Viability-based control of a planar hopper

- Not limited to periodic motion

- Robust to unknown terrain variations

- Accomodates real-time user input

$z_a(x) > \bar{z} \implies x \in \mathcal{S}$

$z_a(x)$

$\bar{z}$

x_{TD}

x_{LO}

r

x

u

θ

The controller is chosen to render $\mathcal{S}$ positively invariant

$f(x, u)$

$\mathcal{X}$

$\mathcal{S} \subset \mathcal{V}$

$\mathcal{V}$

Outside the viability kernel

Failure is inevitable

Inside the viability kernel

u

There exists some action to prevent failure