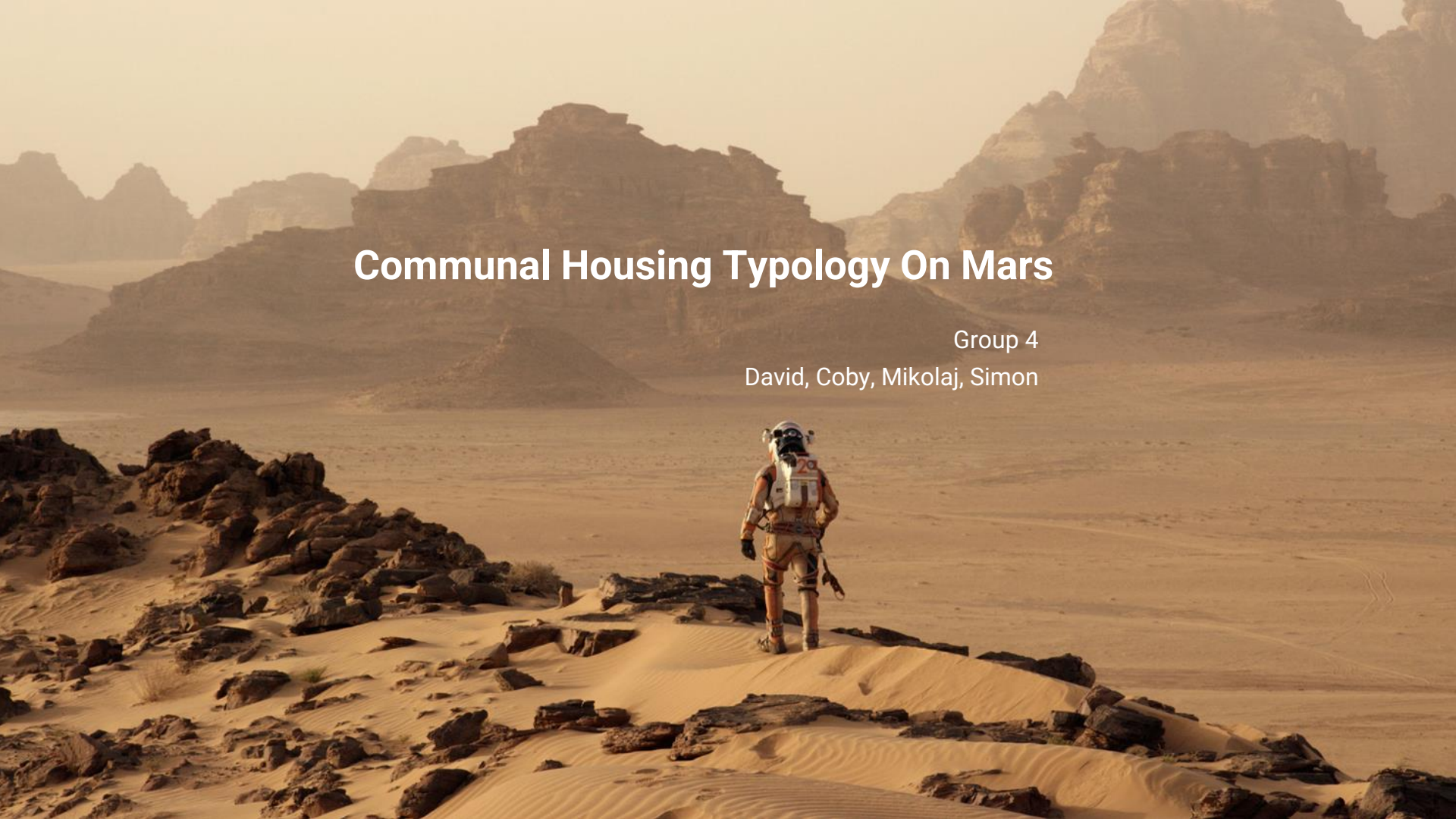


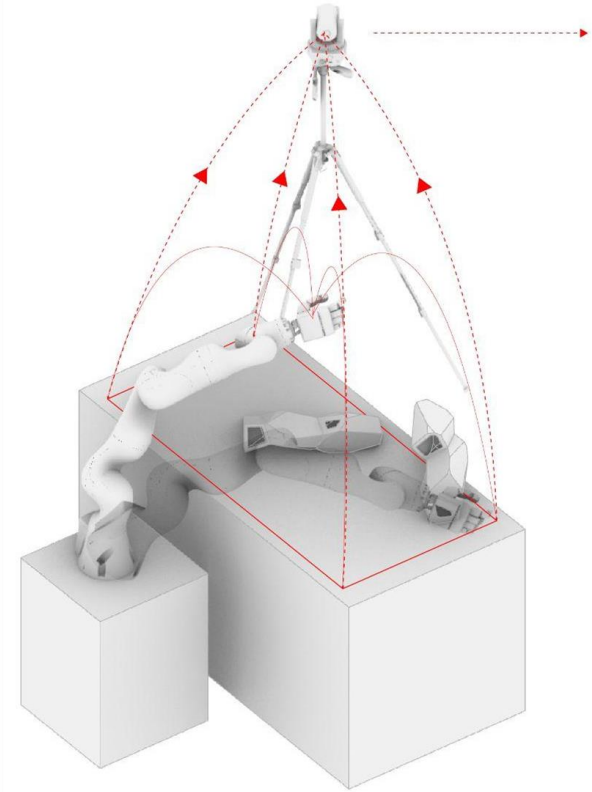
Communal Housing Typology On Mars

Group 4

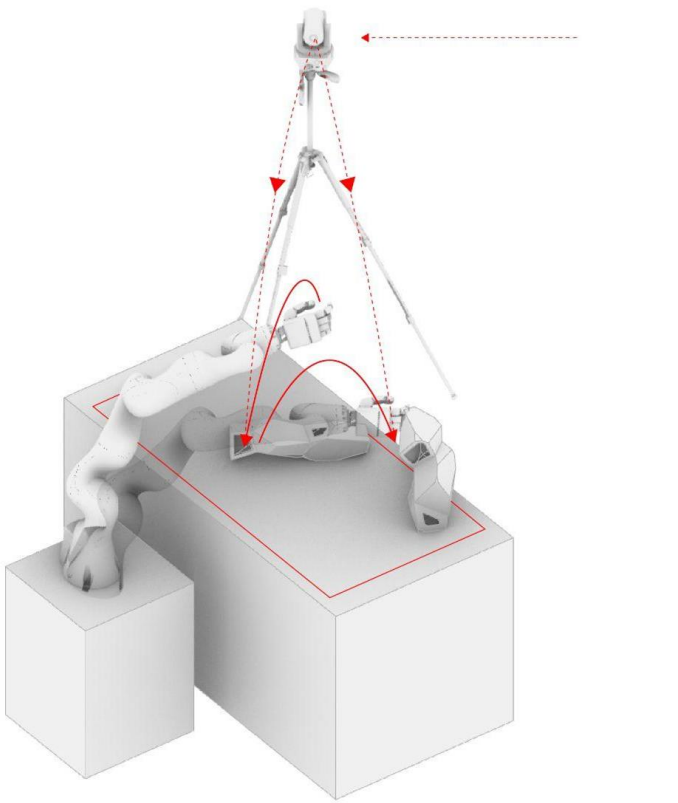
David, Coby, Mikolaj, Simon

HRI

Relationships between robot, camera, computer and components

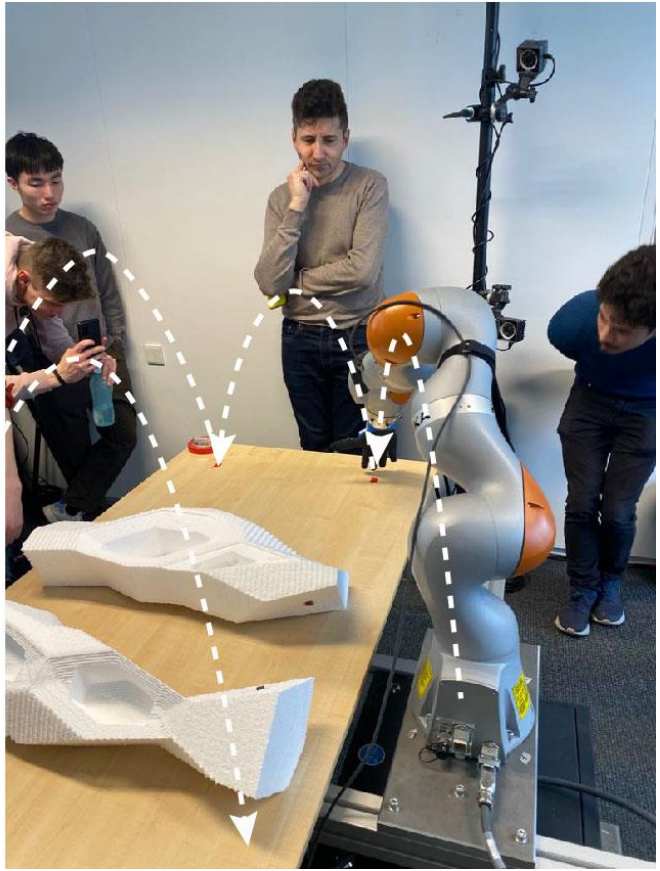


Robot to computer



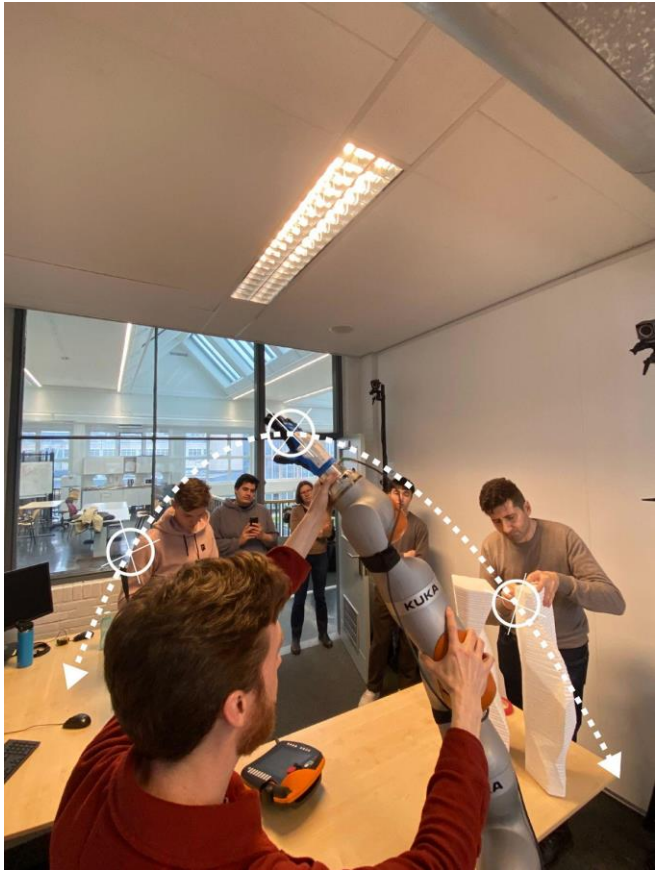
Computer to robot

1. The robot needs to know the exact location of the frame and table. This can be done by directing the robotic arm(hand) to the vertices of the frame, and marking the location of corresponding vertices in images captured by the camera in the computer.



Setting up boundary — Safe nodes — Safe movement — Height Calibration — Grabbing

2. For safety, the robot needs to know its moving area. We define certain mid-air node points to which the robot goes when in standby and to use when moving large distances to avoid collision. We adjust the moving speed. This way we make sure the robot operates safely and no object gets damaged.



Setting up boundary | Safe nodes | Safe movement | Height Calibration | Grabbing

3. Robot needs to know both the exact and relative position of the components to integrate them. For example, to move a cell in the right towards the cell in the left, the hand of the robot should grab the right side of the components to prevent crashing of the arm to the left cell. Moreover, the robot should slow down when it is approaching the target cell.

Setting up boundary | Safe nodes | Safe movement | Height Calibration | Grabbing

4. As in-accuracy occurs during the translation of 3D vision in camera into 2D control frame in computer, pointing the component hole in the computer does not bring the robotic arm to the exact location of the hole. The robot hand stays above the holes, and calibration of height error needs to be instructed with human collaboration.

Setting up boundary → Safe nodes → Safe movement → Height Calibration → Grabbing

5. After the robot hand reaches the hole, it needs to be instructed by humans regarding how to grab the hole, and how much force to grab and lift the component with. Then the robot lifts the component to its final destination.

Setting up boundary | Safe nodes | Safe movement | Height Calibration | Grabbing