**SPxY Project : Role Card: Control Engineer**

|  |  |
| --- | --- |
| **Filename:** 112007\_ORG\_R01\_Role Card-Control Engineer  **Project:** Project SPxY, EPFL Spacecraft team | **Prepared by:** Valentin Suppa-Gallezot  **Approved by:** TBA |

**Role Card: Control Engineer**

**Role Overview:** The Control Engineer for the SPxY project is responsible for developing a comprehensive control algorithm for the X-Y satellite tracking mechanism. The role involves conceptualizing a Simulink model, designing control algorithms (using methods like LQR, LQG, or MPC), and leveraging the strength of the received signal to enhance satellite tracking and improve the accuracy of Two-Line Element (TLE) data obtained from the internet.

**Key Duties and Responsibilities:**

**1. Simulink Model Conceptualization:**

* Develop a Simulink model that accurately represents X-Y satellite tracking mechanism.
* Create a dynamic simulation of the system, accounting for the mechanical and control components.
* Collaborate with the simulation and testing engineer to validate and fine-tune the model.

**2. Control Algorithm Development:**

* Design control algorithms, such as LQR (Linear Quadratic Regulator), LQG (Linear Quadratic Gaussian), or MPC (Model Predictive Control), to optimize the satellite tracking process.
* Implement control strategies that account for dynamic disturbances and changes in satellite positions.
* Fine-tune and optimize the control algorithms to meet performance objectives.

**3. Signal Strength Utilization:**

* Leverage the strength of the received signal from the satellite to enhance tracking accuracy.
* Develop algorithms that adapt tracking parameters based on signal quality and feedback.
* Collaborate with the software engineer to integrate signal strength data into the GUI.

**4. TLE Data Improvement:**

* Utilize control algorithms to improve the accuracy of the Two-Line Element (TLE) data obtained from the internet.
* Implement algorithms that refine orbit predictions and adapt to changing conditions.
* Collaborate with the project team to validate TLE data improvements through testing.

**5. Testing and Validation:**

* Conduct comprehensive testing of the control algorithms in the Simulink model.
* Verify that the algorithms meet performance and accuracy requirements.
* Collaborate with the testing engineer to resolve control-related issues and anomalies.

**6. Documentation and Reporting:**

* Create documentation for the control algorithms, including specifications and technical guides.
* Provide regular progress updates to the project manager and stakeholders.
* Maintain records of control algorithm design decisions and updates.

**Limits of Authority:** The Control Engineer is responsible for developing control algorithms, enhancing signal strength utilization, and improving TLE data accuracy. However, significant changes to the project's control system architecture, budget, or critical design decisions may require approval from the project manager or higher-level management. This role should closely collaborate with the system engineer and other team members to ensure control algorithms align with project objectives.

*Note: The duties and responsibilities listed in this role card are not exhaustive and may be subject to change as project requirements evolve.*