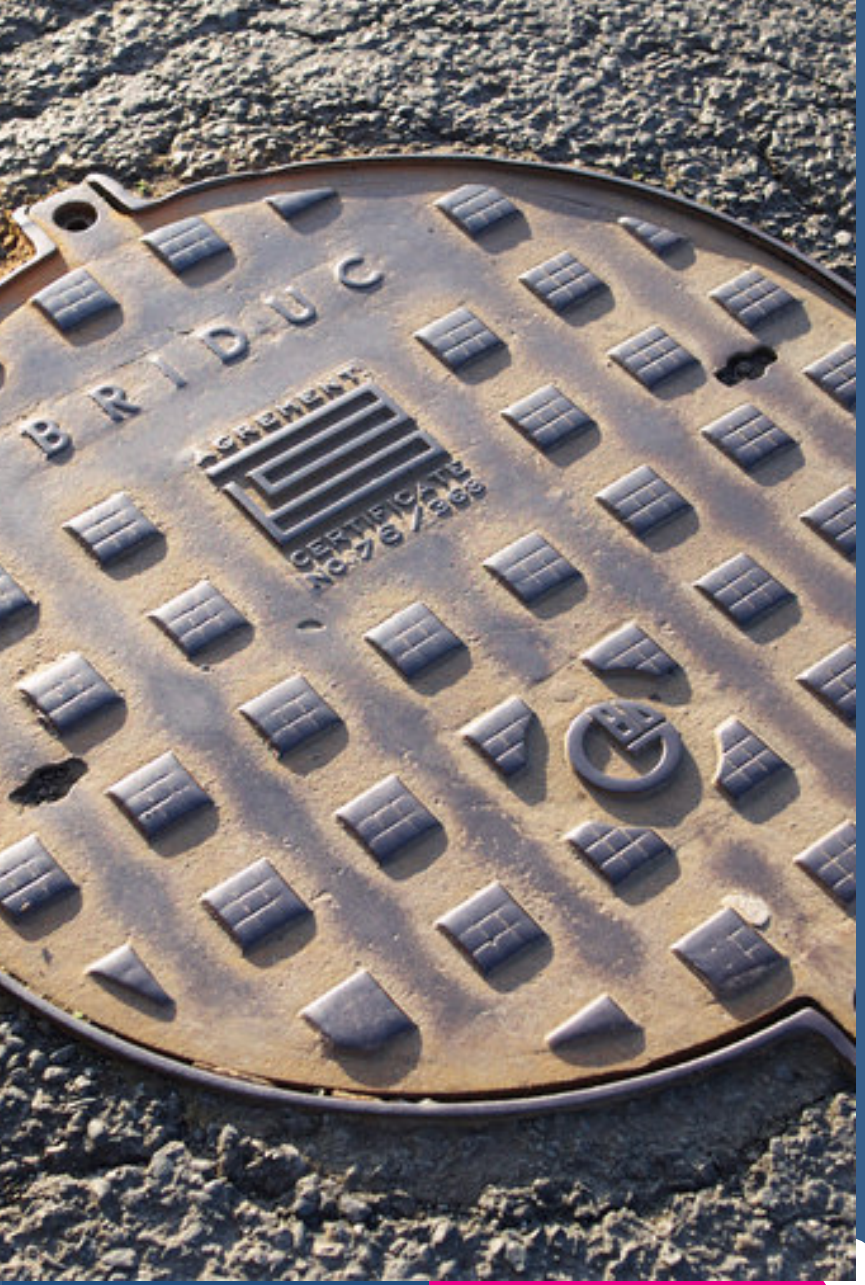
# XOOPT – CIVICBOT

# THE MANHOLE CLEANER




# THE PROBLEM

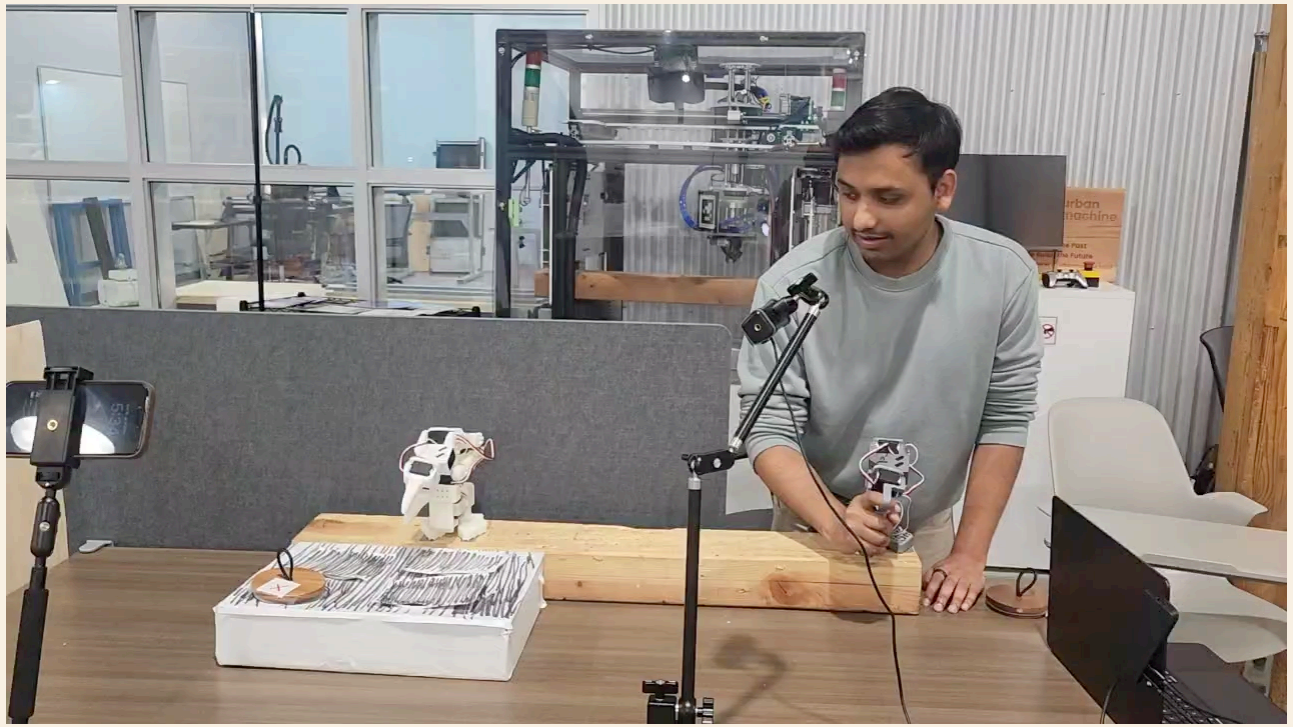
# A CRISIS UNDER OUR FEET

- 1 life lost every 5 days in India from manual sewer cleaning. (Source: National Commission for Safai Karamcharis)
- 100+ worker deaths annually in the U.S. from working in these confined spaces. (Source: U.S. Bureau of Labor Statistics / OSHA)
- This isn't an acceptable risk; it's a global failure of safety and dignity.
- We knew technology could provide a better, safer way.

# OUR SOLUTION

- Our solution is a fully autonomous robot that handles the entire hazardous workflow using a set of specialized AI skills.
- It Sees & Plans: The robot uses its camera and a Vision-Language Model to understand the requested task.
- It Acts with Skill: We trained separate, expert policies for each critical step:
  - Opening the Lid
  - Clearing Debris
  - Closing the Lid
- It Completes the Mission: We train by splitting long horizon tasks into multiple simpler prompts and train it by instruction tuning and curriculum learning.

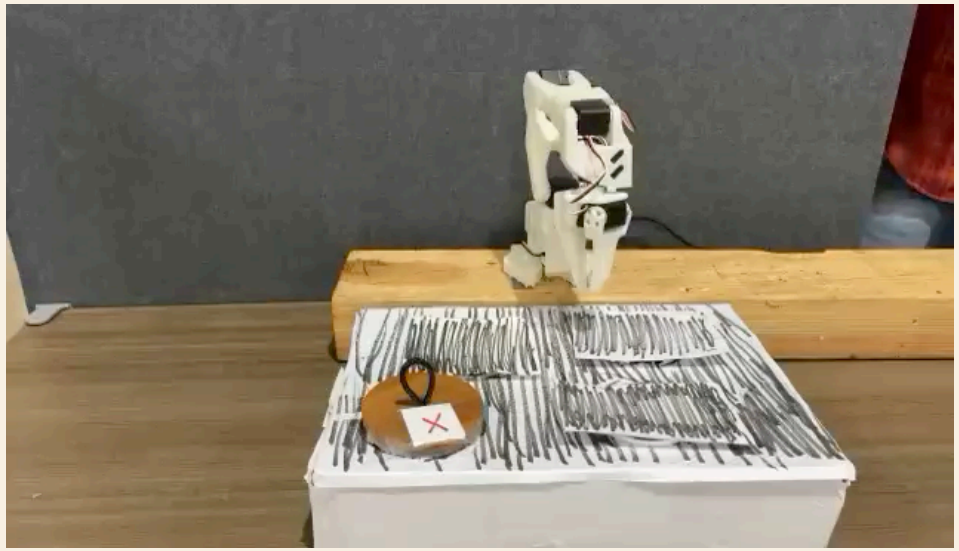
# WORKFLOW



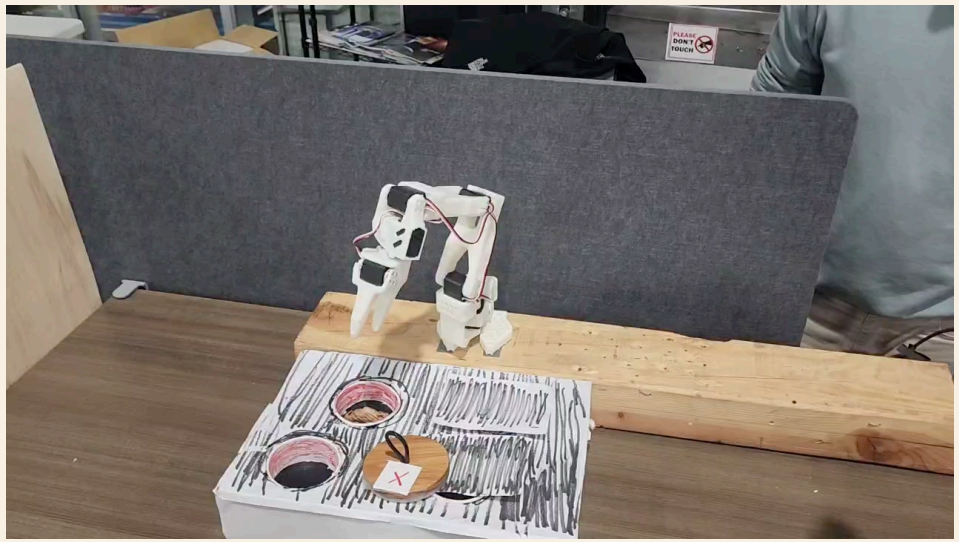
# TECHNICAL SPECS

- We trained both ACT and SmolVLA to perform this task of Debris removal from manholes
- Compute: Nvidia A10G/L40S (Thanks to lightning.ai)
- We trained models for 6-8 hours as well as 30 minutes with limited data (30-50 experiments)
- Our model (ACT with limited training) worked the best in performing this task with imitation learning.

# INFERENCE VIDEOS



Picking up lid



Picking up debris

# DATASETS

- rohanc007/record-only-pick-lid-single
- rohanc007/record-remove-debris

(We couldn’t add ourselves to the hugging face org hence sharing the datasets here)

# FUTURE WORKS

- We will include guidance from VLM models such as ChatGPT to provide more finer and precise control and detect when a task is complete.
- The strength of VLM models will help us improve precision for robots (this will be agnostic to robot )

# THANK YOU

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