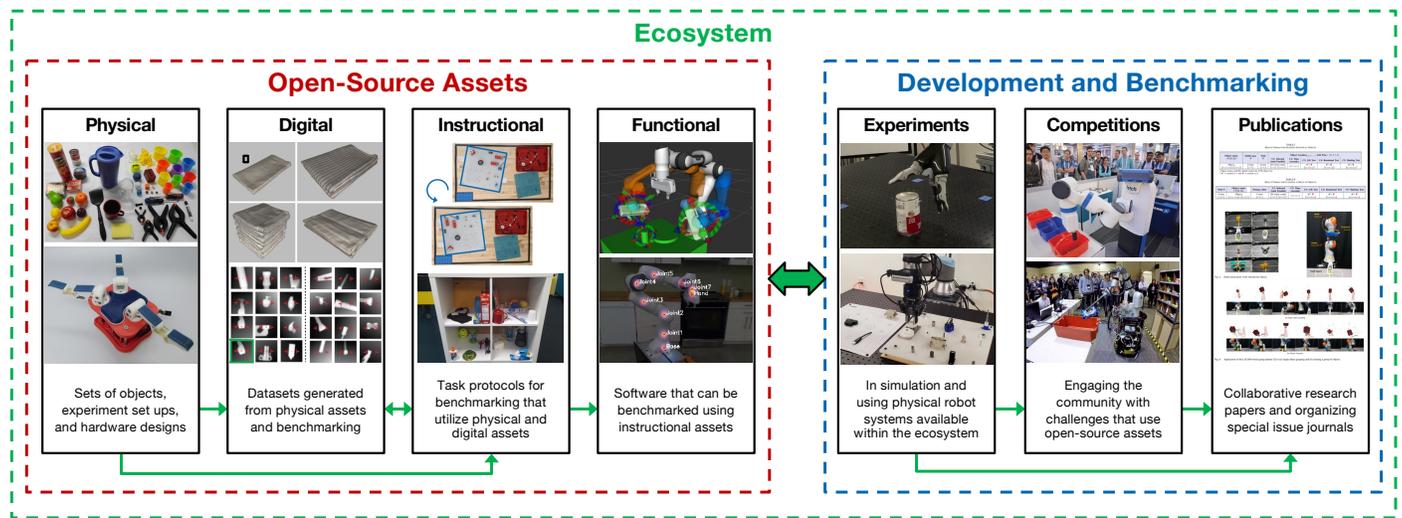


# Collaborative Open-source Manipulation and Perception Assets for Robotics Ecosystem (COMPARE)

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To advance the robotic manipulation open-source ecosystem, systematic development and benchmarking methodologies to assess and compare different algorithms and strategies are needed. The lack of an active and effective mechanism to disseminate and utilize the available datasets and benchmarking protocols reduces their impact and utility. Unified efforts in the development, utilization, and dissemination of open-source assets and benchmarking can aid in achieving this goal. During this workshop we will discuss the current gaps in the robotic manipulation open-source ecosystem and future solutions to improve it through benchmarking.

## Open-Source Ecosystem for Robotic Manipulation and Benchmarking



## Current Gaps

Based on an online survey of over 100 respondents to provide feedback on the current state of open-source assets and benchmarking resources for robotic manipulation, those that were manipulation researchers (57%) rated the following statements as *Never*, *Rarely*, *Sometimes*, *Often*, or *Frequently* (results below are ordered from highest to lowest frequency):



### Barriers

1. My research is limited by a lack of relevant comparable benchmarks in the field
2. My research is limited by current robot simulation capabilities
3. I face barriers when attempting to integrate open-source assets into my research
4. My research is limited by a lack of relevant open-source assets in the field
5. My research is limited by access to robotic hardware

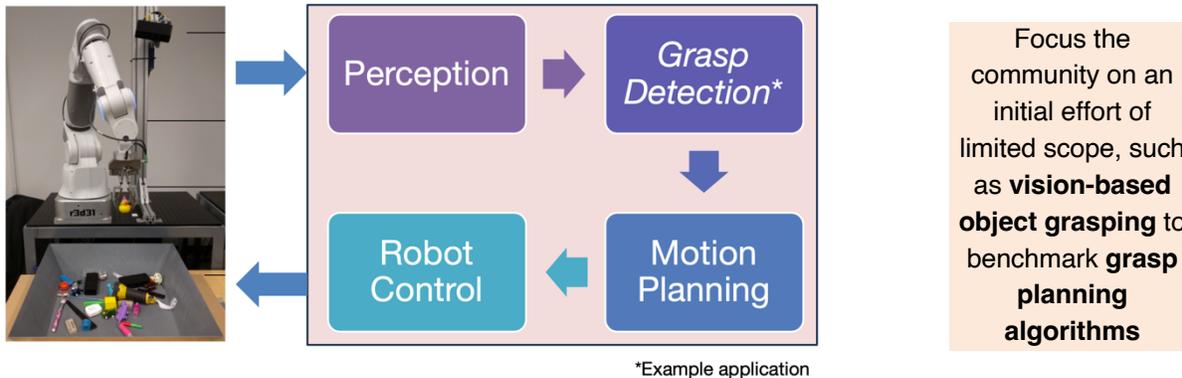
### Activity

1. I learn about the availability of new open-source assets
2. I utilize open-source assets (e.g., YCB Object Set, Cornell Grasp Dataset, GPD) in my research
3. I benchmark my robotic manipulation research to others in the field
4. I contribute to open-source for robotic manipulation

# Proposed Future Solutions

## ▪ Modular Benchmarking Software Pipelines

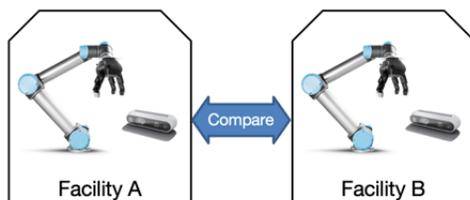
Developing infrastructure to enable open-source assets to be more readily used, developed, and benchmarked by the community across multiple applications and hardware, lowering the barrier to entry using a modular software pipeline.



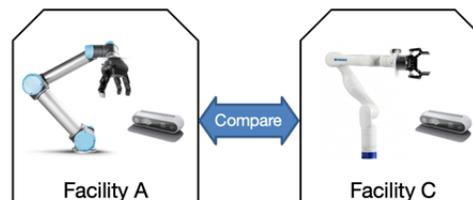
## ▪ Distributed Physical Benchmarking Facilities

A network of research labs with varying robotic manipulation capabilities that share resources and conduct robust benchmarking of solutions, establishing a benchmarking service exchange program (i.e., host X tests, get X tests).

**Replicability** (same parameters as source)



**Generalizability** (some variable parameters from source)



## ▪ Online Community Resources

Organized repositories of open-source assets (e.g., object sets, 3D models, datasets, hardware designs, etc.) and benchmarking results of robotic manipulation solutions (similar to Papers with Code) as well as online forums for discussion (e.g., ROS Discourse) and prioritization of community efforts (e.g., Reddit upvote/downvote system). Developing a ROS Enhancement Proposal (REP) for integration of benchmarking results into ROS packages.

## ▪ Working Groups and Advocacy

Establishing advisory committees and working groups to review and provide feedback to contributed open-source assets, benchmarking tools, and benchmarks so that they meet established standards. Advocacy of open-source and benchmarking best practices into existing working groups (e.g., IEEE TCs) and pushing for conference/journal submission acceptance criteria to favor comparative benchmarking and leveraging of open-source assets.



**Want to follow along with our developments? Interested in contributing?**

**Please contact us using the e-mails on the other side or join our Slack!**

[robot-manipulation.org](http://robot-manipulation.org)

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