# **Cover Letter for Software Engineer Internship - Opticaster (Energy Engineering)**

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Dear Tesla Hiring Team,

I am writing to express my strong interest in the Software Engineer Internship position with the Opticaster team for Fall 2025. As a dual-degree student pursuing BS in Life Science and BE in AI Interdisciplinary Studies at Handong Global University, I am excited about the opportunity to contribute to Tesla's mission of accelerating sustainable energy adoption through innovative software solutions.

## **Technical Expertise Aligned with Tesla's Needs**

My technical background directly aligns with the requirements for this position. I am proficient in **Python** and have extensive experience with **Linux** and **HPC environments**, which I've utilized throughout my research projects and teaching assistant roles. My experience spans the full spectrum of technologies mentioned in the job description:

* **Big Data & Cloud Technologies**: Through my current TA role in "Big Data Modelling and Platform," I work extensively with **SQL, NoSQL, and Docker** for large-scale data analysis, directly supporting 30+ students in mastering these tools.
* **Machine Learning & Optimization**: My recent project developing a **Language-Model-Based RNA-seq Data ETL Workflow** demonstrates my ability to design scalable ML pipelines. I implemented transformer models (ProtBERT) and Bi-LSTM networks, achieving an AUC of 0.7067 - showcasing the exact **time series forecasting and optimization** skills Tesla seeks.
* **Production-Ready Development**: My work at Seoul National University's CCADD involved designing preprocessing algorithms and metrics for regulatory pharmaceutical documents as part of a Ministry R&D project, requiring robust, scalable solutions.

## **Proven Problem-Solving in Energy-Adjacent Fields**

While my background spans interdisciplinary fields, I've consistently applied computational approaches to complex optimization problems. In the **JUMP AI 2024 competition**, our team placed **3rd among 1,600+ participants** by developing an MLP model for drug discovery, demonstrating my ability to tackle challenging prediction and optimization tasks under pressure.

My project using **genetic algorithms for concert tour optimization** and **K-means clustering for vertiport location optimization** showcases my experience with the type of optimization modeling that would be valuable for energy storage systems and grid management.

## **Research Excellence and Collaborative Leadership**

My research experience demonstrates both technical depth and collaborative leadership. At UNLV's DataX Lab, I developed a **ViT-based classifier achieving 99% recall** for lung cancer pathological image analysis, including designing data preprocessing algorithms and storage strategies for large-scale medical imaging data. This experience with handling massive datasets and developing robust ML pipelines directly translates to the performance analysis and fleet monitoring tools mentioned in the internship description.

As a project leader for simulating mammalian circadian rhythm models, I successfully coordinated team efforts while applying systems biology and mathematical modeling - skills that would be valuable for understanding and optimizing complex energy systems.

## **Teaching and Knowledge Transfer**

My dual TA positions in "AI Programming Application" and "Big Data Modelling and Platform" have honed my ability to translate complex technical concepts into actionable insights. These roles require me to troubleshoot technical issues, develop instructional materials, and guide students through hands-on implementation - skills that would be valuable when working with Tesla's experienced engineering team and contributing to scalable infrastructure.

## **Passion for Sustainable Energy Impact**

What excites me most about this opportunity is the chance to apply my interdisciplinary background to real-world energy challenges. Tesla's work with Megapacks, Powerwalls, and Virtual Power Plants represents the cutting-edge intersection of software engineering, optimization, and sustainable energy - exactly where I want to focus my career.

My experience working across biology, AI, and data science has given me a unique perspective on complex systems optimization. I'm particularly drawn to how the Opticaster team's work on battery charging/discharging optimization directly impacts both customer value and grid stability, contributing to renewable energy adoption at scale.

## **Commitment and Availability**

I am fully committed to the **full-time, on-site internship** from August/September 2025 through December 2025/January 2026, with potential extension into Winter/Spring 2026. As an international student, I am prepared to secure the necessary **CPT authorization** for 40 hours/week on-site work during the academic year.

I am excited about the opportunity to work closely with Tesla's experienced engineers on critical projects that impact team success while gaining exposure to real-world energy systems and cutting-edge grid stability technology.

Thank you for considering my application. I look forward to the opportunity to contribute to Tesla's mission of sustainable energy through innovative software engineering solutions.

Sincerely,  
 Nayoung Ku