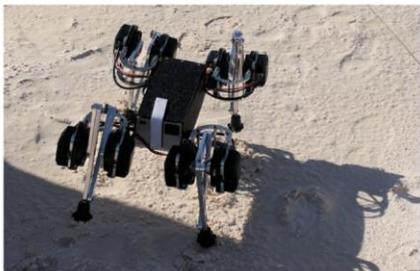


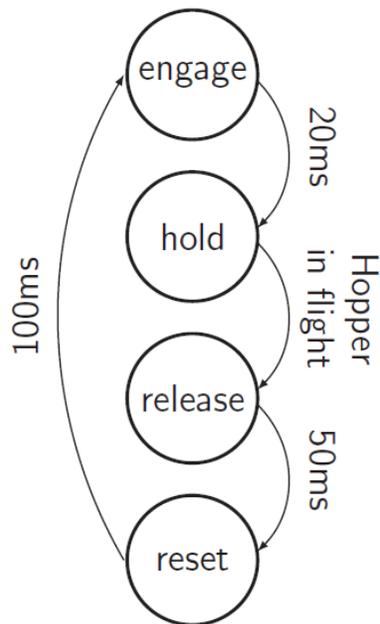
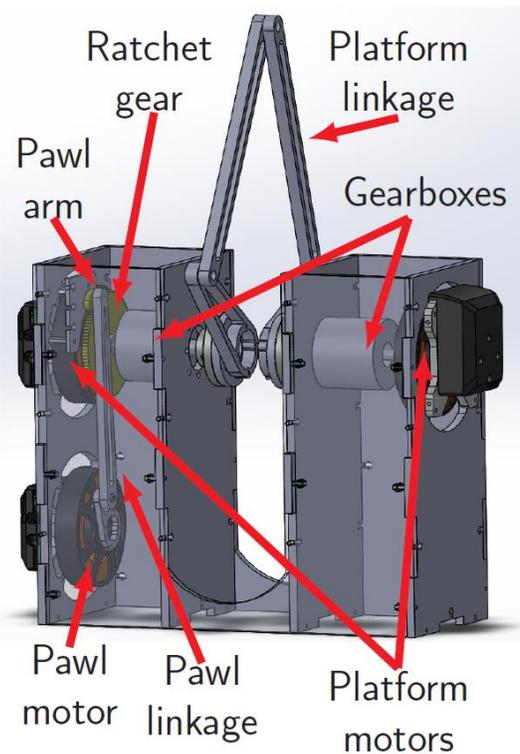
## MOTIVATION

Minitaur can use its direct-drive legs to sense erodibility but cannot run for more than a few minutes in the desert (White Sands, 2017)



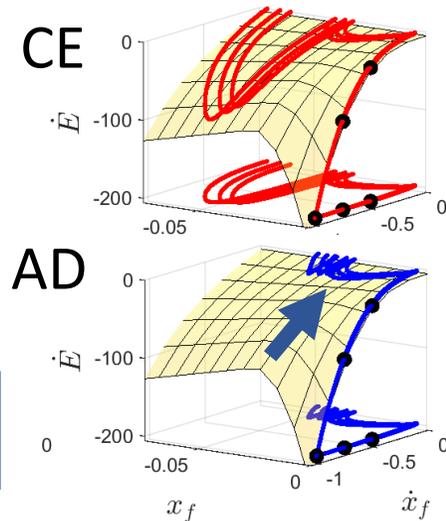
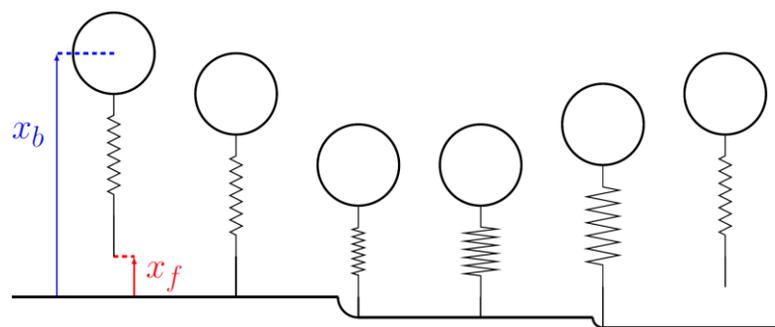
## NOVEL EXPERIMENTAL SETUP

Hopped single Minitaur leg on **ground emulator** programmed with sand force functions



## NOVEL JUMPING CONTROLLER TO REDUCE ENERGY LOSS

**Active damping** controller reduces energy transferred to dissipative ground in comparison to standard **compression-extension** controller by reducing foot intrusion velocity



$$F_{AD} = -(b_{AD} \cdot \dot{x}_f) \cdot (\dot{x}_b - \dot{x}_f)$$

## RESULTS

AD controller gives consistent energy savings in comparison to CE controller, with no loss to jump height

