



THE PROJECT STATEMENT

Transferring from low to high surfaces can be extremely difficult for paraplegics. This is because of the physical strength and agility required to lift oneself and transfer to the desired platform. The requirement to move between a wheelchair and beds, shower chairs, and in this case a kayak translates to a frequent motion necessary for any lifestyle. Hence, the health risks associated with unsafe and strenuous transfer methods form the basis for our design focus. UP Engineering set out to create a design solution that would allow a paraplegic to safely and easily transfer between platforms while further contributing to an unassisted lifestyle.

RESEARCH

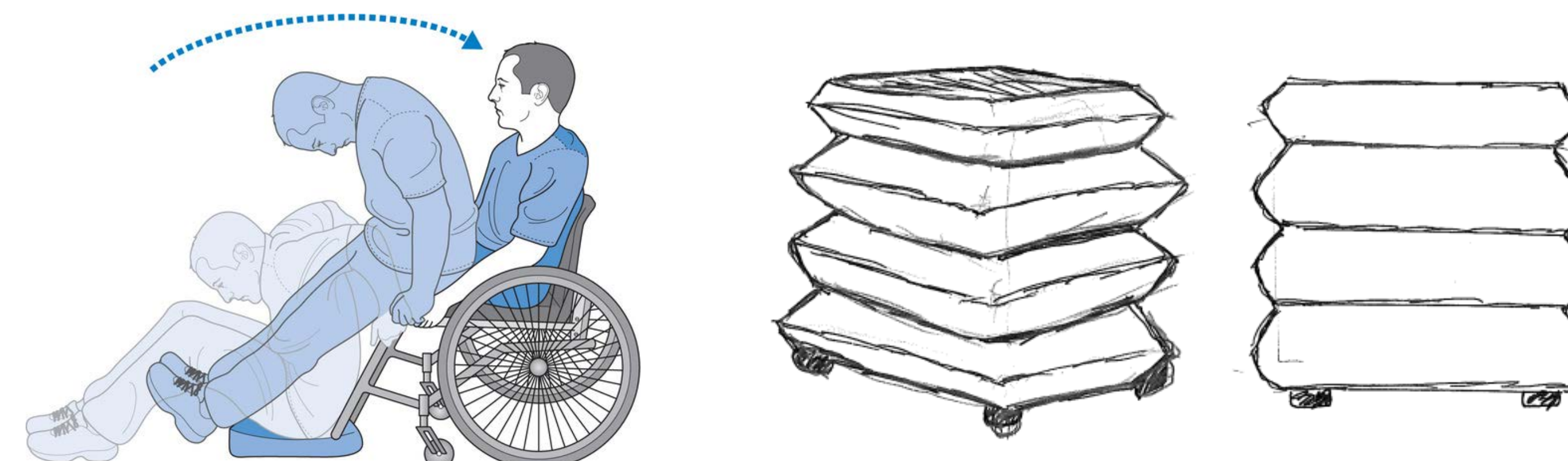
- Initial consultation with Occupational Therapist Monika Caraballo emphasized safety concerns with unassisted paraplegic transfer methods, often leading to unnecessary bruising and strain on the individual's body.
- Market analysis presented a range of hoist-mechanisms, with pneumatic lifting aids only catering to emergency situations.
- The need for stability and device uses per charge would determine the independent and portable use of the device in the real world.

DESIGN OBJECTIVES

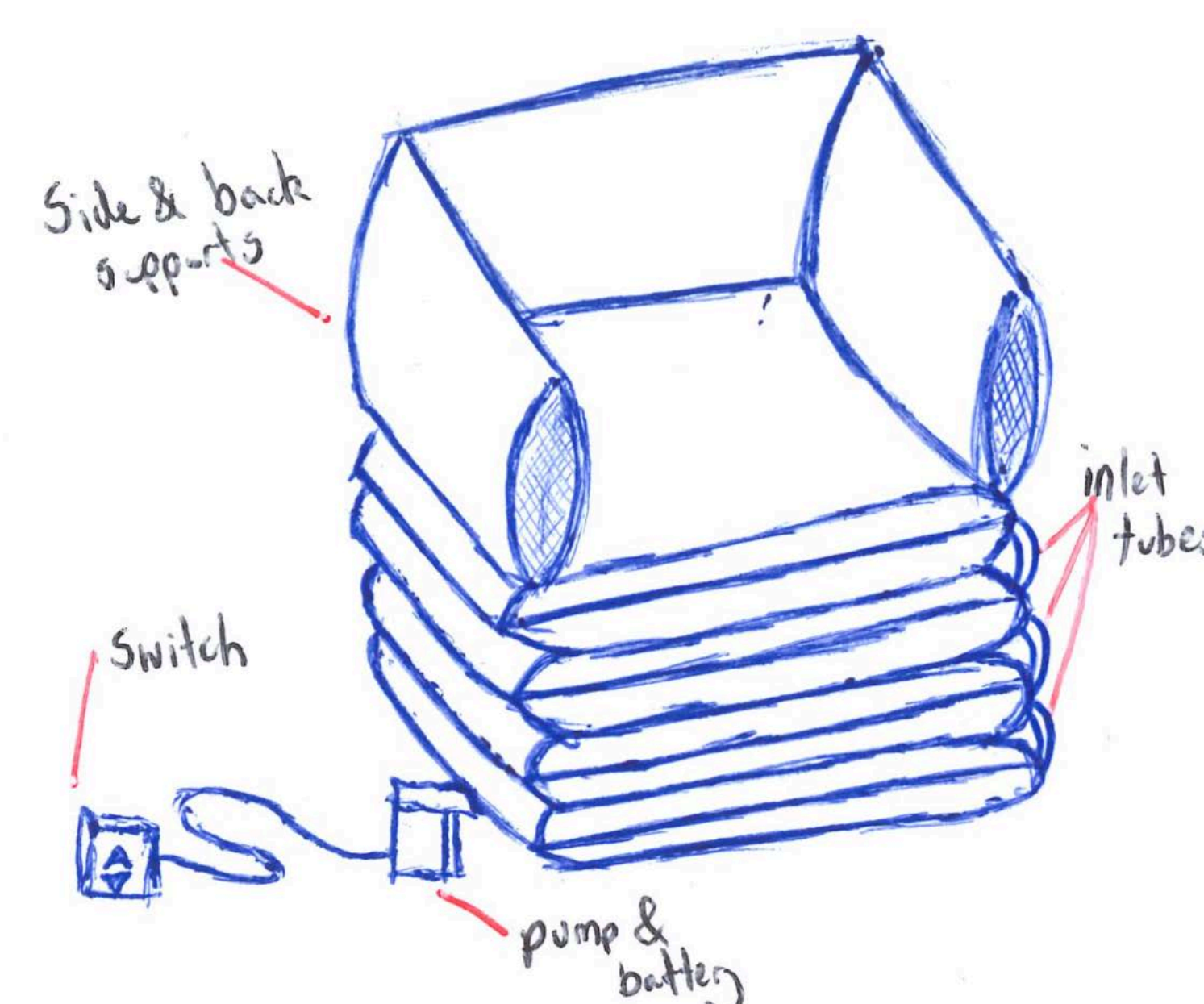
- User is able to safely transfer independently
- Lifting capacity of up to 100kg
- Device weight between 3-5kg
- 2-3minute total transfer time
- Easily accessible from the wheelchair
- Portable and compact (battery powered)
- Easy to maintain

IDEATION AND DEVELOPMENT

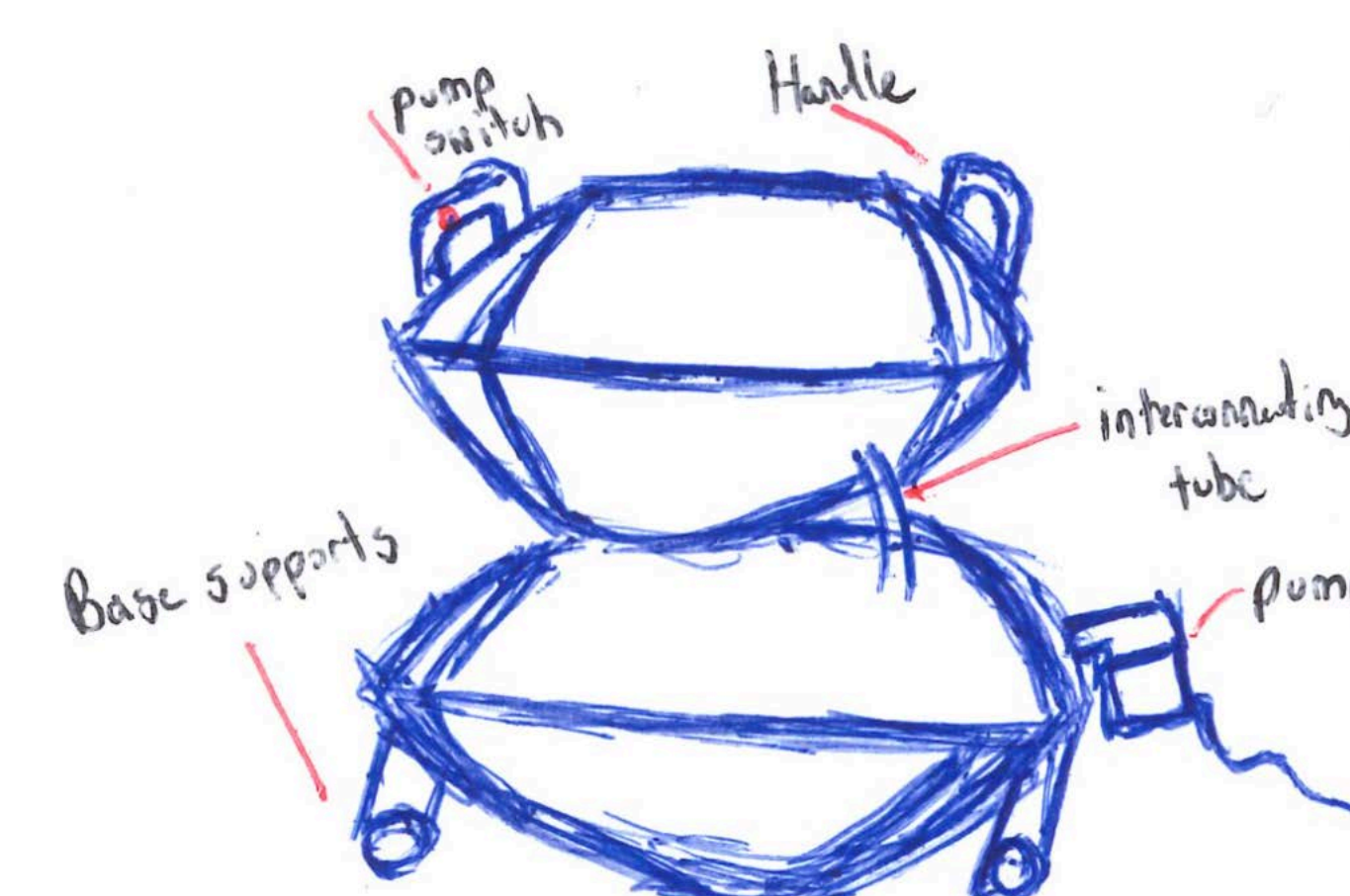
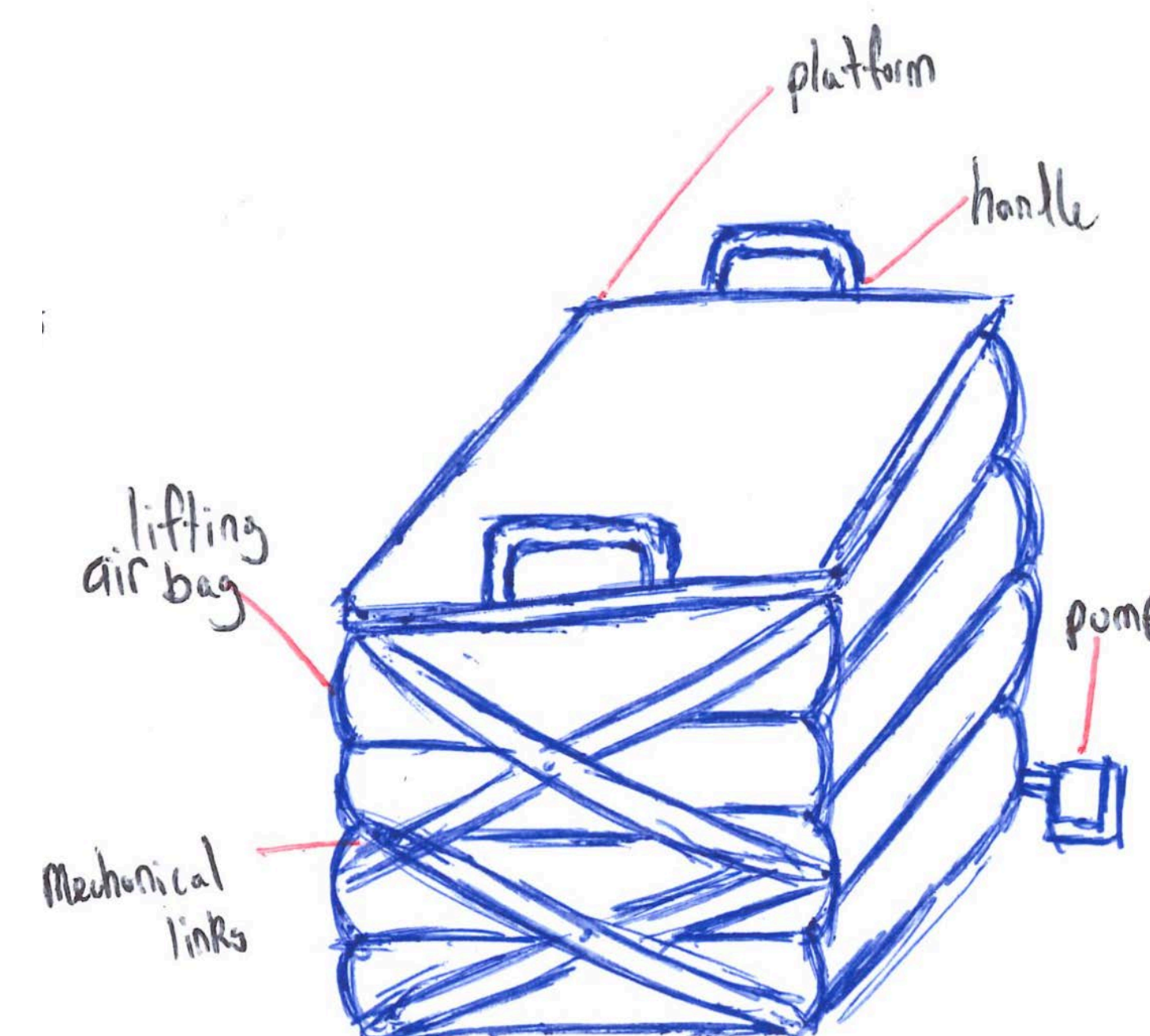
- Design objectives essentially aimed to prevent the following strenuous motion. UP engineering had a basic concept in mind after talks with the client. :



- Initial sketching allowed us to visualise what needed to be made. Critically, the individual control of each layer was necessary for stable lifting :



- Stabilisation methods included handles and parallel stiffeners:



PROTOTYPING AND TESTING

With sufficient research and design development, we were able to produce a reliable proof of concept:



Testing critical requirements included:

- Joining methods – flexibility, durability and sealing were all major components being tested.
- Air pump – testing the ability of various air pumps to inflate the loaded device and achieve 'lift'.

RECOMMENDATIONS

- Further research is needed in obtaining a battery powered air pump capable of achieving multiple uses with a single charge.
- Stability mechanism must be finalised in order to achieve safe use while maintaining compact size.