**Title:** "Optimizing Hip Exosuit-Assisted Walking Using FSR-Based Sensor and ECG Feedback"

Introduction:

Provide an overview of the research problem, rationale for the study, and significance of optimizing hip exosuit-assisted walking for individuals with mobility impairments.

Review relevant literature on hip exosuits, sensor-based gait analysis, and assistive technologies for gait rehabilitation.

**Objectives:**

Clearly define the research objectives, including:

To develop a customized hip exosuit prototype integrated with FSR-based sensors and ECG feedback.

To evaluate the performance, usability, safety, and effectiveness of the exosuit system in optimizing walking patterns and gait mechanics.

To investigate the long-term effects and potential clinical applications of exosuit-assisted walking for rehabilitation and mobility enhancement.

**Methodology:**

Design and Development:

Develop a prototype hip exosuit incorporating FSR-based sensors for gait analysis and ECG monitoring for physiological feedback.

Customize the exosuit design to ensure compatibility with user anatomy, comfort, and ease of use.

Implement real-time control algorithms to adjust exosuit assistance levels based on sensor data and user feedback.

**Experimental Setup:**

Recruit participants with mobility impairments for the experimental study.

Set up a controlled environment (e.g., laboratory or gait analysis facility) for data collection and testing.

Define experimental protocols for assessing gait parameters, usability, safety, and effectiveness outcomes.

**Data Collection and Analysis:**

Collect quantitative data on gait parameters, physiological signals, and user feedback during exosuit-assisted walking trials.

Perform statistical analysis to compare outcomes between different experimental conditions (with vs. without exosuit assistance).

Conduct qualitative analysis of user feedback to identify usability issues, safety concerns, and areas for improvement.

**Validation and Clinical Application:**

Validate the exosuit system through comparative studies with existing assistive devices or rehabilitation protocols.

Explore potential clinical applications of exosuit-assisted walking for gait rehabilitation, mobility enhancement, and functional recovery.

**Risk Management:**

Identify potential risks and challenges associated with the research activities (e.g., technical difficulties, recruitment issues, regulatory compliance).

Develop risk mitigation strategies to address identified risks and ensure project success.

**Ethical Considerations:**

Obtain ethical approval from institutional review boards (IRBs) or ethics committees for human subjects research involving participants with mobility impairments.

Ensure compliance with ethical guidelines for research conduct, participant recruitment, informed consent, and data confidentiality.

**Dissemination Plan:**

Outline plans for disseminating research findings through academic publications, conference presentations, and knowledge transfer activities.

Engage with relevant stakeholders (e.g., healthcare professionals, industry partners, user communities) to facilitate knowledge exchange and technology transfer.

**Monitoring and Evaluation:**

Establish mechanisms for monitoring project progress, including regular team meetings, milestone reviews, and progress reports.

Evaluate research outcomes against predefined success criteria and revise the research plan as needed based on interim findings and feedback.