



西南交通大学
Southwest Jiaotong University



香港科技大学

Personal Portfolio

For Fall 2027 Admission

Yujie Li

Southwest Jiaotong University

Content:

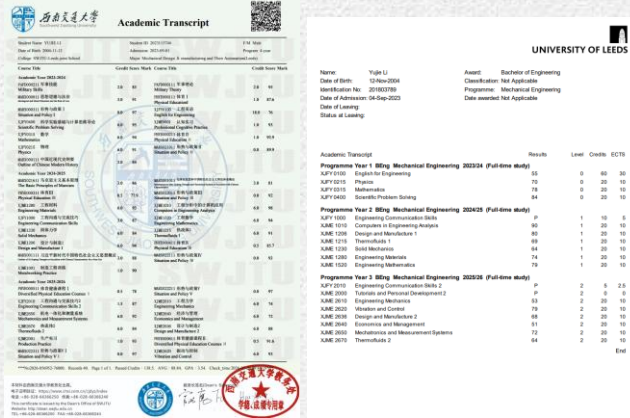
① Self Introduction

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SELF INTRODUCTION



SWJTU and Leeds Transcripts

Dual BEng in
Mechanical Design &
Manufacturing and
Their Automation
(SWJTU) &
Mechanical
Engineering (UoL)



Provincial Second Prize

Personal Details

- Full Name: Yujie Li
- Nationality : China
- Date of Birth: November 2004
- Phone Number: +86 15378207870
- Email: 1299543747@qq.com
- AVG and GPA: 88.84, 3.54/4.0

Professional Skills and Certificates

- Skills: SolidWorks Structural Modeling, MATLAB Simulation Modeling, Python Mathematical Modeling, Arduino IDE Embedded Design
- Certificates: IELTS 6.5, CET - 6, National Computer Rank Examination Level 2

Competition Experience

- Led mechanical design and structural optimization of mechanical-photovoltaic dual-mode power generation system. Achieved 5W friction-based power generation and 4W solar power generation with modular and compact design. Won Provincial Second Prize in Sichuan Energy Conservation and Emission Reduction Competition

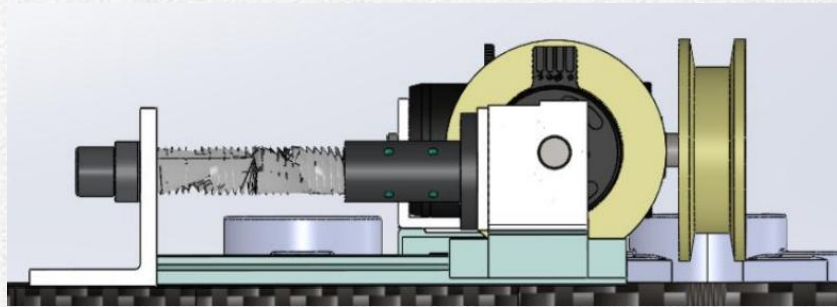
Publication

- Title of Publication: 基于机械—光伏双模耦合的智联单车能源回收系统设计与应用
- Title of Publisher: 模具制造
- Ranking: Sole Author
- Status: Accepted

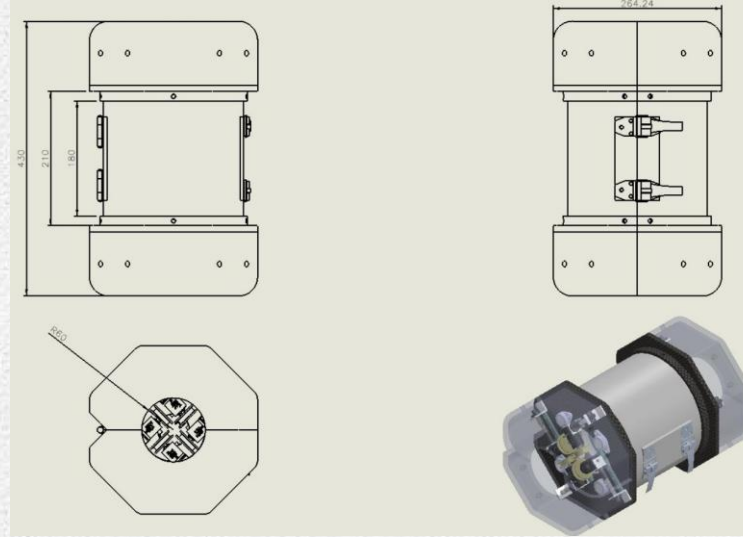


Research Project

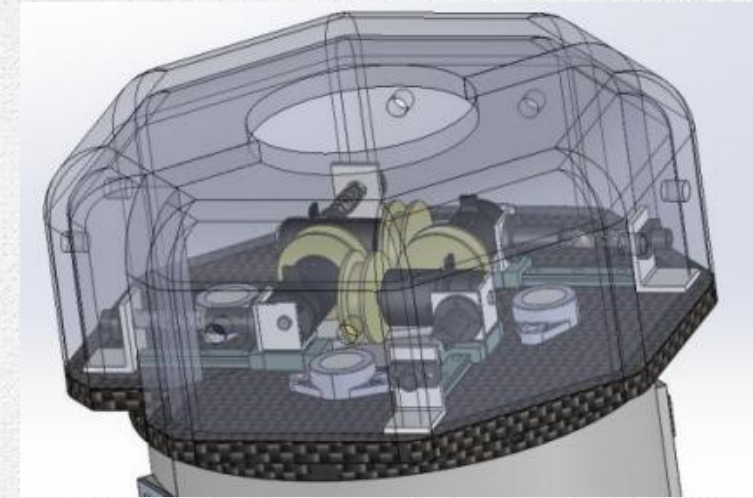
(Non-destructive Testing Robot for Stay Cables of Cable-stayed Bridges)



Spring-guide Rail Mechanism



Robot Engineering Drawing



Shell Design

- I. **Pain Point:** Manual high-altitude cable inspection is inefficient and dangerous; existing robots lack diameter adaptability and are overweight
- II. **Objective:** Develop a lightweight modular cable-climbing platform for subsequent non-destructive testing integration
- III. **Key Results:** 30% weight reduction (12kg total); adapts to 0.8-2.0m diameter cables; completed full mechanical & control system design

Background

- I. **Core Philosophy:** Adaptive clamping, lightweight and modular design (separate drive & detection modules)
- II. **Mechanical Innovation:** Spring-guide rail adaptive clamping mechanism; hinge-buckle split body for quick installation
- III. **Lightweight Optimization:** Carbon fiber + aluminum alloy materials, achieving 30% weight reduction without stiffness loss
- IV. **Drive & Control:** 7-motor direct drive + 1-encoder feedback; PID closed-loop speed control for stable 0.1-0.2m/s climbing

Methodology

- I. **Apr-Jun 2025:** Literature review & global technology bottleneck analysis
- II. **Jun-Oct 2025:** Overall scheme design & SolidWorks 3D structural modeling
- III. **Oct 2025 – Jan 2026:** Drive system selection, anti-slip verification & PID control design
- IV. **Jan-Apr 2026:** System simulation, performance optimization & final project defense

Research Process

Research Project

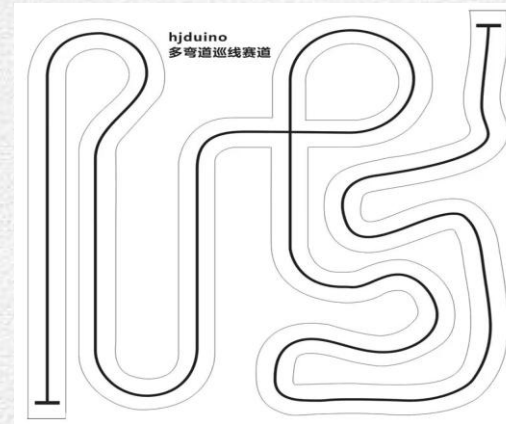
(Dynamic Wireless Charging System for Line-following Trolley)

$$u(t) = K_p \cdot e(t) + K_i \cdot \int_0^t e(\tau) d\tau + K_d \cdot \frac{de(t)}{dt}$$

Control Method

- Industry Trend:** Dynamic wireless charging is emerging as the key enabling technology for uninterrupted operation of electric vehicles, logistics robots and industrial automation equipment
- Core Problem:** Traditional static charging requires mandatory shutdown, creating critical bottlenecks for 24/7 autonomous systems
- Project Objective:** Develop an STM32-based autonomous trolley that achieves simultaneous movement and wireless power transfer
- Key Achievements:** 20% improvement in charging efficiency, $\pm 3\text{mm}$ high-precision line tracking under low-resolution encoder conditions

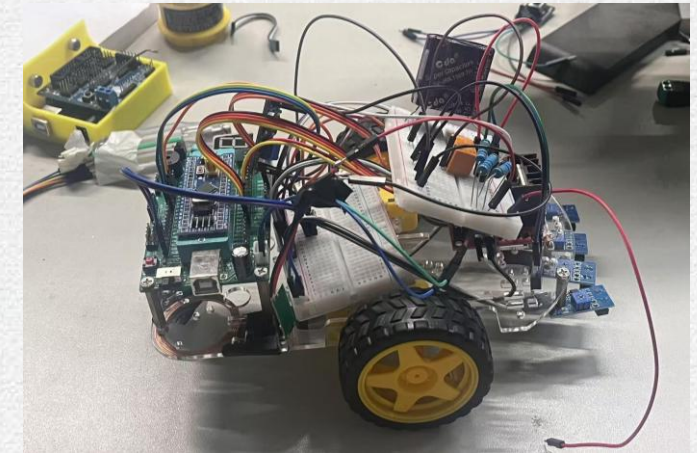
Background



Trolley Track

- Modular System Architecture:** Integrated 5 core subsystems: STM32 main control, dynamic wireless charging, infrared line-tracking, motor drive and power management
- Hardware Innovation:** Optimized coil layout and resonant frequency to minimize energy loss; designed lightweight mechanical structure for improved mobility
- Control Algorithm:** Tuned incremental PID controller to eliminate tracking jitter and ensure stable path following
- Iterative Validation:** Adopted closed-loop engineering workflow: Single-module testing → System integration → Performance debugging → Parameter optimization

Methodology



Trolley Structure

- May–Jul 2024:** Literature review & technical pre-research; mastered STM32 embedded development fundamentals
- Jul–Oct 2024:** Hardware circuit design, component procurement & mid-term project review
- Oct–Feb 2025:** Full system assembly, PID parameter tuning & iterative performance optimization
- Feb–Apr 2025:** Comprehensive performance testing, academic paper writing & successful final defense

Research Process

Extracurricular Activities

"Red Pomegranate"

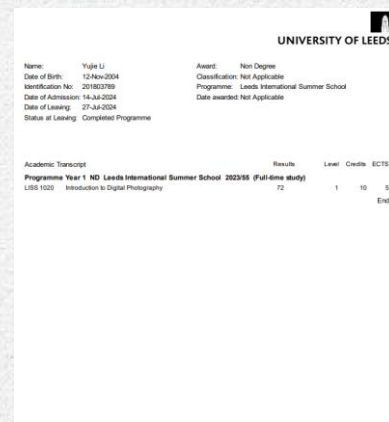
Served as Bai ethnic group representative, shared Bai traditional culture and craftsmanship with 80+ students from 12 ethnic backgrounds. Led a cross-ethnic team to research the integration of ethnic craftsmanship and modern engineering design. Enhanced cross-cultural communication and leadership skills, and also developed the ability to integrate diverse perspectives into engineering problem-solving.



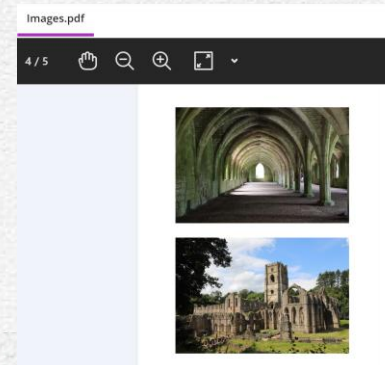
Participants from Diverse Ethnic Groups

Leeds International Summer School

Completed a one-month photography course covering visual storytelling, lighting composition and documentary photography. Produced a personal portfolio focusing on rural scenery and urban lines, and collaborated with global peers on a final group exhibition. Actively carried out professional skills and cultural exchanges with students from different countries, received recognition from teachers and students of the University of Leeds, and successfully completed the exchange tasks. Awarded a 15,000 RMB scholarship by Southwest Jiaotong University.



Transcript



Portfolio

Three Rural Outreach Program

Led interviews with 10+ SWJTU alumni working at Yunnan Transportation Planning and Design Institute, Power China and KUST. Compiled their career insights and engineering practice advice into a sharing post for students. Enhanced cross-organizational communication and content curation skills, gained in-depth understanding of the development trends in transportation and energy engineering sectors, and clarified my academic and career orientation in mechanical engineering.

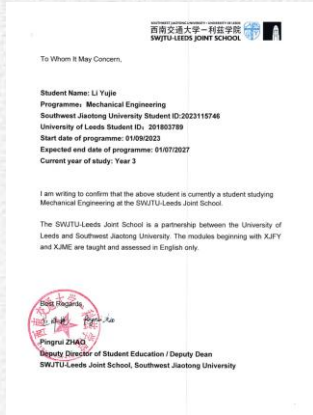


Interview



Group Photo

Awards & Scholarships & Certificates



EMI Certificate



Research Project



Three Rural Outreach Program



Internship Certificates



Excellent Student Cadre



"Red Pomegranate"



NCRE Level 2



Comprehensive Scholarship



Excellent Communist Youth League Member