

LIMBFINITY

OneLimb: **Adjustable lower limb** **prosthetics for** **children**



Who We Are

Limbfinity's Mission

Understanding the challenges of having a lower limb difference, Limbfinity's goal is to change the narrative of owning a prosthetic. With each new assembly the family and child that require a new prosthetic lose time, money, and have an increased risk of future health issues. Limbfinity's goal is to create a lower-cost product that will replace multiple assemblies into one lower limb prosthetic that will last two years.

Our Team

Limbfinity has the resources and background in manufacturing, biomedical engineering, and medical research to make this product a reality. Our knowledge of standards and understanding of safety between product and user interaction allows us to make critical decisions to ensure the proper execution in the manufacturing of our product.



James Shimic
Project Manager

James is employed at Hirsch Precision Manufacturing and inspection of medical devices and aerospace parts. He also brings three years of experience working as a high school math teacher.



Eileen Reh
Logistics Manager

Eileen has over two years of research experience at CU and Technical Universidad Darmstadt. She has also been a TA for the department with a focus on combining art and engineering.



Melissa Medialdea
Financial Manager

Melissa has three years of managerial experience. She is the TA for the course Comp Methods. Melissa is currently employed by The Boeing Company as a first-year design tech.



Samantha Vallo
CAD and Test
Engineer

Samantha has experience in both Cyrus Manufacturing and a research lab at NIST. Have done extensive work in testing, calibration, data analysis, and documentation.



Daniela Meza
Manufacturing
Engineer

Daniela has worked in the oil, gas, and biomedical field. She is currently an intern at Alio where she focuses on hardware testing. Daniela has experience in research and TA'ing for Freshman Projects.



Avery Fails
Systems Engineer

Avery has done research at CU for the physics department and worked for the Human Interaction and Robotics Group. Also worked as a TA for engineering project courses.

The Problem

Having an improperly fit lower limb prosthetic can cause long-term damage to the human body. The added physical stress can cause hip, back, and knee pain. If one limb is longer than the other, the posture and gait become unbalanced. If the foot is disproportionate to the length of the limb, the feet will compensate by turning outward. In either case, the imbalance creates a wearing on the hips and causes osteoarthritis.

To prevent this issue, the patient requires a new assembly 1 to 2 times annually between ages 1 to age 14, with each component of the assembly needing 3 appointments for proper refitting. This causes the parent to take the child out of school or miss out on quality time as they miss work.

Other Prosthetics



10-50 % co-pay

A minimum of \$2,500 to upwards of \$30,000 is needed for a new assembly dependent on the sophistication of the device.



Increased body pain

Hip, back, and knee pains can further develop into early-onset arthritis by age 15.



15 hours

To properly refit one whole assembly.

Our Product

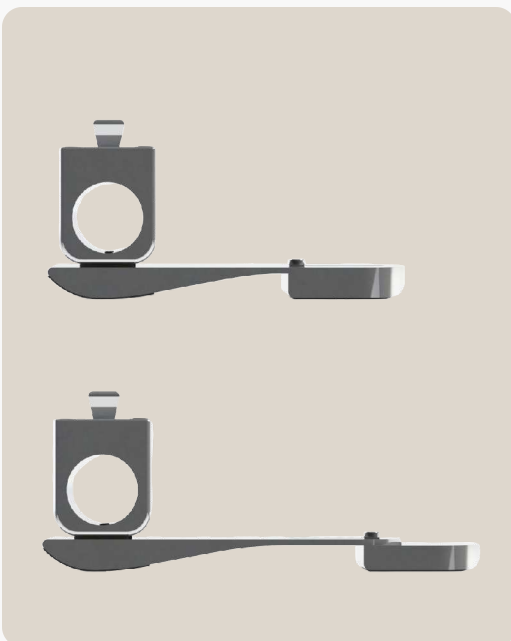
Nearly 50,000 children in the U.S. need lower limb prosthetics. Due to the rapid growth rate of children, they can require up to six lower limb prosthetic assemblies throughout their development, averaging \$30,000 per assembly. Unfortunately, insurance does not fully cover the costs, creating a large financial burden for these families. In addition, each new prosthetic component requires an average of three doctors' visits to ensure that it fits properly, costing the family more time and money. Limbfinity has created adjustable foot and leg prosthetic components with the mission to help reduce the number of costly new prosthetics needed during a child's development.

Adjustability

Limbfinity's design focuses on single-product adjustability with the goal of positive, long-term health outcomes during and after a child's development. To accommodate for a child's development, both the pylon and foot adjust independently to reflect changes in their residual limb. The pylon adjusts continuously from 5 inches to 8 inches while the foot can fit into a child's size 13 to an adult's size 6, these ranges can adjust with a child for 2 years.

Compatibility with modern prosthetic connections is important, both our pylon and foot connections use the universal male-pyramid joint, allowing the assembly to be connected to the users' personalized socket or an athletic foot component.

OneFoot

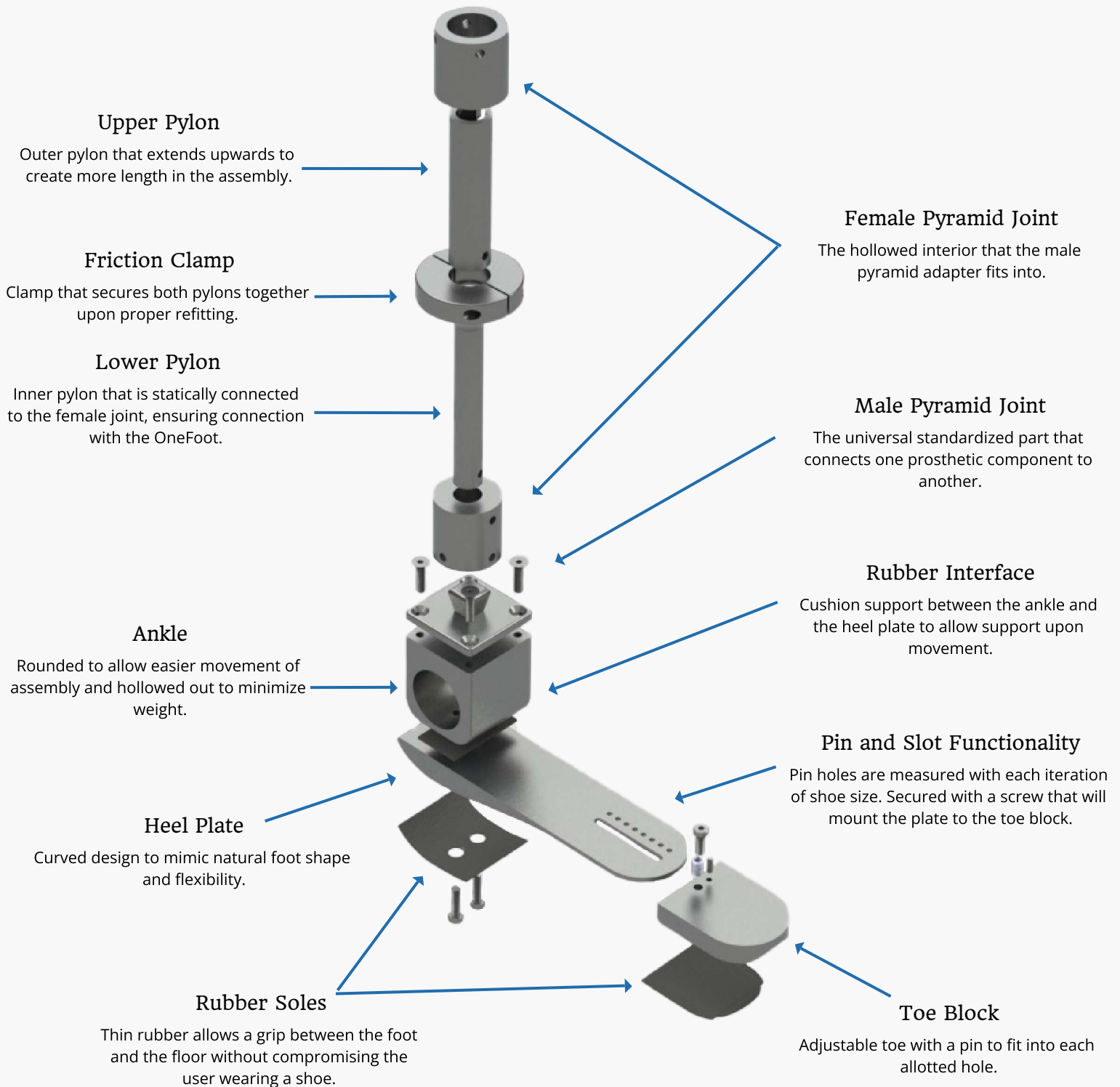


OneLeg



OneLimb Features

The OneLimb Assembly is composed of OneFoot and OneLeg. Our assembly ensures proper connection with any prosthetic component via the pyramid joints. This provides the end user with complete flexibility when using our products.



Customer Relationships

The business-to-business model consists of three main entities: the consumer which is the legal guardian of the child, a licensed prosthetist, and insurance companies. These three interact with one another as shown below.

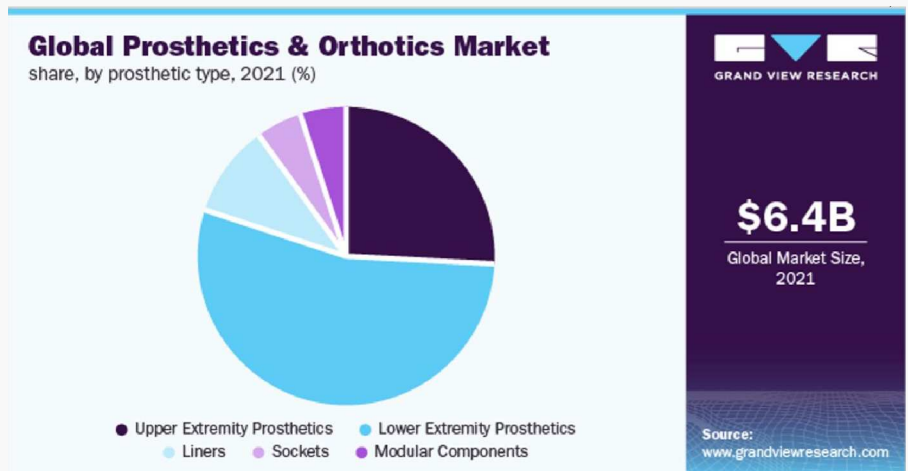


Opportunity

With 55% focused on lower limb products and 20% focused on prosthetics geared towards children we are entering a market of 6.4 billion with an annual 3.8% growth rate.

The final OneLimb assembly will cost \$5,000 without insurance, lower than most prosthetics.

With full development of our product, we hope to make a break into nonprofits to provide prosthetic solutions to those who have limited access to healthcare. This can occur with partnering with Limbs for Life and Limbs International.





Next Steps

Limbfinity plans to continue to iterate this design by making updates to material and improving overall design aesthetic. Limbfinity will also provide customization capabilities to the end user to improve customer engagement.

To conduct more testing on patients, the assembly will need to have FDA clearance and a partnership with a local, Boulder, CO, pediatric prosthetist or orthotic specialist.



How We Help

- ✓ Annual savings of 50 thousand dollars in healthcare
- ✓ Hours saved in doctor's office
- ✓ Prevention of future health issues
- ✓ Simpler coverage
- ✓ Replacing multiple prosthetics into one assembly for two years

Conclusion

Through the Engineering through Social Innovation course offered by the University of Colorado Boulder, and sponsored by the Engineering for Social Innovation program, Limbfinity was able to design, manufacture, test, and present a functional prototype of the product.

Because when it comes to your children, there is *one* solution.

References:

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3. McGimpsey, Grant, and Terry C. Bradford. NIST. https://www.nist.gov/system/files/documents/2017/04/28/239_limb_prosthetics_services_devices.pdf.
4. "Prosthetics and Orthotics Market Size & Share Report, 2030." Prosthetics And Orthotics Market Size & Share Report, 2030, <https://www.grandviewresearch.com/industry-analysis/prosthetics-orthotics-market>.