

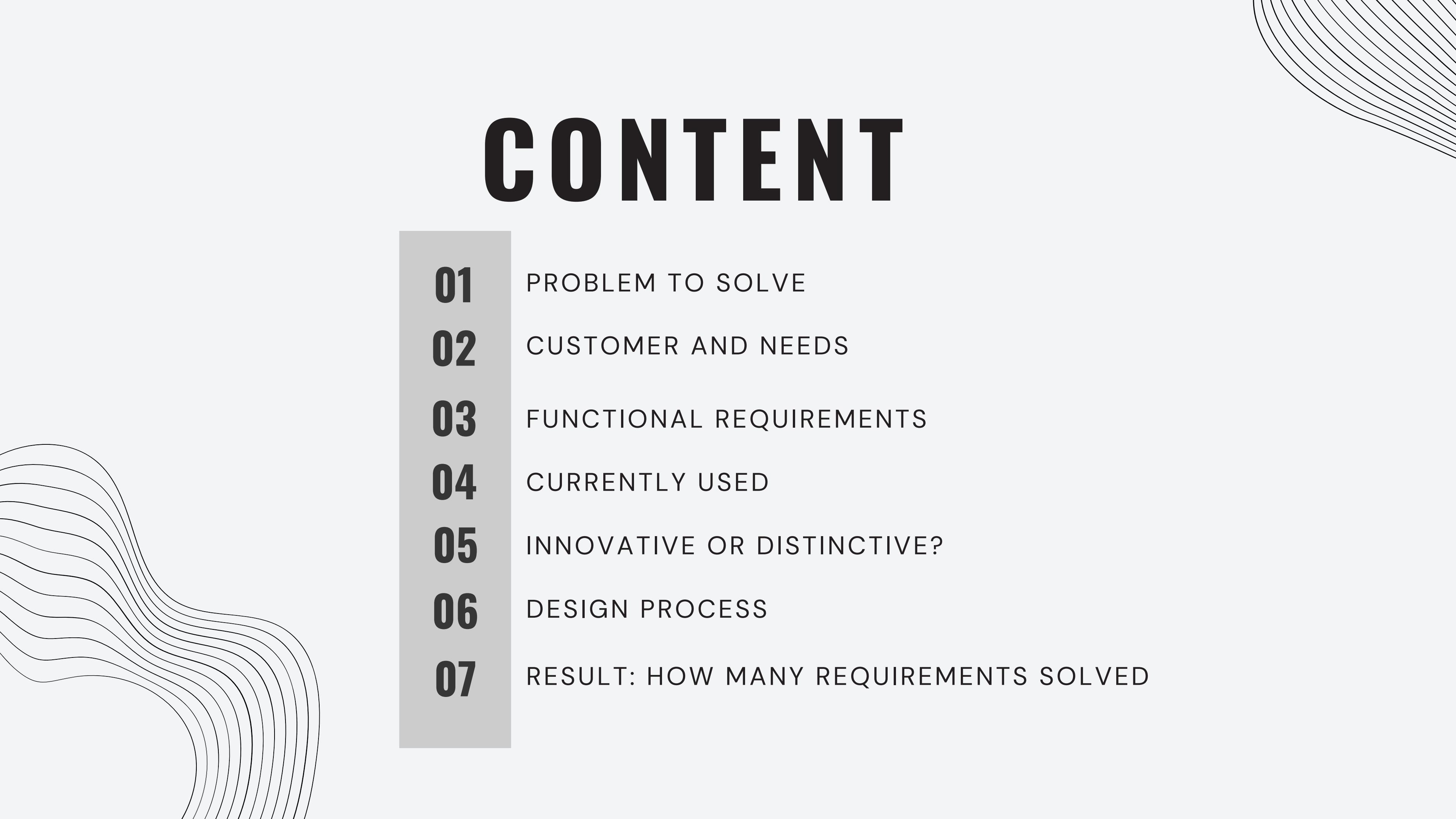


CREVICE PROBE PROJECT

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LARAN-TEK

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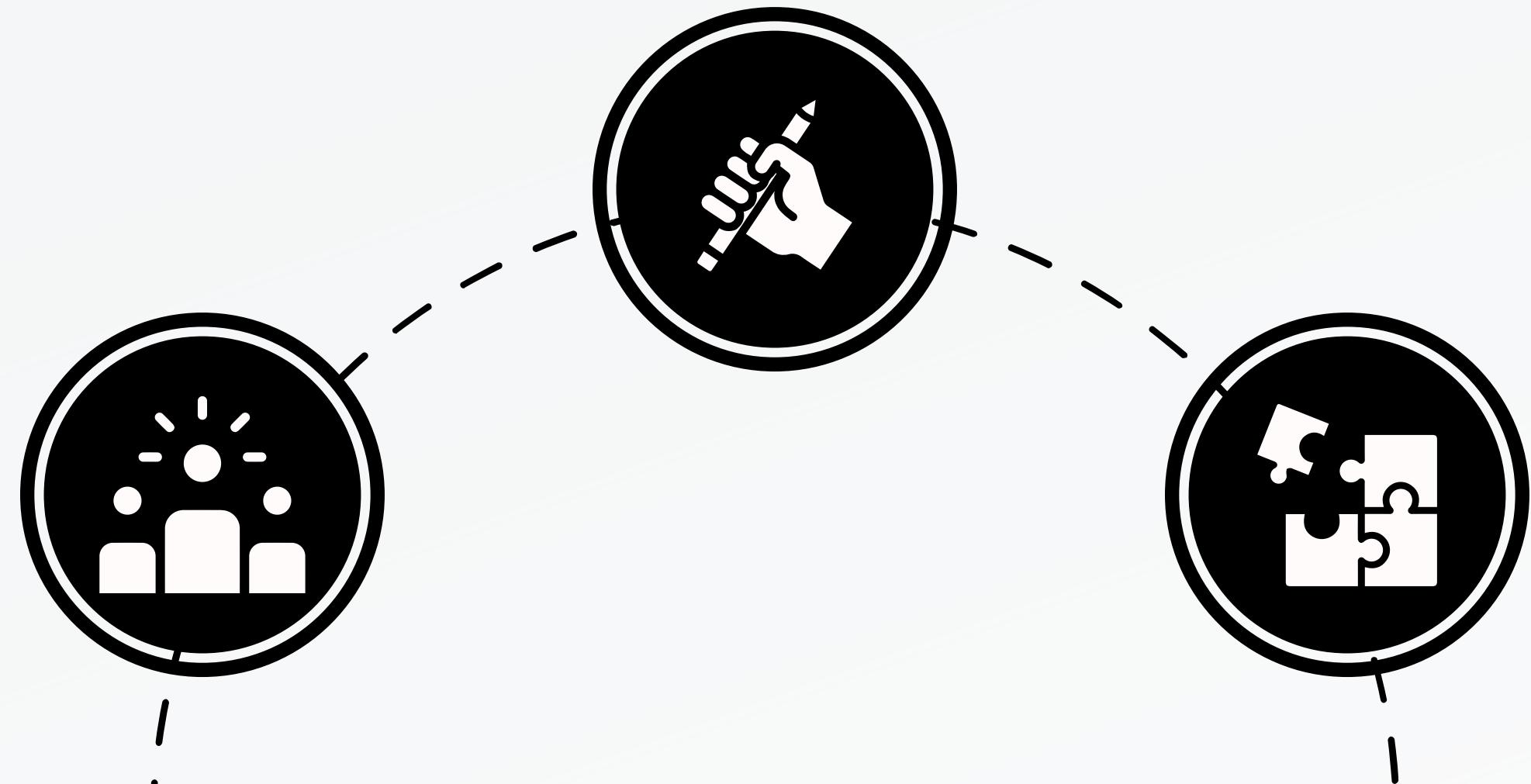
PROBLEM TO SOLVE

Problem

- Record Temperature
- Remoteness
- Insertion

Task

"Measure the temperature in a crevice in a lavafield, where humans can't come"



[1]



CUSTOMER AND CUSTOMER NEEDS

WHO CARES?

RU RIOT team, the volcanic department at the university of iceland, , specifically William Michael Moreland

WHAT ARE THEIR NEEDS?

To measure crevice temperature in places people cannot go, record the temperature and retrieve the data.

FUNCTIONAL REQUIREMENTS

Deliver data logger near a crevice, stick sensor into crevice and measure temperature, ensure the data stays intact.

FUNCTIONAL REQUIREMENTS

Functional requirements [2]



The functional requirements:

- Deliver data logger near a crevice and stick a probe into the crevice (length of cable)

physical solutions:

- Crane
- Robot arm
- Anchor and box with pulley.

We decided on the crane and further divided the functional requirements:

- Sensing environment
- Mobility within 2 sq.m
- Remote control (100-500m, but any is improvement)
- Temperature resistance (unknown)
- Probe insertion (navigate within 2sq.m and insert probe)

Functional requirements [3]



CURRENTLY USED

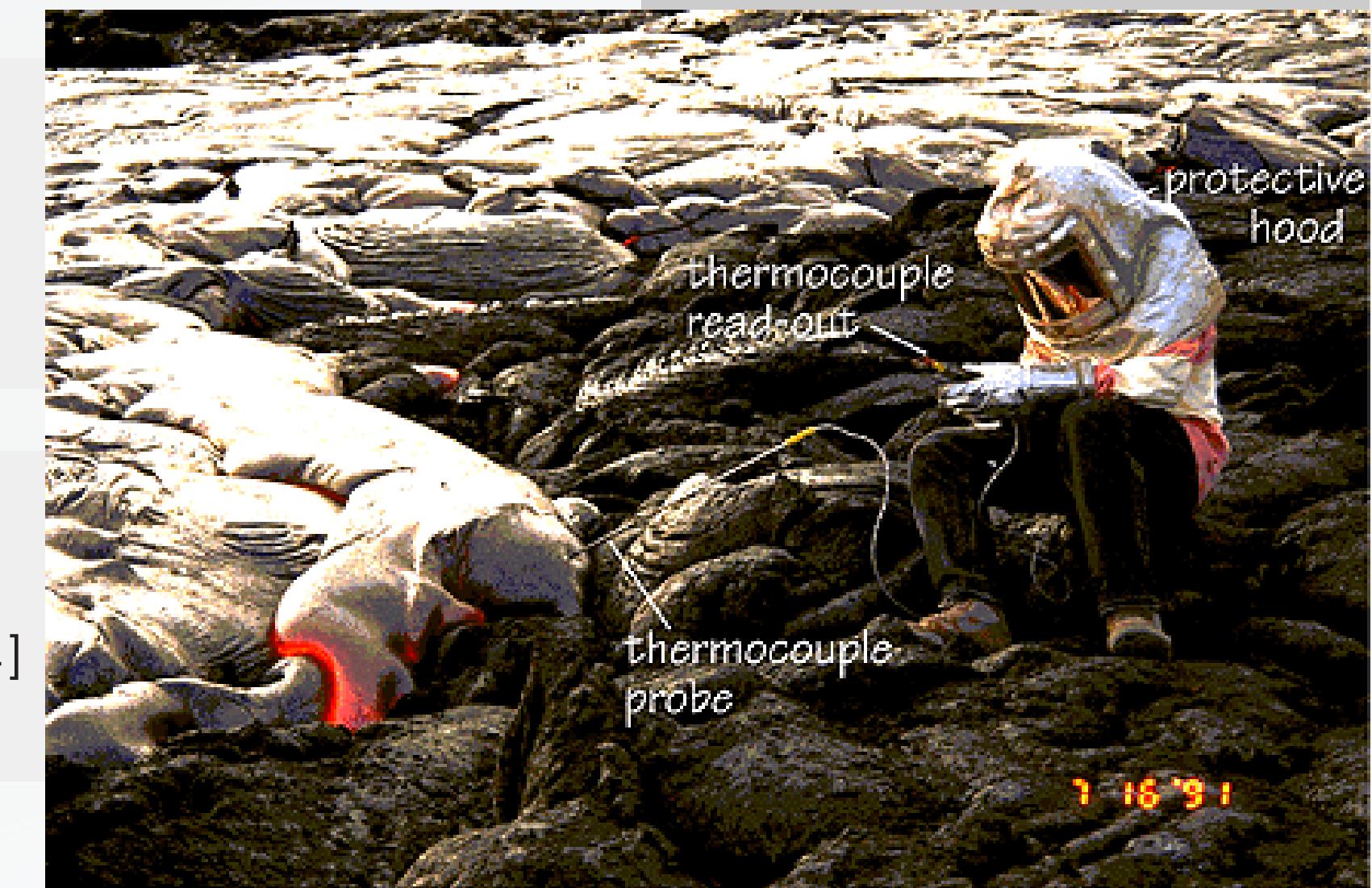


What is currently used is a probe attached to a metal stick. +accurate data -human operator -reach



What is also used is a drone with thermal camera. +more reach -less accurate data

[4]



INNOVATIVE OR DISTINCTIVE

Innovative

- Improving upon the existing design
- Repurposed
- No competitive solutions except stick

What was before?

It used to be a metal stick that delivers the probe

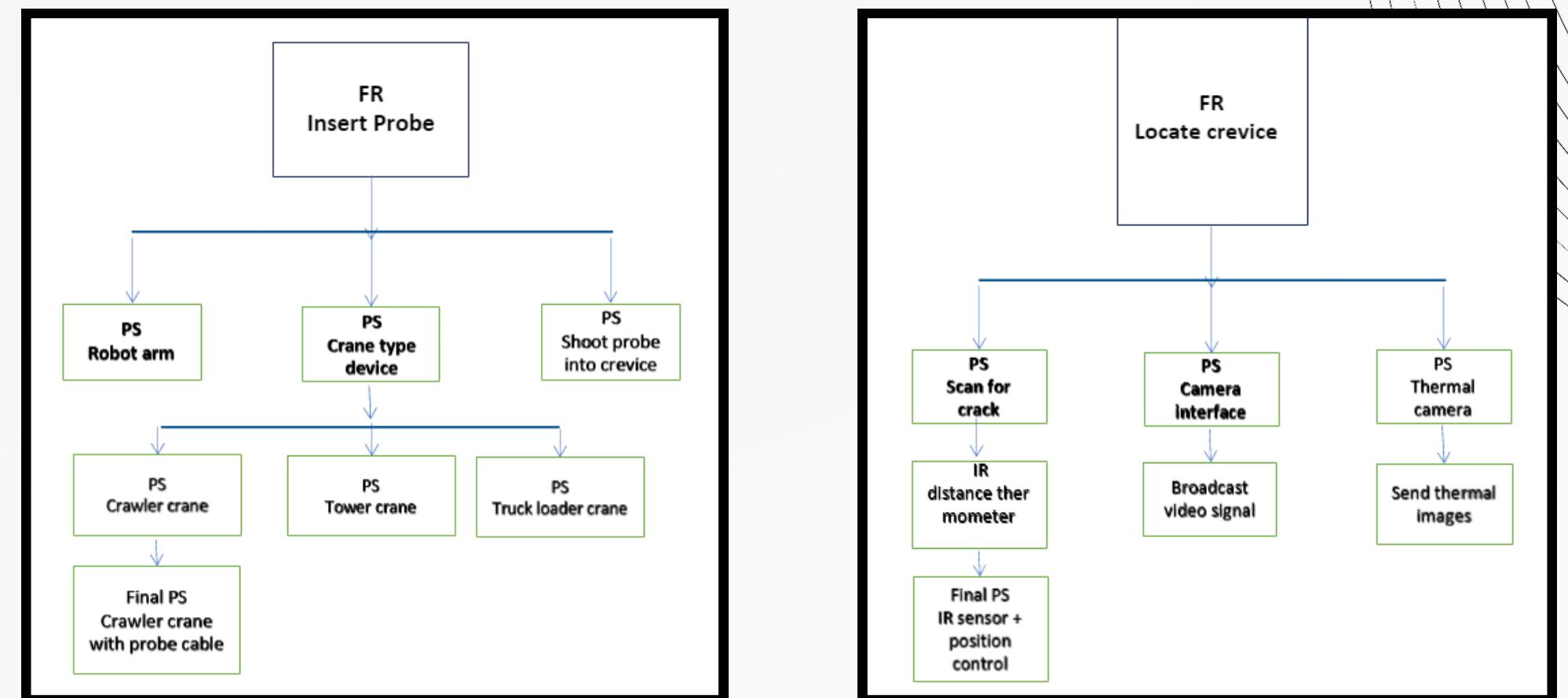
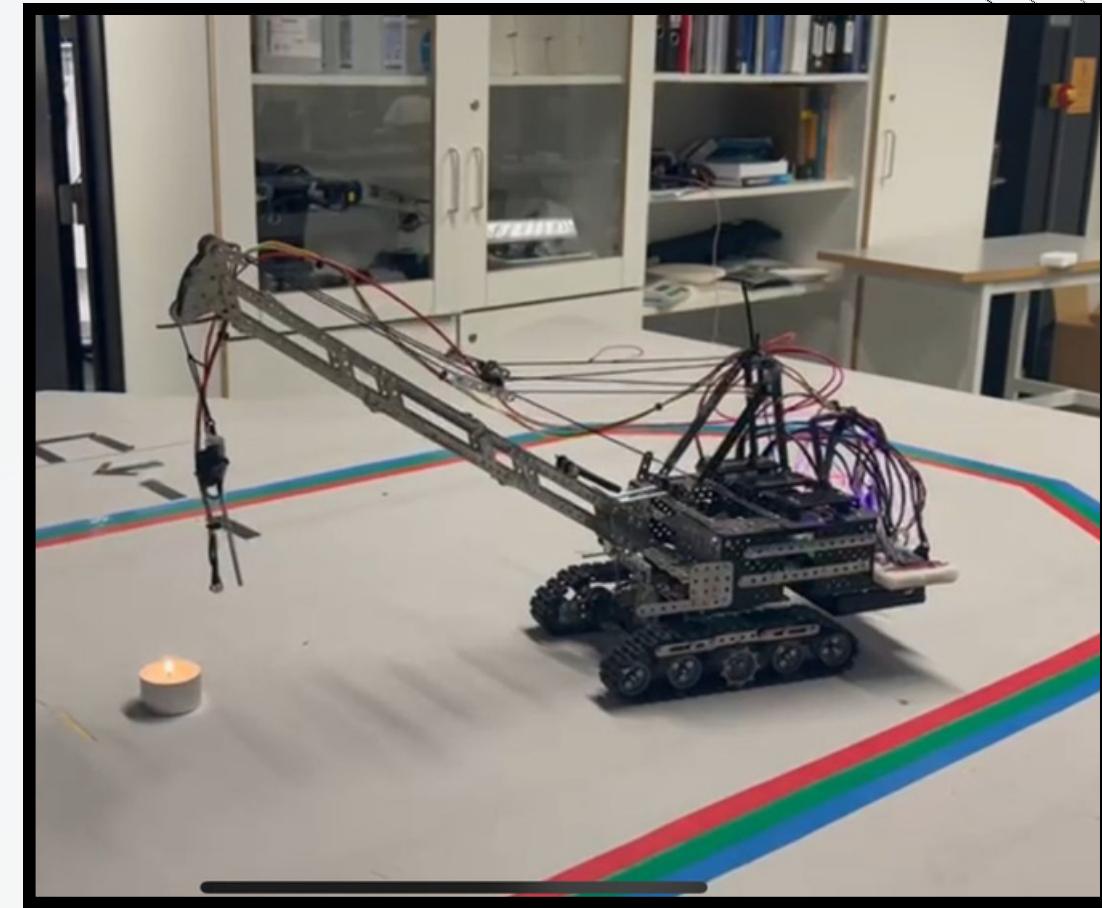


What we made

- Remotely controlled crawler crane
- Bluetooth control
 - 4 motors
 - Automation
 - Modular

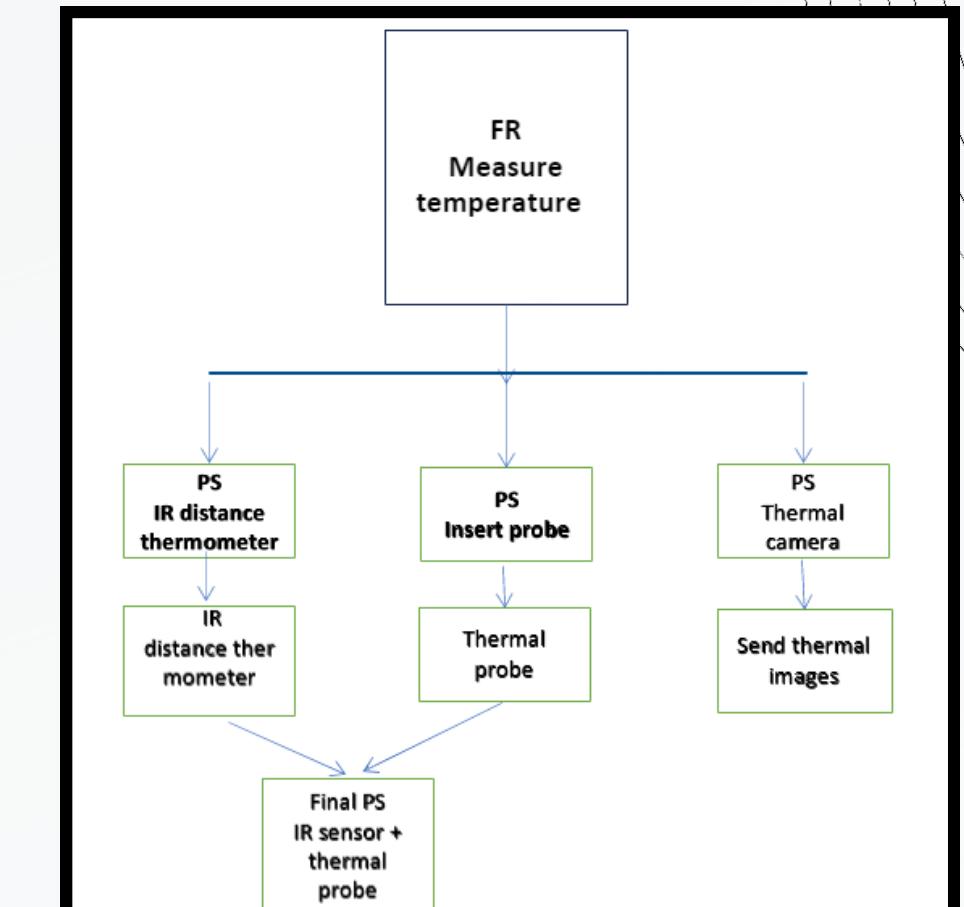
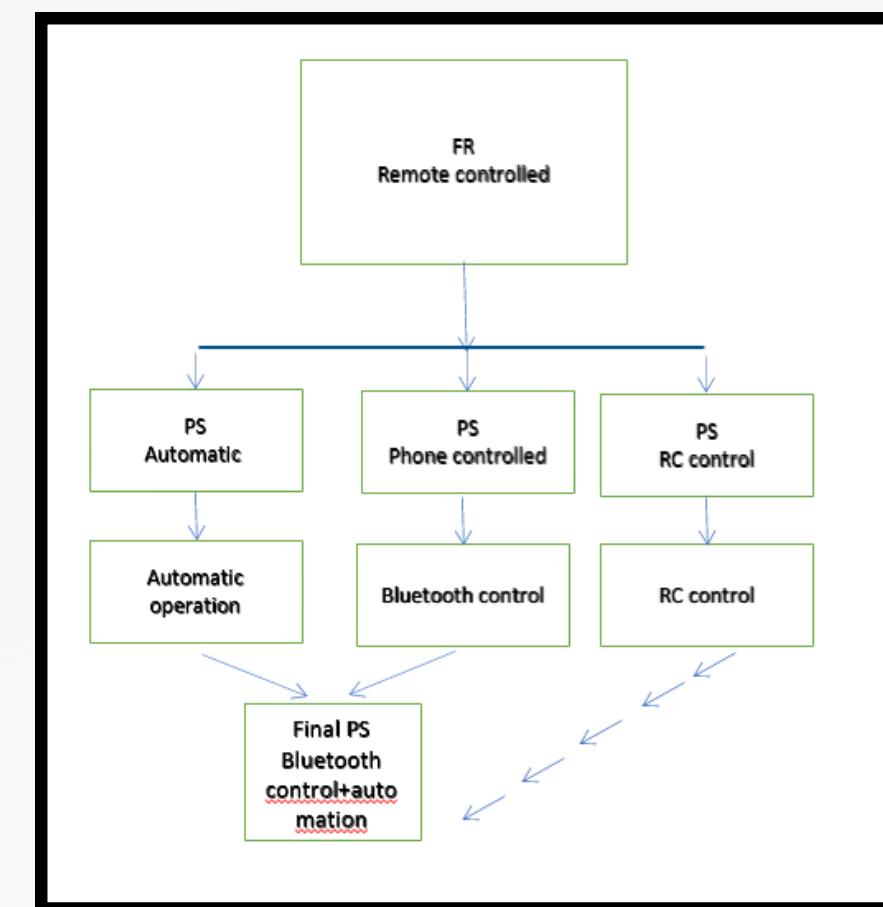
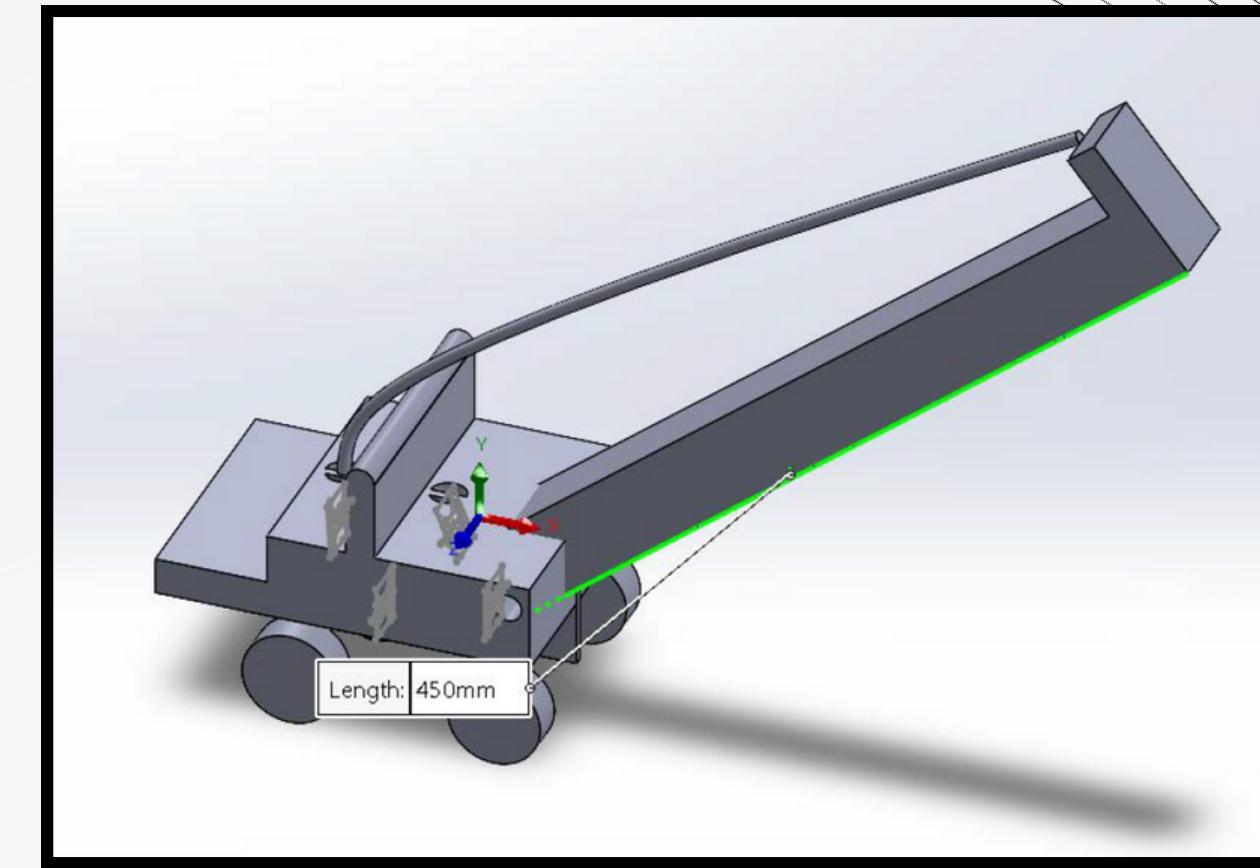
DESIGN PROCESS

- Axiomatic design
- Functional requirements
 - Locate crevice
 - measure temperature
 - insert probe
 - remote control
- Physical solutions
- Design choices
- Improvements



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RESULTS

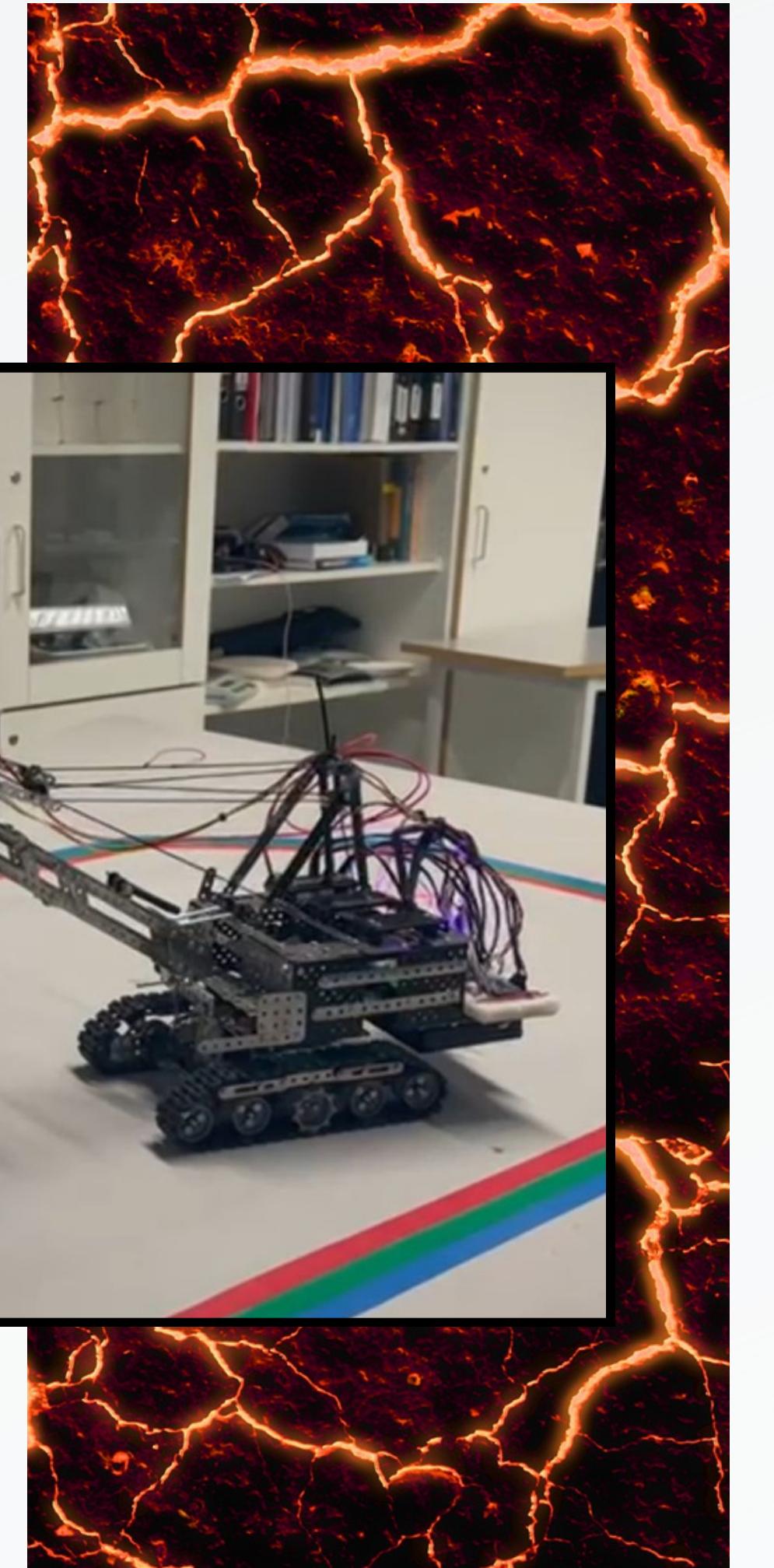
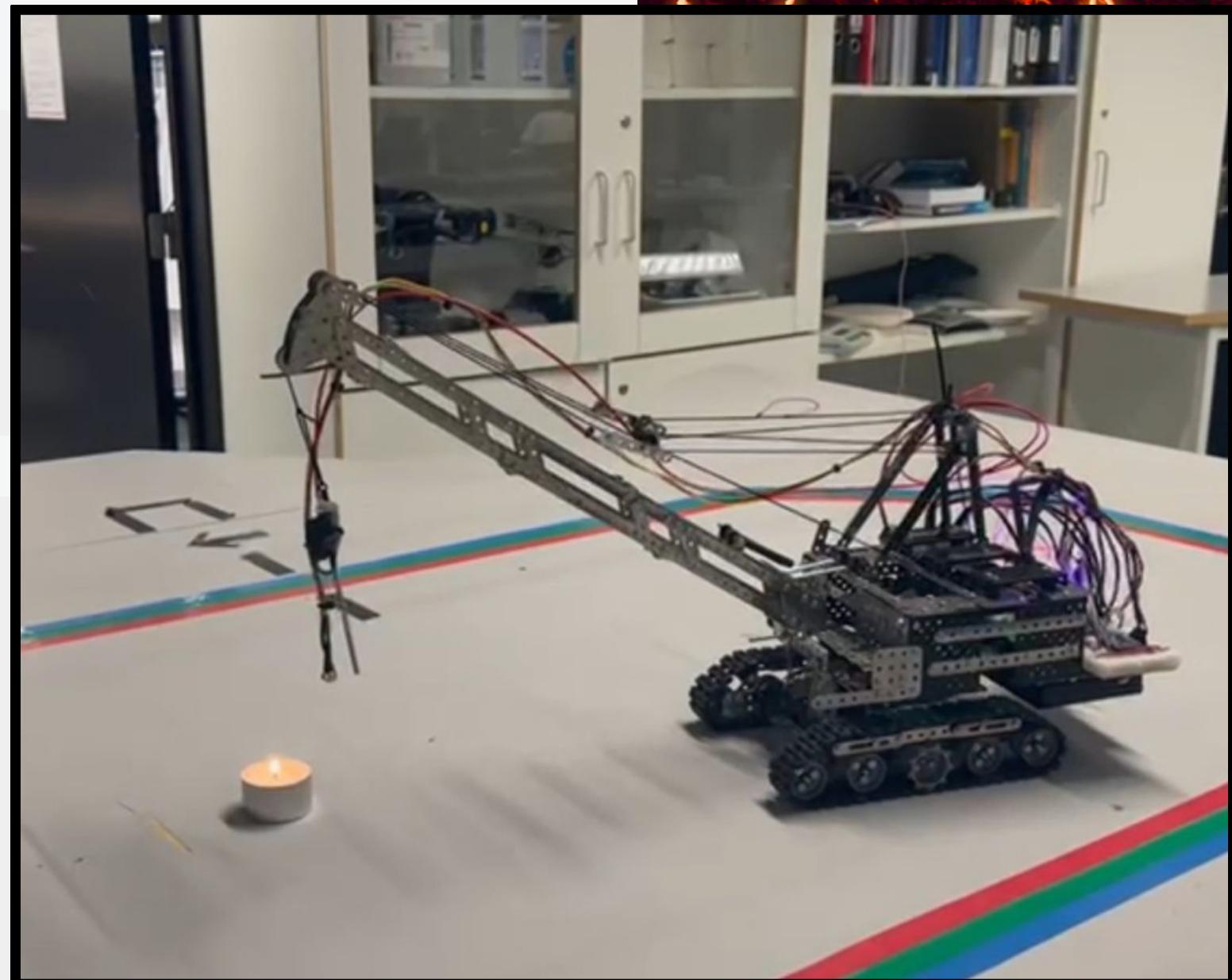


Final Design, combined physical solutions into remote controlled



Physical solutions

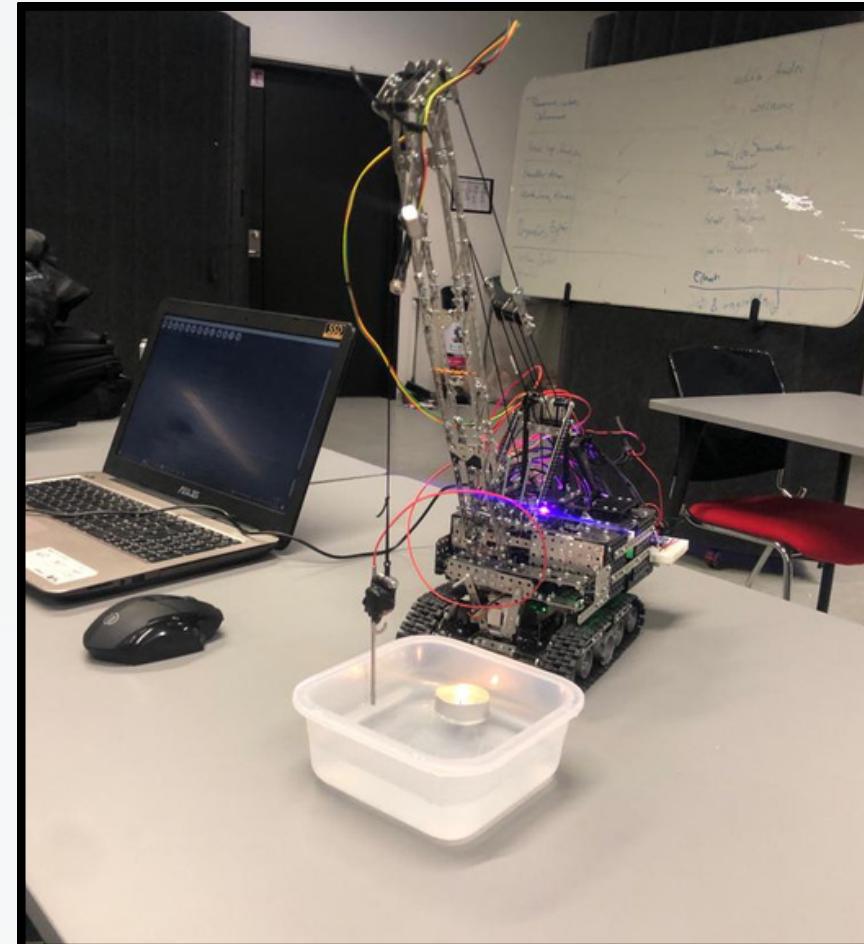
- Crawler crane
- Remote Bluetooth control
- Position control on motors
- IR distance temperature sensor
- Automatic scanning



RESULTS AND DEMONSTRATION

Testing:
We used a candle and hot water in a container.

VALIDATION



- Probe Deployment:
- 8 Successful tests
 - 0-6cm from candle
 - average 3cm
 - st dev 2.33
- 2 failed tests out of 10

TEST RESULTS

CAN IT STAND THE HEAT?





THANK'S FOR
WATCHING

SARANA INC

CITATION

01

[\[1\]](https://encrypted-tbno.gstatic.com/images?q=tbn:ANd9GcSD5UGLUOYUWTEQCWDNJO5UYOEKUVUVEEG59G&usqp=CAU)

02

[\[2\]](https://www.stainless-structurals.com/)

03

VOLCANO WORLD [\[4\]](https://volcano.oregonstate.edu/sites/volcano.oregonstate.edu/files/oldroot/volcanologist/working_on_volcs/lava2.gif)

04

SCIENTIFIC AMERICAN WEBSITE [\[3\]](https://static.scientificamerican.com/sciam/cache/file/foec2aa6-31cd-4183-a8a51cc41c93106b_source.jpg?w=590&h=800&oc15d410-49b7-4b3f-886d18f674b5c2e6)

05

[\[5\]](https://canva.com) OVERALL DESIGN