**GAIT – ASSIST**

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**Title:** GAIT ASSIST – A haptic feedback system to Robotic exosuits for legs to assist people with mobility issues

**Problem statement and approach:**

The problem addressed by this project is the limited mobility and independence experienced by individuals with lower-limb impairments, caused by injuries, accidents, or other medical conditions. This haptic feedback system for an exosuit provides real-time assistance and feedback during walking, utilizing load cells, tactile sensors, IMUs, and Electromyography sensors to detect the user's movements and generate appropriate feedback signals. The feedback signals are then transmitted to the actuators, which produce the necessary forces to provide haptic feedback to the user. The haptic feedback system offers a solution to the problem of limited mobility and independence by providing real-time assistance and feedback during walking. It enhances the user's gait, stability, and confidence, reducing the risk of falls and injuries while allowing users to perform daily activities with ease and improving their overall quality of life.

Moreover, the haptic feedback system is adaptable and can be customized to meet the specific needs of different users and applications, such as rehabilitation or assistive technology. The system can also be integrated with other technologies, such as virtual reality or machine learning, to further enhance its effectiveness and functionality. Overall, the haptic feedback system for an exosuit represents a significant step towards improving the mobility and independence of people with lower-limb impairments.

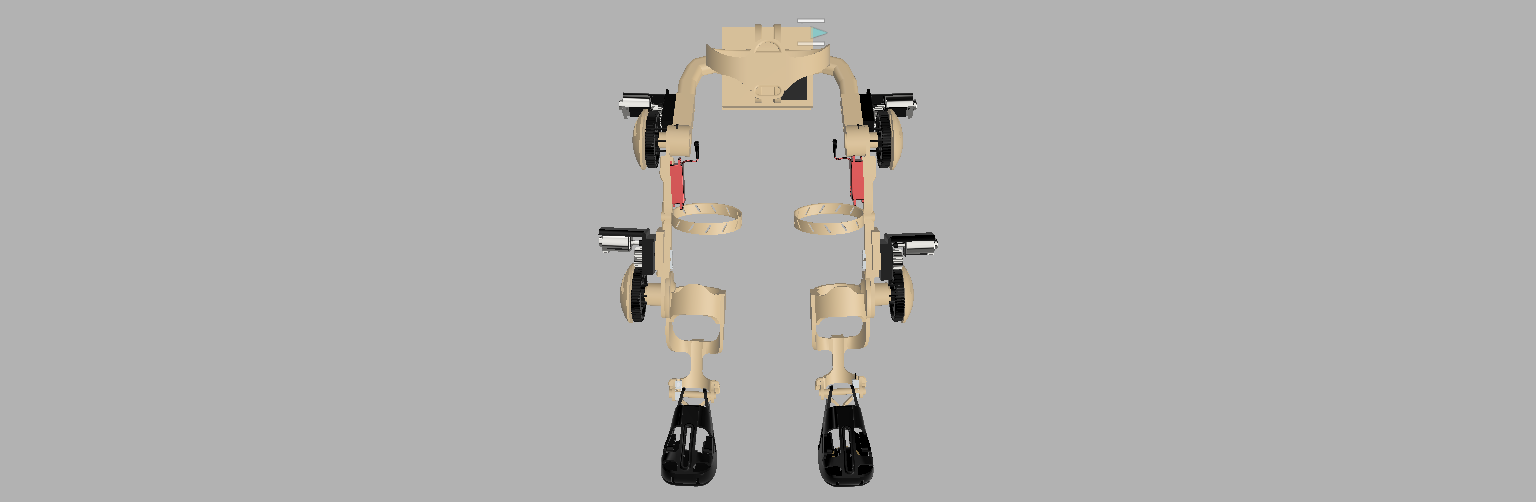
**Description:**

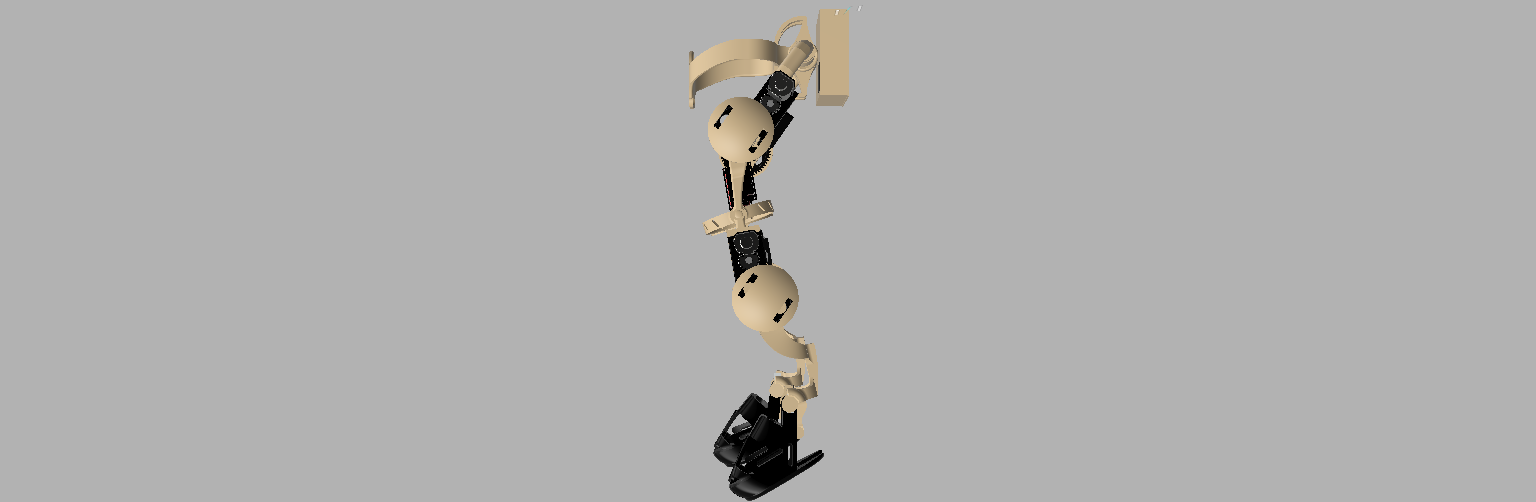
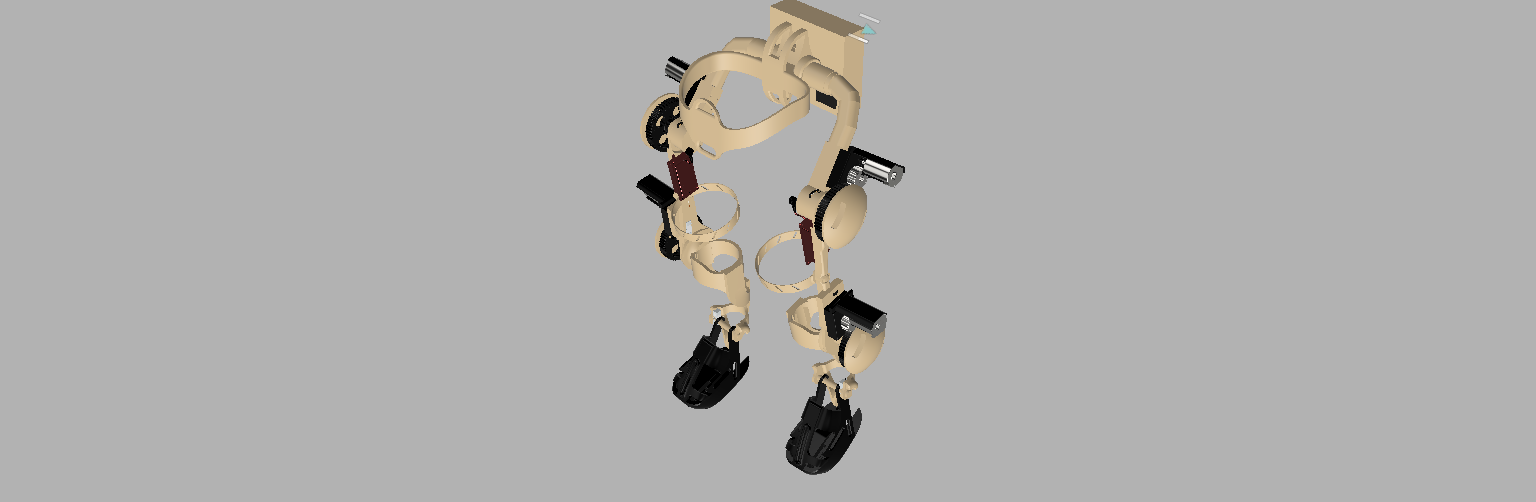
The project aims to develop a haptic feedback system for an exosuit that assists people with lower-limb impairments. The exosuit includes several sensors, such as load cells, tactile sensors, IMUs, and Electromyography sensors to detect the user's movements and provide feedback. The system uses load cells to measure the force applied by the user's legs while walking, tactile sensors to detect contact with the ground and provide information about the terrain, IMUs to measure the orientation and movement of the user's legs, and Electromyography sensors to detect muscle activity and provide information about the user's intention to move. To generate appropriate feedback signals, the sensor data is processed by a control algorithm that controls the actuators. The actuators generate necessary forces to provide the haptic feedback to the user. Depending on the specific application, the actuators may include motors, pneumatic or hydraulic actuators, or other types of actuators. A closed-loop control system is modeled using Simulink, a simulation tool for multidomain dynamic systems. The Simulink model simulates the behavior of the closed-loop control system under various conditions such as changing terrain or user gait. This ensures that the haptic feedback system is effective and reliable.

The project's primary objective is to develop a haptic feedback system that enhances the user's mobility and independence by providing real-time assistance and feedback during walking. The system is highly customizable and can be tailored to meet the specific needs of different users and applications such as rehabilitation or assistive technology.

**CAD DESIGN:**

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**Conclusion:**

In conclusion, the haptic feedback system for an exosuit developed in this project is a significant advancement in assistive technology for people with lower-limb impairments. The system uses a combination of sensors, control algorithms, and actuators to provide real-time assistance and feedback during walking, enhancing users' mobility, stability, and confidence.

Overall, the haptic feedback system for an exosuit represents a significant step towards improving the mobility and independence of people with lower-limb impairments. The system has the potential to significantly enhance users' quality of life and improve their ability to perform daily activities with ease. Further research and development in this field can lead to more advanced and efficient haptic feedback systems that benefit a wider range of individuals.