

BIONIC LIMB MECHANISM

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Branch : Mechanical Engineering

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Introduction:

Prosthesis is a synthetic tool that replaces a missing frame component, which can be misplaced with the aid of beginning, twist of fate or every other sickness. Prosthesis is meant to repair the everyday functions of the lacking body element, if not all, as a minimum some mobility and functionality to the wearer. The price for a basic prosthetic leg alone degree from 2,500 to 45,000 INR. Advanced prosthetics even fee greater, it may vary from eight lakhs to 10 lakhs. In making this bionic leg, the mechanical layout includes fundamental parts, namely the connecting socket with the amputation and the drive gadget which includes motor, battery and manage. Our research prototype uses an Arduino microcontroller to layout a myoelectric prosthetic, a prosthetic that reads electrical indicators from the residual limb and powers motors for motion. The cognizance of our research is to design a low-cost decrease limb prosthetic capable of knee and ankle movement in response to electrical alerts from the residual limb. We use an Arduino Uno microcontroller in our layout, as well as low value excessive electricity materials for fabrication.

Objectives:

1. To create a prosthetic limb which can sense the muscle movements and that movement can be automated, which makes the amputated person to feel the bionic limb as his own biological limb.
2. To design and develop the prototype of the bionic limb mechanism which is comfortable to use.
3. To fabricate the prototype using low-cost materials and hence make it affordable for everyone.
4. Using sensors like EMG muscle sensor and DC motor etc.

Methodology:

1. Widely popular Arduino UNO microprocessors will be used as a Platform
2. EMG Muscle sensor will be used to sense the limb moment
3. Battery will be used as a power supply
4. To replicate 8DOF moment of human knee joint and ankle joint will be done by using gear mechanism with DC motors and screw suspension will be used for ankle joint as a damper.
5. An electric circuit would be built using these components and several testing will be done to calibrate the bionic leg

Conclusion:

- Improvement of sensation, improved reintegration/ embodiment of artificial limb and better controllability
- Improve mobility
- Use of muscle sensors will increase the precision and accuracy
- Will be built in low cost
- Will have more torque and high acceleration

Scope for future work:

- We can do our fabrication process using different lightweight materials
- Linear actuator can be used for ankle moment
- For more up gradation the foot will be made of piezoelectric so that it can be charged by itself.



Assembled Bionic Limb