

Control Barrier Functions Meet Cyber-Physical Systems

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Ensuring safety is HARD

Motivation

We're increasingly deploying robots to safety-critical environments.



ROBCO

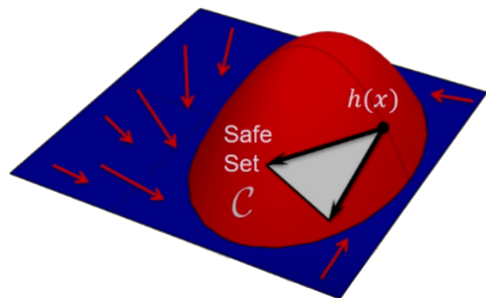


EDGAR

Real-time/ Sensor and actuator noise/ Uncertainties/...

¹ Inspired by Prof. Sylvia Herbert and Dr. Cherie Ho

Control Barrier Function to certify Safety



Compute control action that guarantees the agent never escapes **safe set**

$$\mathcal{C} := \{x | h(x) \geq 0\}$$

\Rightarrow The function $h(x)$ is a **control barrier function** if $\sup_u \dot{h}(x, u) \geq -\alpha(h(x))$ for all $x \in \mathcal{C}$

Control Barrier Function to certify Safety

Your tasks

- Literature review on Control Barrier Functions (CBF) and its combination with other techniques
- Summary of the main ideas of using CBF in different contexts
- Comparison and discussion

Requirements

- Basic knowledge of motion planning (beneficial)
- Basic knowledge of control theory (beneficial)

Interested? Contact me!

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