Project management  
  
**Project Management**

**1. Introduction to Project Management**

Effective project management is essential for ensuring the successful execution of this research on Machine Learning-Based Security for 5G Network Slicing. This project followed a structured and time-based approach, integrating elements of Agile research methodologies and task-trackingtools to monitor progress and meet deadlines efficiently.

The research was planned and executed using:

* **Gantt charts** for milestone tracking and scheduling.
* **Github** for task management and collaboration.
* **Microsoft Excel** for timeline adjustments and progress monitoring.

By leveraging these tools, the project maintained flexibility while ensuring key deliverables were completed on time.

**2. Planning and Scheduling**

To structure the research efficiently, a detailed Gantt chart was developed to outline key phases of the project. The project timeline included the following major milestones:

A screenshot of a calendar

AI-generated content may be incorrect.

A Gantt chartvisualization of this timeline provides a clear representation of deadlines and progress tracking.

**Key scheduling techniques used:**

* **Task Prioritization**: High-impact tasks (such as model training and testing) were scheduled in the early implementation phase to allow for troubleshooting.
* **Buffer Weeks**: Extra time was allocated in case debugging, additional testing, or adjustments were required.
* **Progress Reviews**: Weekly evaluations ensured alignment with project goals.

**3. Resource Management**

**3.1 Software Resources**

The following software tools and platforms were utilized for the research:

* **OpenAirInterface** – 5G simulation and network slicing setup.
* **Mininet & ONOS SDN Controller** – Network slice management and security policy enforcement.
* **Wireshark & Splunk** – Traffic monitoring and attack detection analysis.
* **TensorFlow/PyTorch** – Machine Learning model implementation for anomaly detection.
* **Microsoft Excel** – Data tracking and results analysis.
* **Trello** – Project tracking and collaboration.

**3.2 Hardware Resources**

* **Computing Environment**: The project was executed on a high-performance computing system with **NVIDIA GPU acceleration** for ML model training.
* **Virtual Machines (VMs)**: Used to simulate multiple network slices under different attack conditions.

**3.3 Data Resources**

* **Synthetic Attack Datasets**: Generated simulated cyberattack patterns (e.g., DDoS, Spoofing, Cross-Slice Attacks) for ML model training and evaluation.
* **Pre-existing Security Datasets**: Open-source cybersecurity datasets were analyzed for comparison.

By strategically managing resources, the project ensured optimal utilization of computing power, software capabilities, and data accuracy.

**Next Steps**

* **Risk Management & Mitigation Strategies** will be added later after implementation testing.
* **Challenges & Resolutions** will be documented post-implementation.
* **Evaluation of Management Effectiveness** will be assessed at the end of the project to reflect on what worked well and areas for improvement.