

# Synthesizing Infinite-state Reactive Systems

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- Reactive Systems : Always safe against unpredictable environment
- Realizability : “Does an implementation exist for my spec?”
- Synthesis : “Generate a witness!”
- Boolean spec : Polynomial time for General Reactivity (1)! 😊
- But, we (always) want more...
  - “What if my spec admits infinite theories?”
  - $x > 0 \Rightarrow -3y \leq 3.85$
  - “While the button is pressed, the infusion pump shall deliver no more than 0.2mg above the standard dosage”

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- Infinite-state reactive system synthesis with JKind
  - Formal Verification techniques for infinite-state synthesis
  - K-Induction
  - Greatest fixpoints
- Future Work: Witnesses simulating nondeterministic behavior!
- “Why?...”
  - Robot motion planning (Controllers with random, difficult to learn strategies)
  - Model-based Fuzz Testing (Synthesized fuzzers reactive to the system-under test)
  - ...possibly even more!
- Want to learn more? Poster session!