Monsoon Semester 2022

IL213: Innovation Lab & Grand Challenge Studio 3

PLAKSHA UNIVERSITY

Detect'O

BY TEAM 21

Motivation

- Underground water pipe leaks can be a problem for many people: government agencies people living in the vicinity of the leading pipe-inspection companies.
- A leaky pipe can cause inconvenience to end users and people interacting with the effects of broken infrastructure is a loss for companies transporting water/gas etc.

Problem Statement

"Leaks in underground water pipes go unnoticed until they become larger and identifying the exact location is a very tedious and time consuming process."

Specifications

• Small enough to fit through the pipes, but also large enough to carry the necessary components.	✓
• Able to move through the pipes in a controlled & stable manner.	✓
• Equipped with sensors and cameras that can provide detailed information about the condition of the pipes.	✓
• Withstand the harsh conditions, including high temperatures, corrosive materials, and mechanical stress.	✓
• Has a reliable power source, such as a battery or tethered source, to allow it to operate for extended periods of time.	✓
• The robot should be easy to maintain, with easily accessible components that can be quickly replaced if necessary.	✓

Stakeholders

- **Pipe Inspection Companies** will use the robots to perform inspections of pipes for their clients, to identify issues such as corrosion, or leaks and to inspect hazardous areas.
- **Pipeline Operators** will perform inspections using robots to identify issues that affect the flow of materials and provide accurate data about the condition of the pipes.
- **Government Agencies** employ these technologies to inspect pipes for drainage systems, or to inspect infrastructure such as oil and gas facilities.
- **Industrial Users** employ this robot to inspect pipes in their facilities, ensuring the safety & reliability of their operations, and complying with regulations.

Future Timeline

Present

Sep 2022
Explored multiple domains, devised problem statement, and conducted a diverse research study

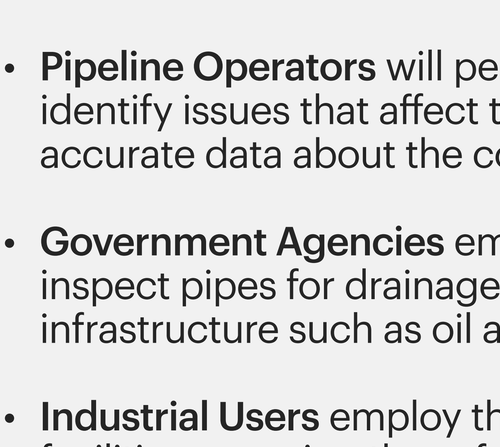
Dec 2022
Produced OKRs and KPIs with a first sneak peek of prototype with a experimenting setup

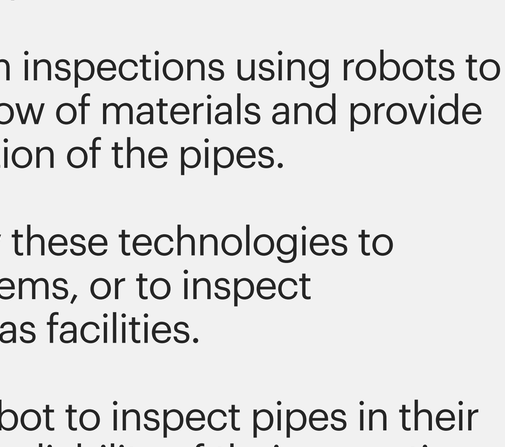
Feb 2023
Refining the (actual) prototype design & additional research with multiple in-house testing rounds

May 2023
Refinement from in-house testing rounds + Rollout for first iteration of the final robot within Plaksha campus

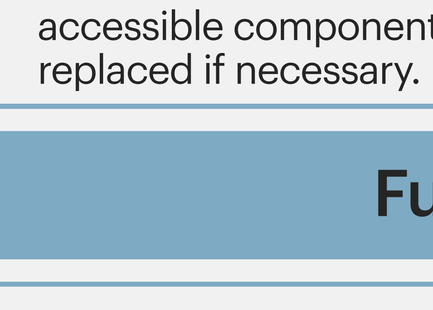
Design & Experimental Setup

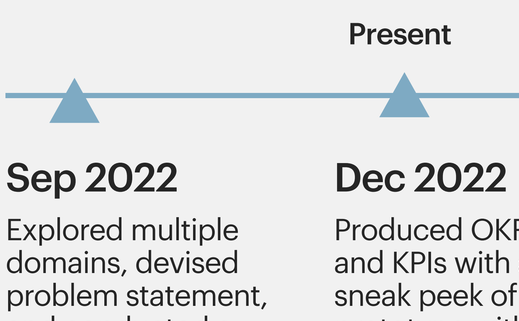
Robot Design Iterations



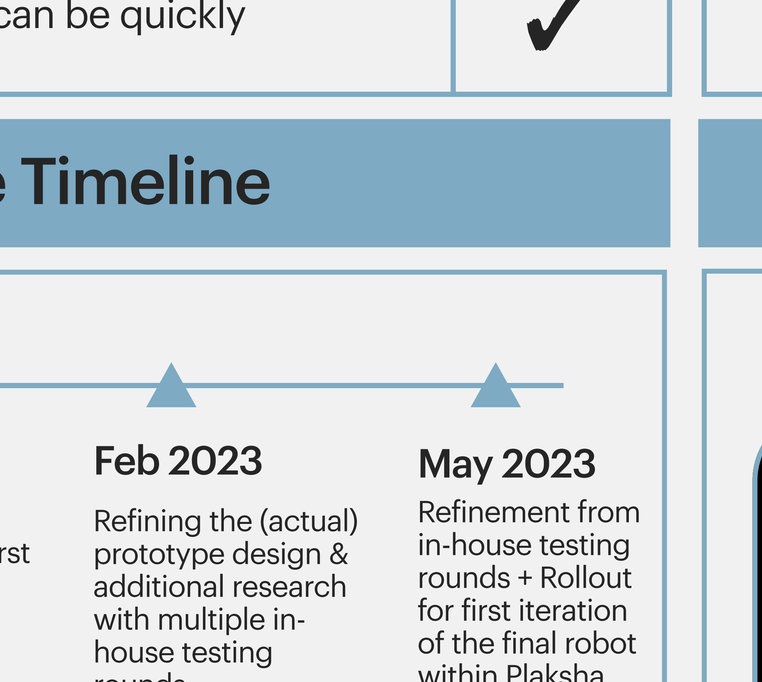


Project Renderings





Experimental Setup V1



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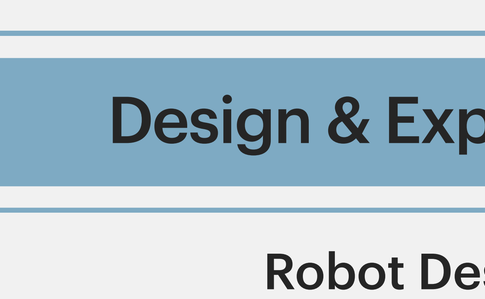
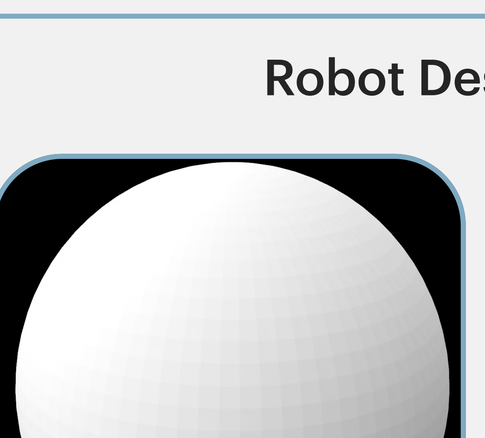
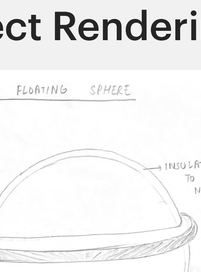


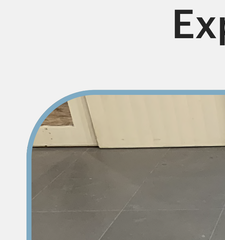


Gömböc

- Acoustic Sensors are placed inside the experimental setup, allowing to detect leaks using vibrations & water flow change.
- Endoscopic Camera has been placed inside to provide more visual comprehension of the leakage or to identify the corroded location.
- Arduino has been powering the internal infrastructure enabling us to capture data from the sensors & the camera.

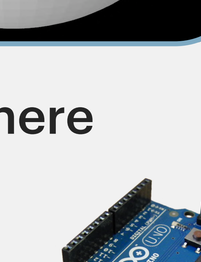
PROJECT MENTORS

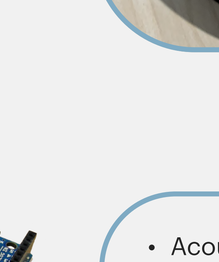

Prof. Sandeep Manjanna

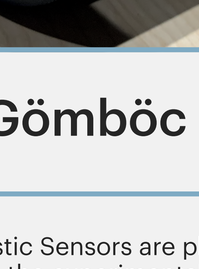

Prof. Prashanth Suresh Kumar

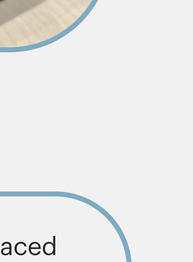
TEAM MEMBERS


Priyanshu Singhal


Rahath Malladi


Atharva Sawant


Khushi Goel


Hriday Rathi