PERSONNELEVATOR
"THE PORTABLE PICK-ME-UP"

ENABLETECH
ENGINEERING FOR ACCESSIBILITY

THE NEED TO RISE

Emily Kettner remembers vividly the day she could no longer rise from the ground.

An artist and a weaver, Emily uses a floor loom to create elegant narrative tapestries that she then sells--or, more often than not, gives away to friends and family. But operating a floor loom requires that for each new pattern the weaver wants to make, they must descend below the device to reconfigure the loom's pedals.

On a cloudy Friday afternoon in the middle of summer, as she tells it, she finished tying the new pedal configuration and attempted to rise up off of the ground, only to unexpectedly fall back to the carpet. She tried again, and, once more failing to raise herself up to her chair as she always had before, realized with a great sense of heaviness that the progression of the neuromuscular condition with which she had been living since childhood--Limb-Girdle Muscular Dystrophy--had finally taken away her ability to lift herself up from the ground.

ADDRESSING THE NEED

Personnelevator is a miniaturized, portable, battery-powered scissor lift made to help people with a variety of physical impairments--ranging from age-related weakness, to spinal trauma, to various neuromuscular conditions--move between ground-level and a high seated position safely and without stress or exertion.

When innovators talk about designing for improved mobility for the physically impaired, they often mean designing technologies to enable safer or more efficient horizontal movement: walkers, wheelchairs, and scooters all seek to improve this kind of mobility for their users. Personnelevator, on the other hand, offers itself as an assistive solution to negotiating vertical space. Many physical conditions make rising from the ground--or lowering oneself onto the ground--difficult for affected individuals: paraplegia, muscular dystrophy, and Parkinson's Disease are just a few of the diverse circumstances that make the twenty inches between earth- and chair-height difficult to negotiate. For some prone to falling, our portable lift is an emergency device for rising back up; for others who merely want access to the floor in a risk-free way, our lift is an enabling device; and for those whose adventures take them into unknown environments and terrains, Personnelevator becomes an empowering device.

CUSHIONED

V4

BATTERY-POWERED

STEEL FRAME

V5

COLLAPSIBLE

REQUIREMENTS, GOALS, AND DREAMS

To tackle the original challenge of "assisting a person off the ground" we established a range of requirements, goals, and dreams:

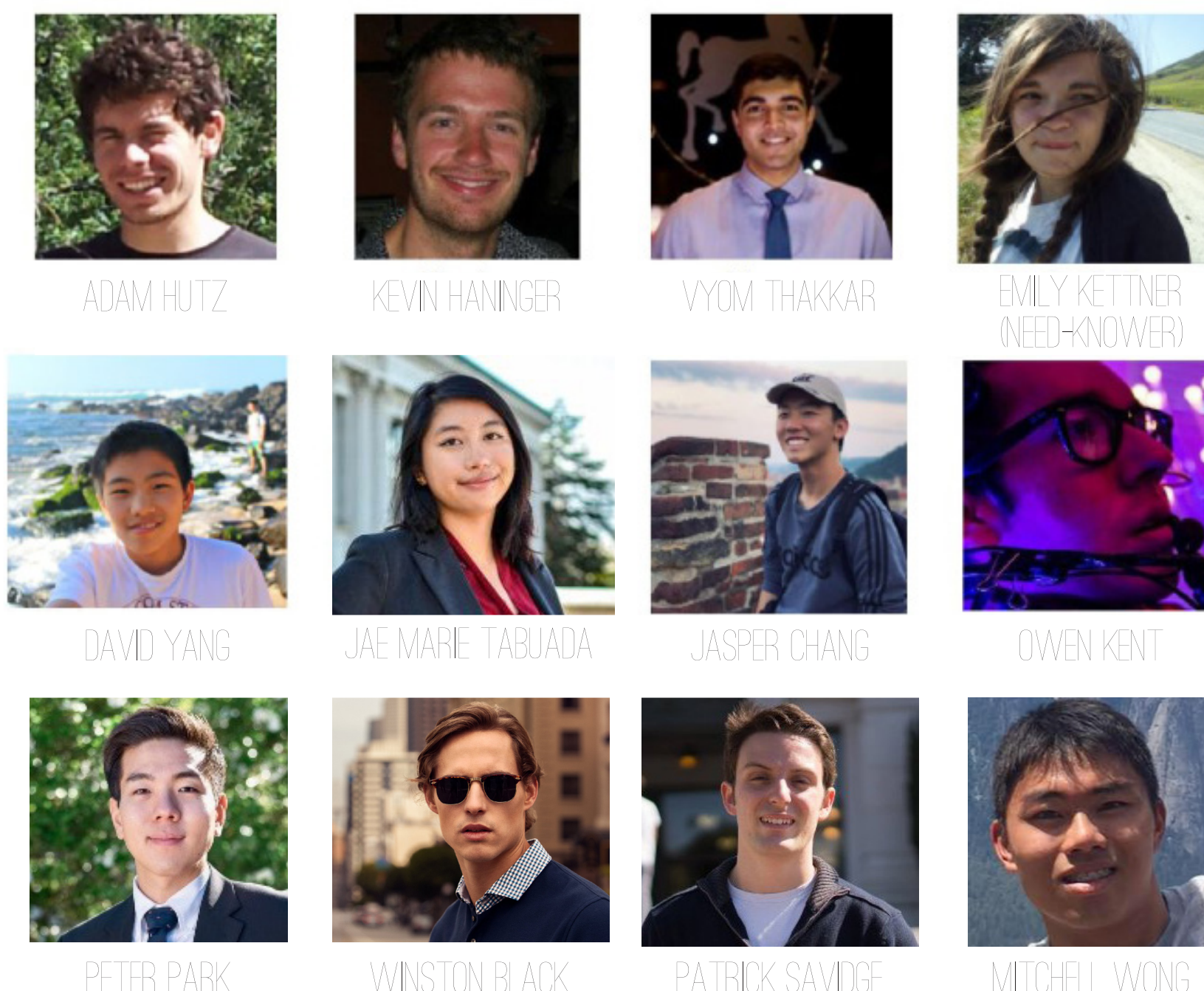|	REQUIREMENTS	GOALS	DREAMS
LIFTING CAPACITY	120 LBS	200 LBS	300 LBS
DEVICE WEIGHT	"PORTABLE"	10 LBS	5 LBS
POWER SOURCE	120V OUTLET	18V BATTERY	RENEWABLE ENERGY!
CLOSED HEIGHT	8"	4"	2"
SAFETY	SAFE FOR ADULTS	SAFE FOR ALL AGES SUPERVISED	SAFE FOR ALL AGES

NEXT STEPS: V5

The forthcoming version of the device must be lighter and safer, while still meeting or exceeding our capacity and size requirements.

Last semester we began work to change from a wormgear motor and a steel frame to a much lighter and stronger **pneumatic system** that uses inflatables to carry the majority of the user's weight.

Bottzinger Xjack

THE TEAM

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THE ITERATIVE PROCESS

The iterative process has taken us through four separate versions of the device, and most recently into the terratory of a fifth unfinished version.

We started by laser-cutting acrylic to test the theory of the scissorlift. The plastic "succeeded" insofar as it operated smoothly up and down, but failed soon under any weight.

Our first and second aluminum iterations advanced us towards our requirements for lifting capacity while retaining a low device weight, but quickly ran into trouble at advanced lifting loads.

We then produced a steel "V4," the device pictured above, using a wormgear motor and 3D-printed 18v battery pack. This device has met our lifting capacity goal, our power source goal, our closed height goal, and our device weight requirement, but we feel there is room to improve with both "device weight" and "safety".