# SmartLeg - Smart Transfemoral Prosthesis II

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Transfemoral amputation causes the loss of two important joints to reproduce the gait: the knee and the ankle joints. Passive transfemoral prostheses available for sale are not efficient in reproducing the human gait cycle. Yet powered prostheses available for sale are developed outside of Brazil, therefore are imported and are too expensive for most Brazil's population. Many prostheses offer limited adaptation and expensive maintenance. Aiming to propose a solution for these problems, we developed SmartLeg Beta, a powered transfemoral prosthesis able to adjust itself to each biotype by a gait recognition system using non-invasive sensors. SmarLeg Beta also aims to have an affordable price for the Brazilian market. The prototype proposes an instant gait recognition method by the acquisition of kinetic and kinematic data, being able to recognize tasks in compliance with the conditions of each gait event to control the knee. In addition, it uses dynamic sensors integrated to the prosthesis and presents a new mechanical design for powered transfemoral prosthesis that uses a brushless motor, aiming to reduce the production costs and maintenance. Firstly, the prosthesis was modeled based on the biophysics of the movement. Following, the development of the prototype was divided in mechanics, electronics and software. In the end of the development, the prototype was assembled and integrated. In partnership with a rehabilitation institution, people that suffered transfemoral amputation will be invited to test the prototype and to collect results of the system operation. We expect that the prototype interprets and reproduces the gait efficiently, reduces physical energy, is low cost and promotes future users' quality of life and self-esteem.

**Awards Won:**