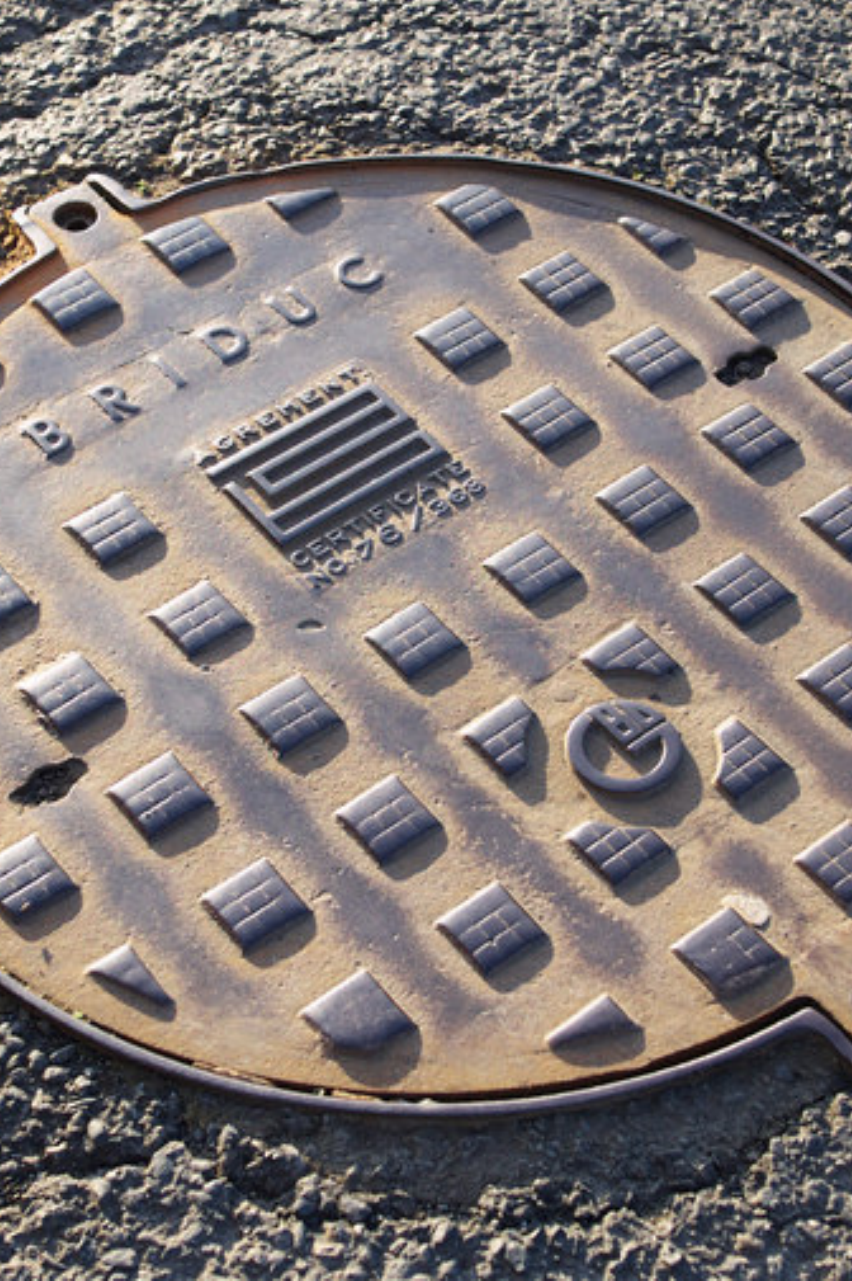




XOOPT – CIVICBOT

**THE MANHOLE
CLEANER**



THE PROBLEM

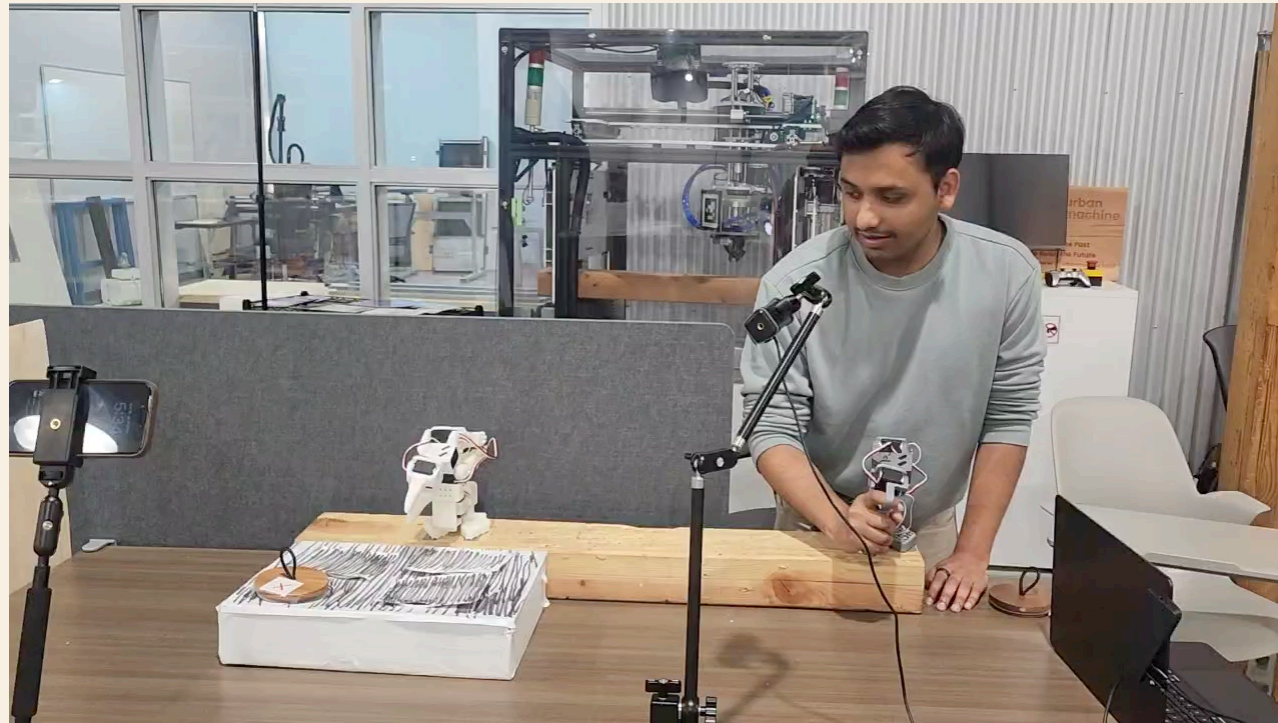
A CRISIS UNDER OUR FEET

- 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



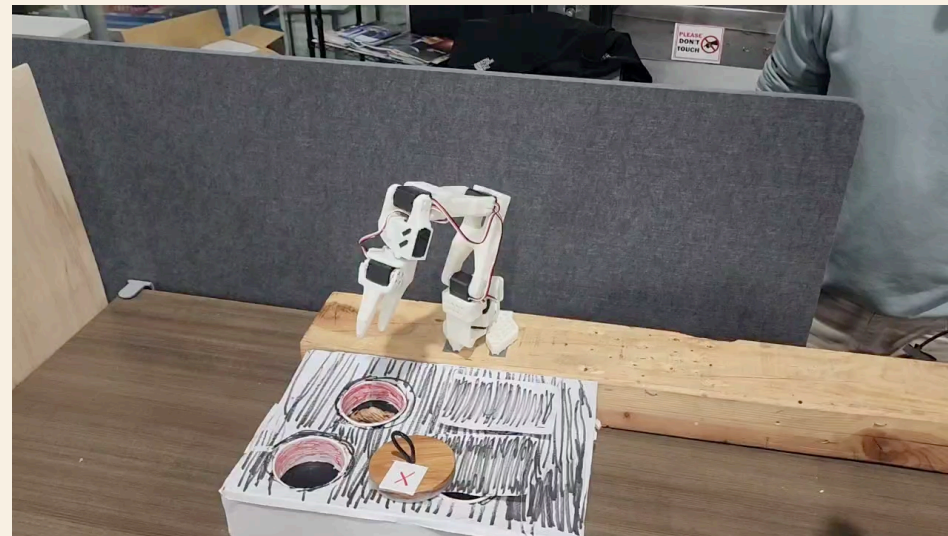
TECHNICAL SPECS

- 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)

An abstract geometric design on the left side of the slide. It features a dark blue background with various geometric shapes and patterns. A white circle is positioned near the top left. Below it, a light blue semi-circle is visible. To the right of the semi-circle, there is a pink triangle with diagonal lines. Further down, there is a pink square with a pattern of concentric lines. At the bottom, there is a pink triangle with a solid color. The design is composed of various shades of blue, pink, and white.

THANK YOU

Ankur, Gaurav, Gauri, Rahul, Rohan