



# Improved Stability and Control of a Low-Cost Prosthetic Knee

The LIMBS International/Autodesk SCOPE Team worked to design a prototype adaption to the LIMBS International M3 Relief Knee that provides a more natural and stable gait when compared to current mechanical knees available in the developing world, while keeping the device affordable for amputees in the growing global middle class.

## Our Problem

The current prosthetic market neglects users in the global middle class because it produces only low-cost or high-cost solutions. There are limited options for those seeking affordable prosthetic knees with greater stability than a passive mechanical knee.

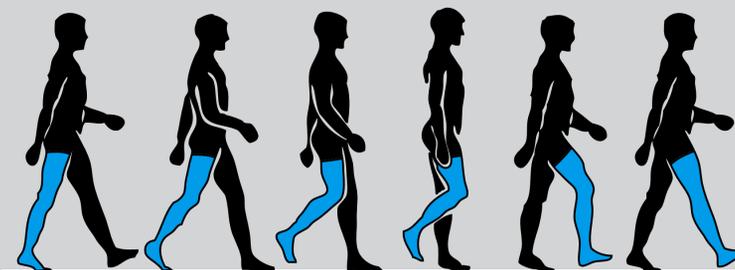
Our project bridges the gap between affordability and prosthetic technology by creating an intelligent adaption to the LIMBS M3 Relief Knee that improves gait quality and stability while remaining affordable for the growing global middle class.



Photo courtesy of LIMBS International: <https://www.limbsinternational.org/countries/13832/Bangladesh>

### Stability in the Stance Phase

The stance phase occurs when the knee is straight and planted on the ground. If the knee is not rigid during the stance phase, it will collapse and the user will fall. To ensure stability, a prosthetic knee must lock and hold the weight of the user throughout the stance phase.



### Gait Quality in the Swing Phase

The swing phase occurs as the knee swings forward in a step. Behavior during this phase changes depending on gait speed. An intelligent prosthetic needs to be able to adapt to changes in gait speed and mimic the gait of a biological knee to provide good gait quality.

## Our Process

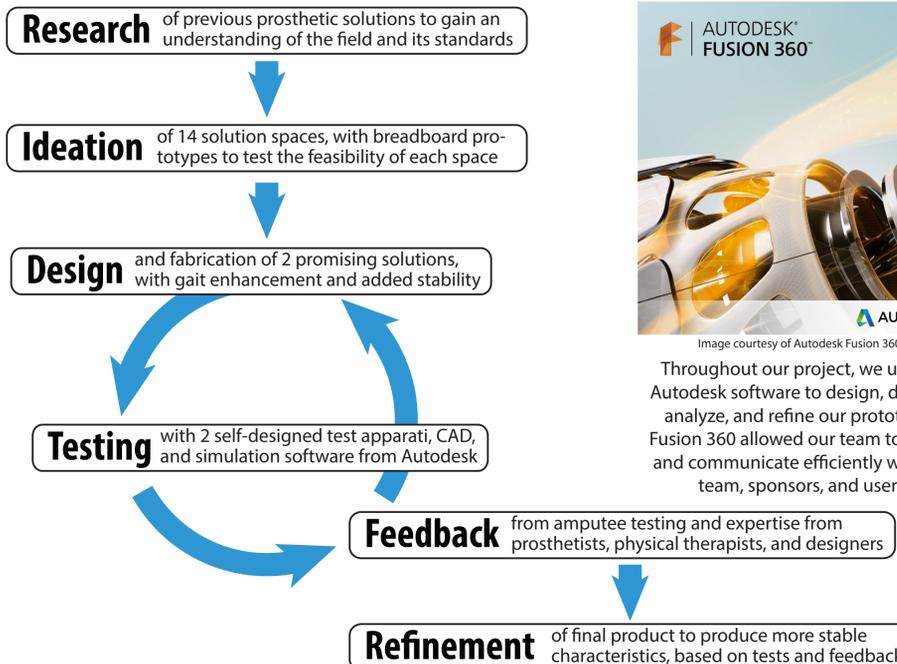


Image courtesy of Autodesk Fusion 360  
Throughout our project, we utilized Autodesk software to design, develop, analyze, and refine our prototypes. Fusion 360 allowed our team to iterate and communicate efficiently with our team, sponsors, and users.

## Our Product

We produced two independent solutions to make robust stance control and simple gait adaptability affordable for the growing global middle class. These build off the success of the existing LIMBS M3 Relief Knee and can be feasibly integrated into the current system. These solutions will allow amputees in the growing global middle class access to an intelligent prosthetic system.



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