

An affordable lower limb prosthesis with polycentric knee joint, dynamic ankle joint and suction-suspension socket system having advanced features. Funding Agency- IMPRINT

Prof. S. Kanagaraj (PI) and Prof. Nelson Muthu (Co-PI) Department of Mechanical Engineering, Indian Institute of Technology Guwahati, Assam 781039

Theme:- Healthcare; **Objectives:-** (i) Design and development prosthetic knee joint with patient specific link length variation, knee rotation and prosthesis alignment mechanism. (ii) A direct socket fabrication technique with suction-suspension mechanism to increase the fitment and comfort level of amputee by reducing exhaustive conventional technique. (iii) A topologically optimized dynamic ankle joint and FRP foot to minimize the impact load and increase the body balance during uneven terrain walking. (iv) Testing facility as per ISO-10328 to test developed prosthesis. (v) Patient Trial and rehabilitation feedback.

- ❖ Knee joint link length can be adjusted by the prosthetist to increase the stability or ease in flexion along with deep squat sitting flexion; Knee rotation provides cross-legged sitting on floor, alignment mechanism help to align the socket, knee, ankle and foot according to the need of amputee.
- ❖ Smart socket is developed through FEM of multiple designs such that the patient does not have to undergo time intensive trials and testing, and go for direct usage.
- ❖ The design is compact and provides dorsiflexion and plantarflexion – 35° Inversion and Eversion – 15° Internal and External rotation – 5° , range of motion to perform walking in uneven terrain by providing voluntary control hence improving the balance and psychological acceptance of prosthesis.
- ❖ A porous structured breathable prosthetic liner is developed which can be stretched in horizontal direction providing compressive force to maintain constant volume in stump.
- ❖ With an aid of affordable assistive devices, amputees shift towards reintegration into society which help in overcoming the other social factors such as employability and productivity that influence to make them as working individual with an amputation.

