

## 05. SHAPING OF SAND

### LOCATION

Conceptual Project

### KEYWORDS

Robotics, 3D Printing

### INVOLVEMENT

Responsible for: Concept Developing, Grasshopper Programming, 3d Printing

### ABOUT

This project demonstrates the use of robotic technology in architectural applications. We experimented with a custom-built tool to simulate the 3D printing of sand, aiming to explore the potential of constructing buildings in the future using only robotic arms and local materials like sand or clay, without relying on concrete or other traditional building materials. The project seeks to investigate new, sustainable approaches to building by leveraging advanced robotics and locally sourced, natural materials in architecture.

**Concept Of The Project**  
How to build with subtractive and additive technique in order to build sand structures?

### Design process

- Step 1: Designing the tools
- Step 2: 3D printing the tools and acquiring the material. We started from the idea to carve in clay, but more ideas came when we tested with a sand bed.
- Step 3: Testing with a "grabber tool" to scoop the sand and deposit it along the designed path
- Step 4: Perfectioning the tool for ideal water and sand flow

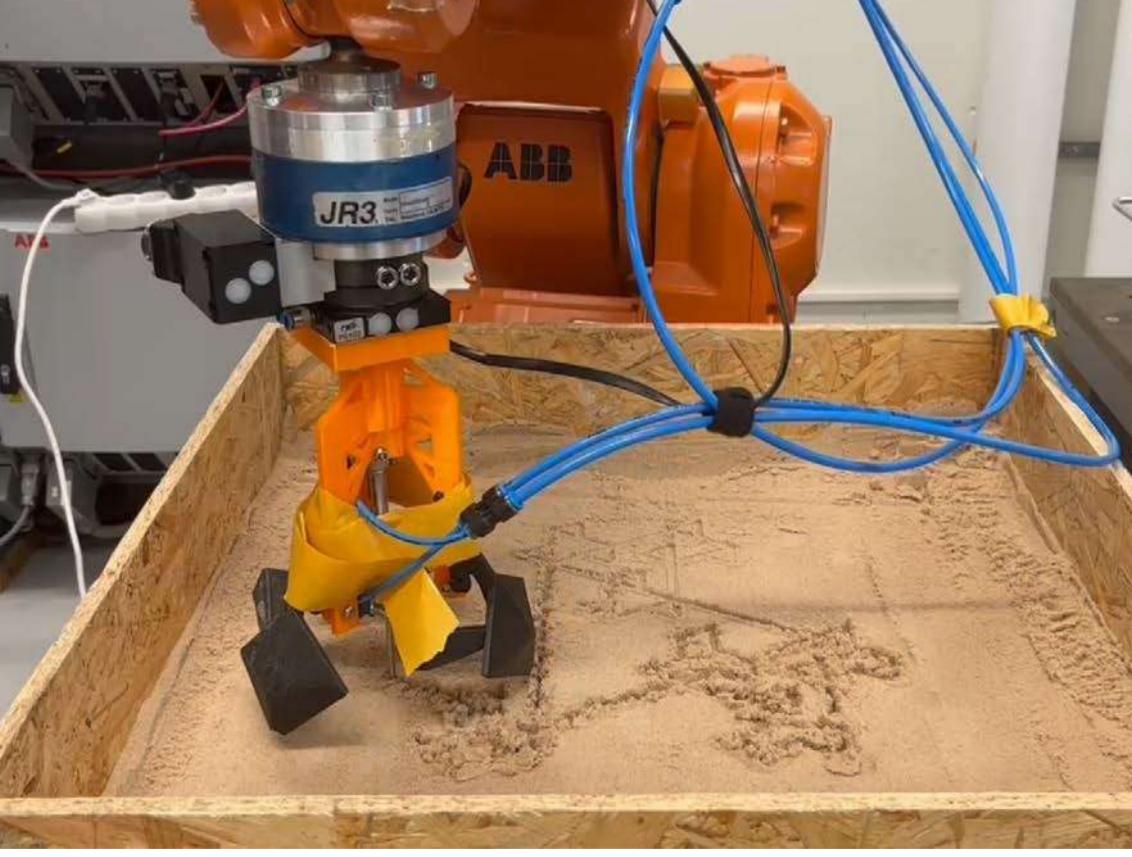
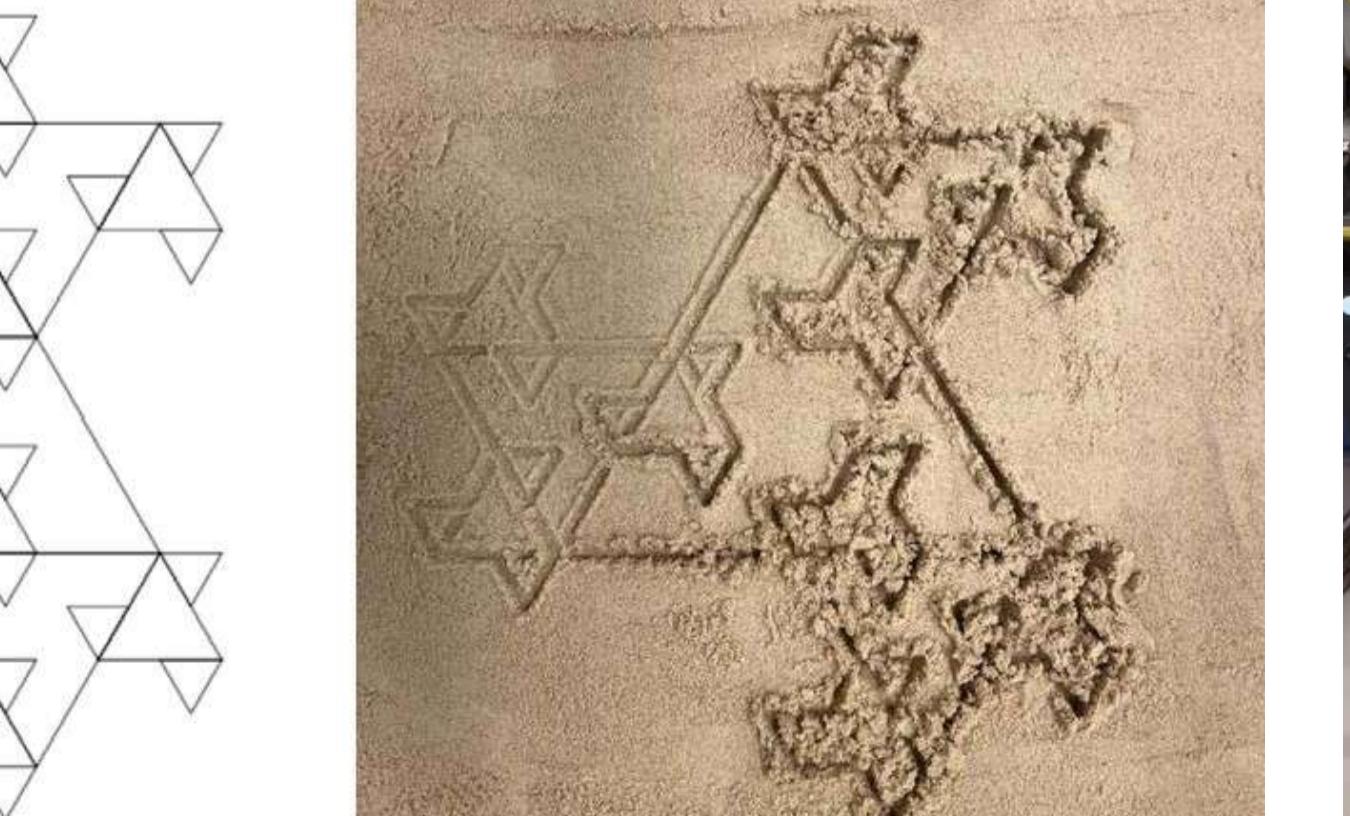
### Softwares Used

Designing the tools: Rhino Coding and path planning: Grasshopper

### Hardware Used

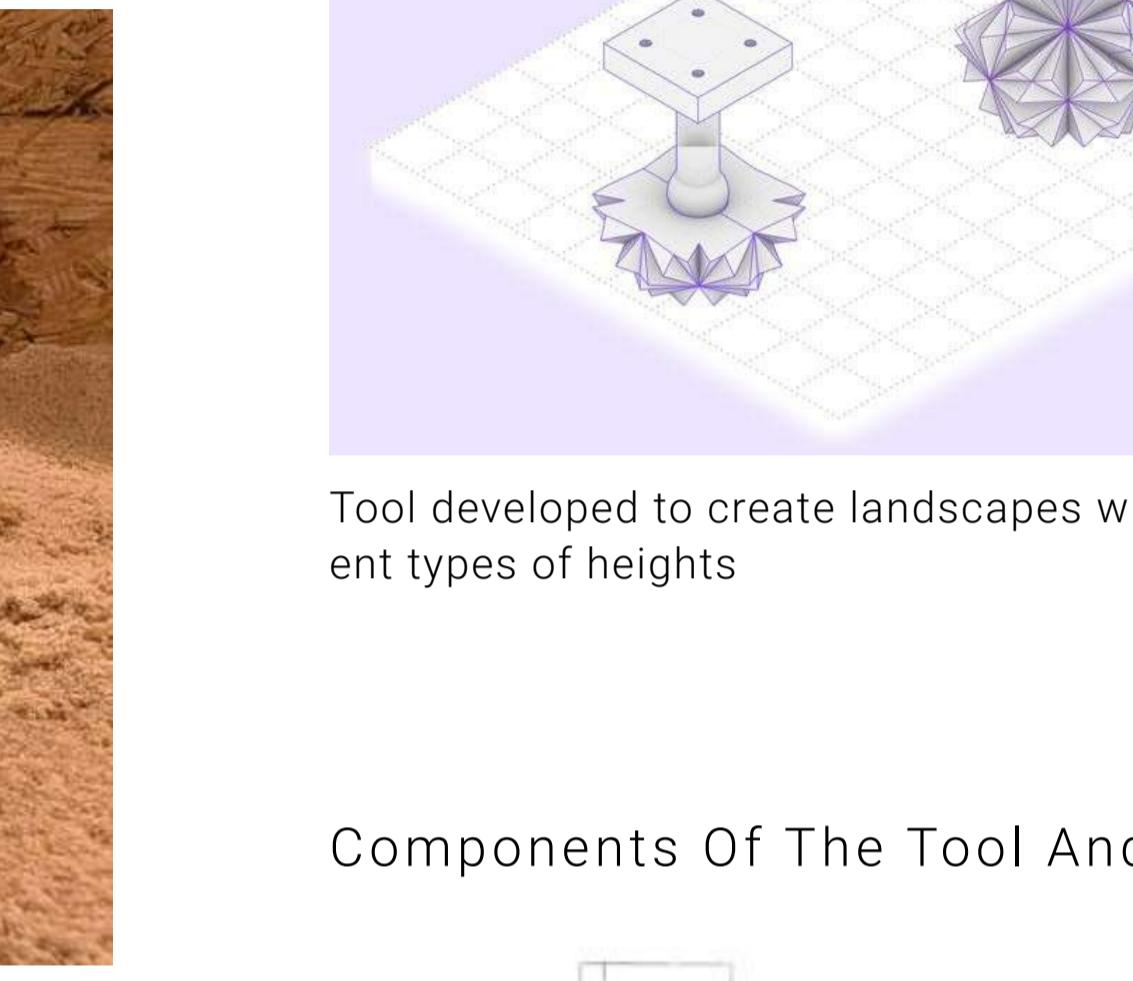
3D printing the tools: Prusa 3D printers  
ABB Robot Arm

### The Experimental Path

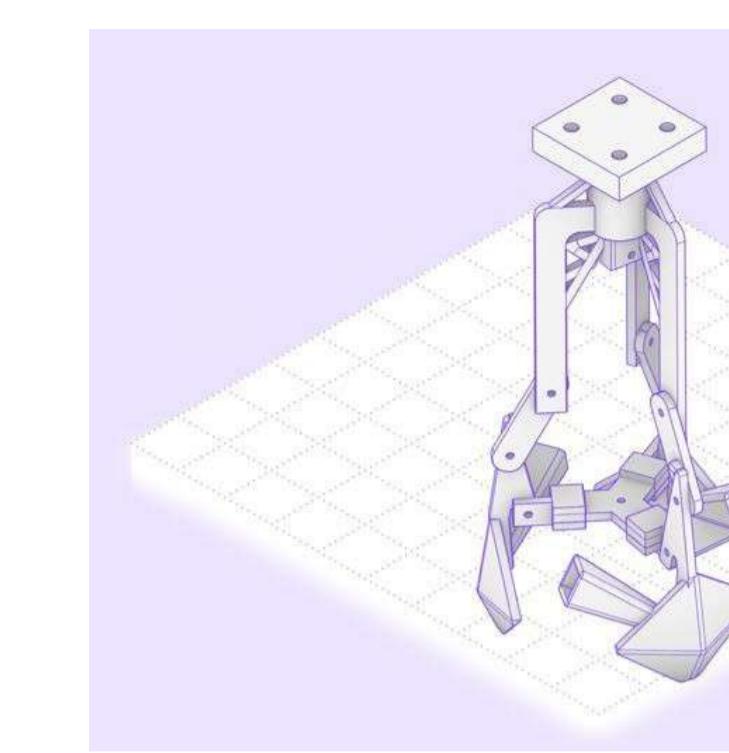


### Concept Idea

### Work Result



### Tool 1: Complex subtractive path



Tool developed to create landscapes with different types of heights

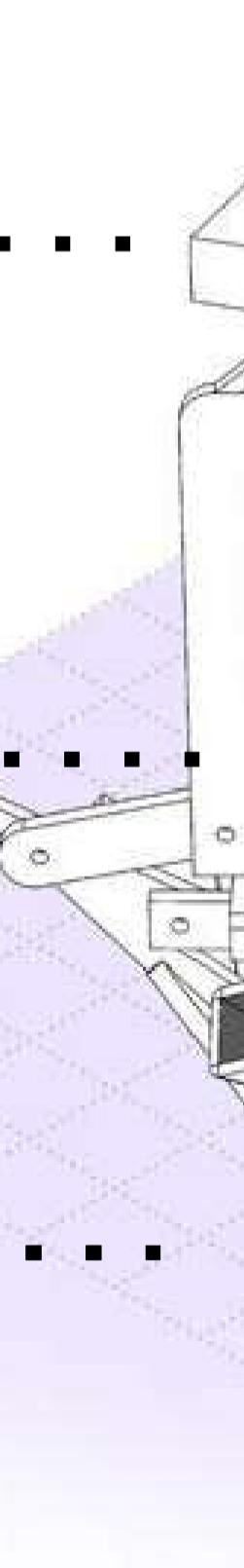
### Tool 2: Creative subtractive and additive manufacturing path



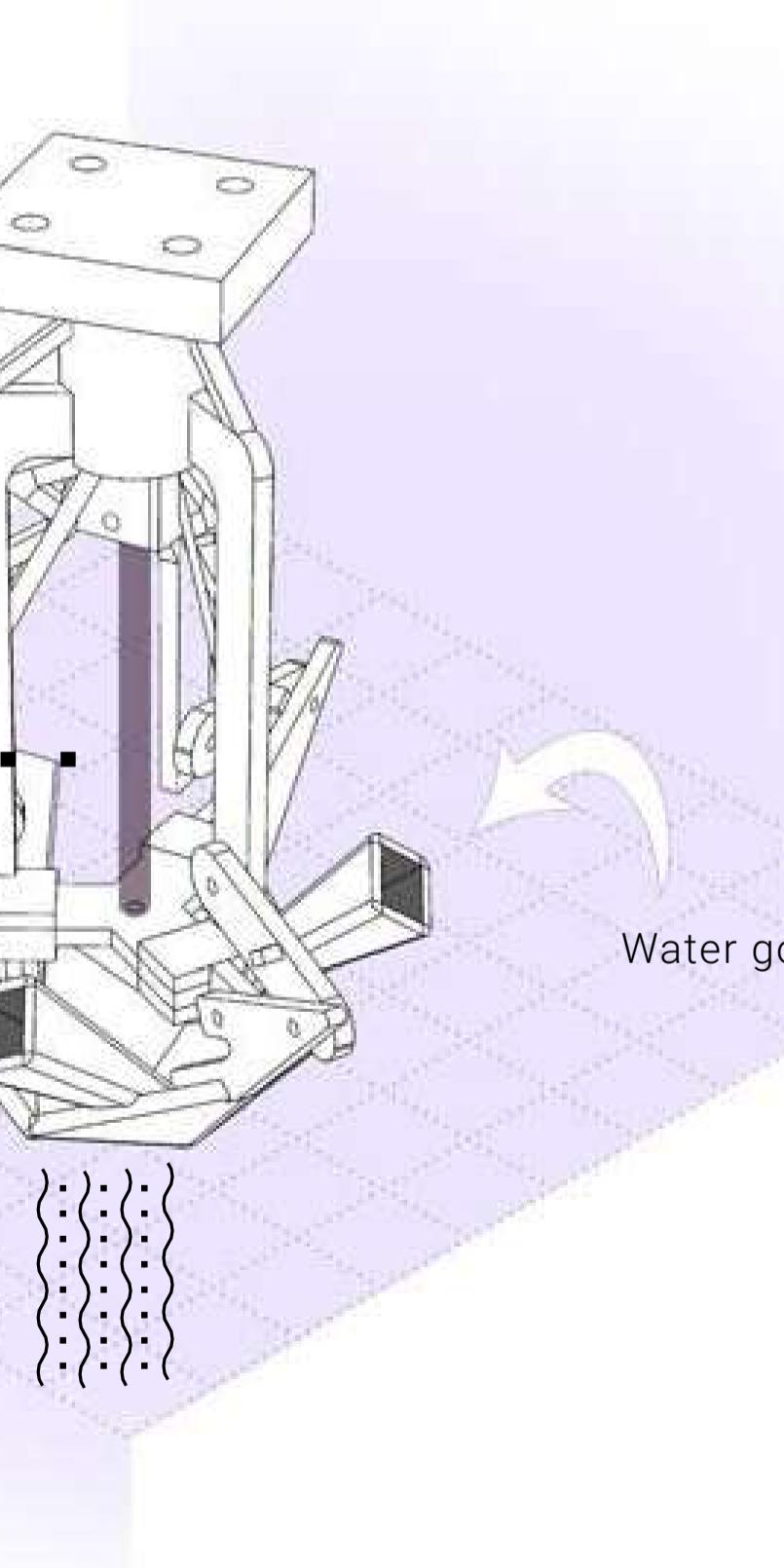
Closed position (moment when the water is added):

Open position

### Components Of The Tool And Connection To The Robot Aarm



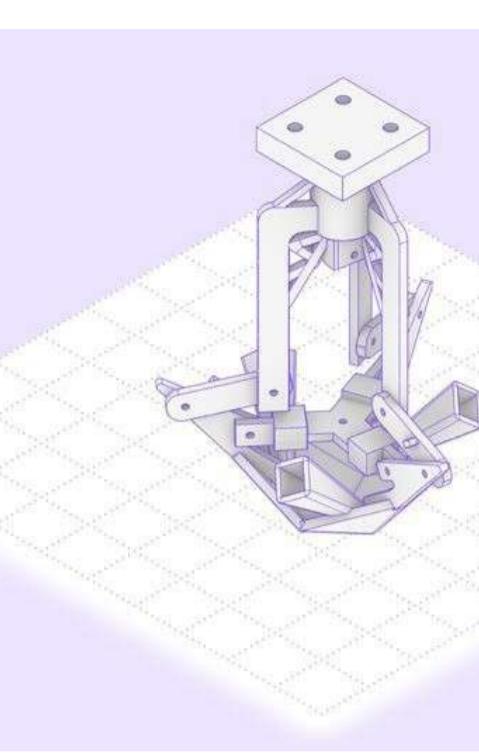
Connection to robot arm



Metal tube with a small air pump to open and close the grabber

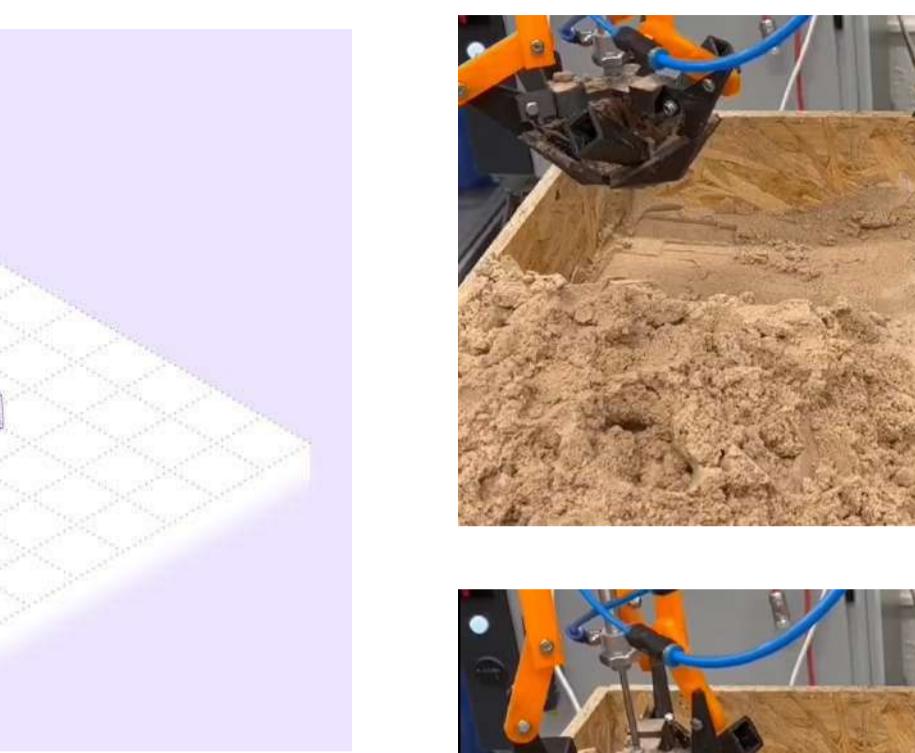
Water goes in

Water and sand get deposited to create formations

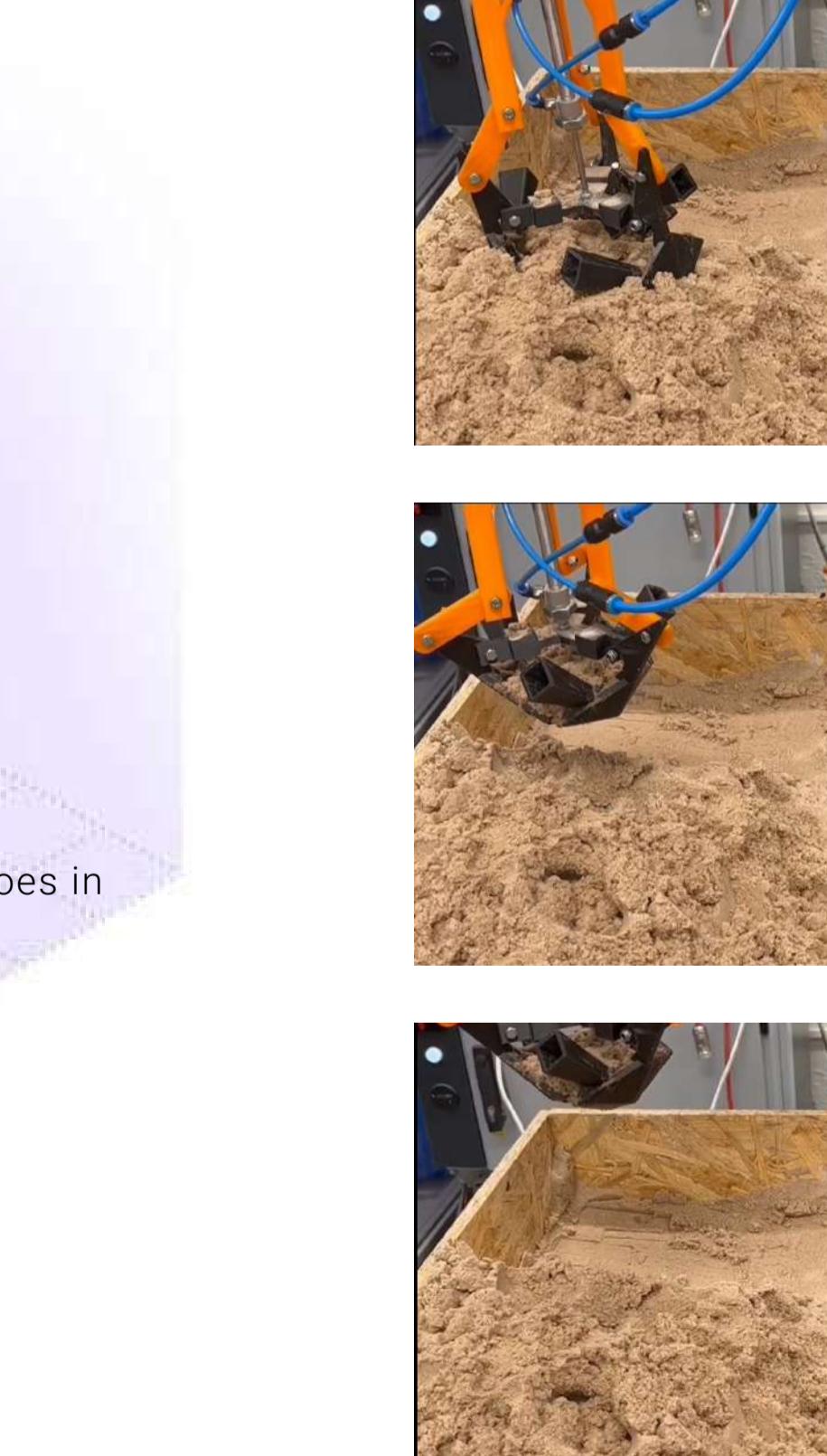


Tool designed to pierce the surface of the sand, scoop and create patterns that will solidify with the addition of water

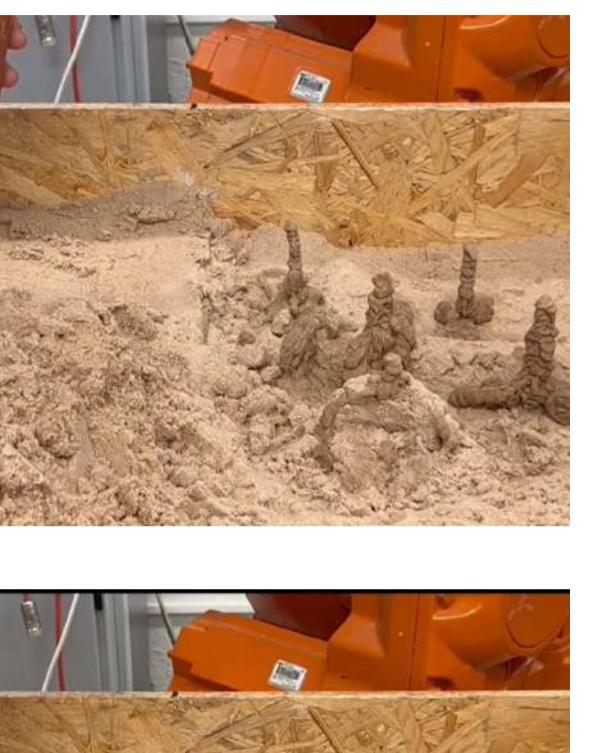
Open position



Components Of The Tool And Connection To The Robot Aarm



Connection to robot arm



### The Final Path Simulation In Reality

