

TOOL PAPER

Mixed-Reality Robot Behavior Replay: A System Implementation



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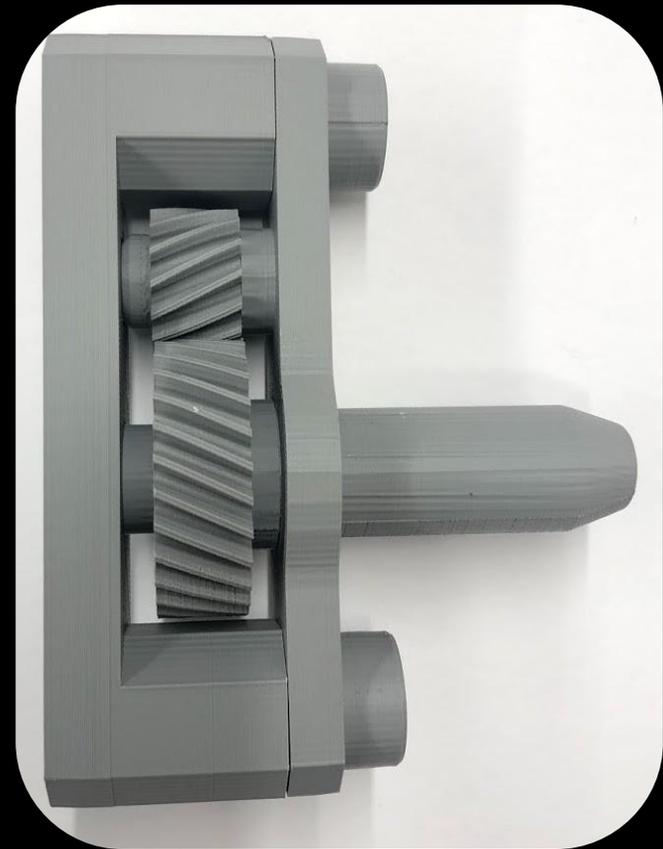
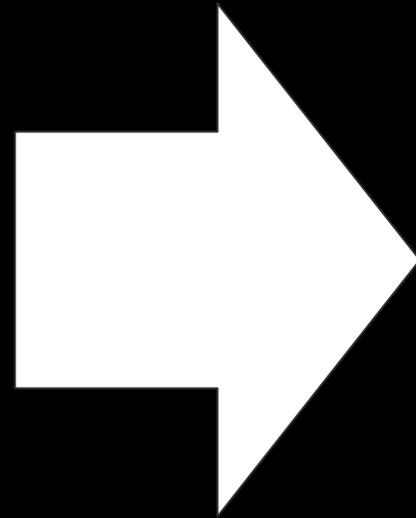
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Placing screw

4x

Motivation: Failures Happen When You Are Away



Mistaking
table corner
as screw

**What did you
do at the
screw table?**

**I grasped
a screw.**

...



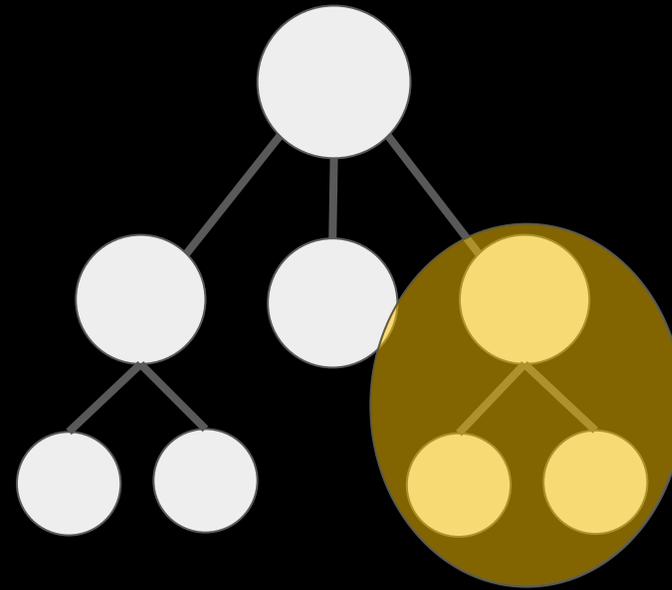
Mixed-Reality Robot Behavior Replay



Robot Behavior Replay Implementation

Behavior Representation

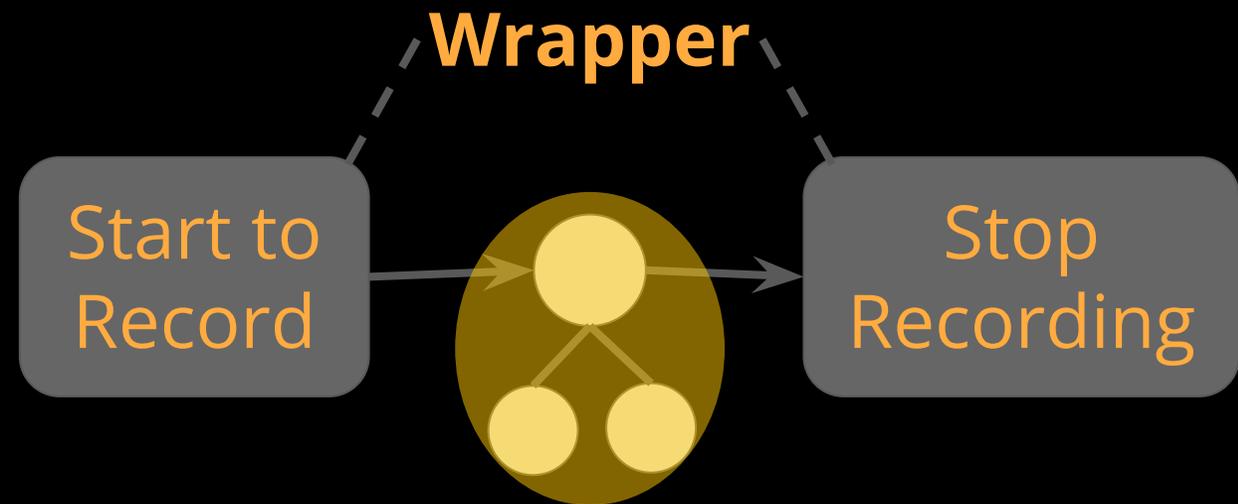
- Behavior Tree
- Easy to separate & reason about behaviors



Robot Behavior Replay **Implementation** (cont'd)

Behavior Storage & Recording

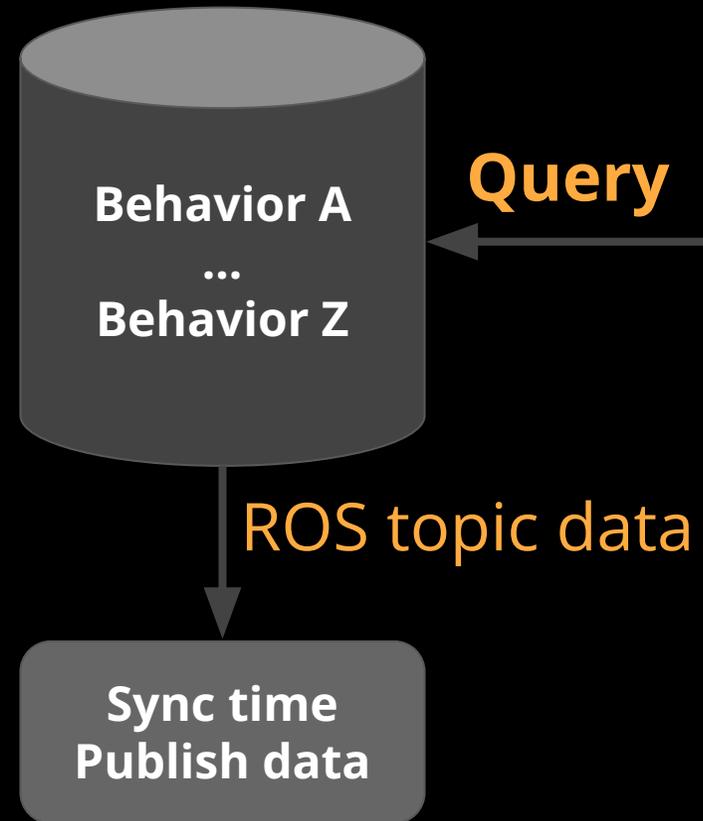
- MongoDB (NoSQL)
- Store any types of ROS messages
- Wrapper to record relevant topics



Robot Behavior Replay **Implementation** (cont'd)

Behavior Replay

- Query behavior
- Receive ROS topic data
- Sync. time & publish data



Generalization: Navigation Replay



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Main Takeaways

1. Robot may fail to explain past behavior.
 2. Our tool helps visualize previously executed behaviors.
 3. It is open-sourced at github.com/umhan35/robot-behavior-replay with instructions.
 4. It generalizes to any behavior you can do with ROS.
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