

李唐

教育

北京交通大学

中国·北京 | 2021年9月 - 至今

本科·2021级·通信工程·詹天佑学院

- 课程: 高等数学/代数、数字/模拟电路、通信原理、数字信号处理、计算机原理、大学物理、电磁场
- 自学: 自动控制原理、机器人导论、计算图形学

项目经验

2023年 - 至今

(更多项目请访问[Github](#))

PANCAKE: 分布式自动运输小车集群

降低80%的成本提升130%的效率 | 高承重能力的3D打印自动导航小车集群，分布式完成运输任务

- 主导**完成硬件设计。完成硬件方案调研、可行性分析和方案设计；完成PCB设计制作，电子硬件调试；完成小车的3D建模(Fusion 360)、3D打印测试迭代、钣金打样；完成组装
- 主导**完成软件开发。完成嵌入式(STM32+ESP32)软件开发(C/C++)；完成ROS平台搭建、驱动部署、软件开发(C/C++/Python)；完成软硬件联调联试
- 带领**小组(3人)参与“2023-2024大学生创业创新比赛”，建立良好项目进度管理和组织定期组会讨论。项目现正在评级阶段

PIONEER: STM32F103智能小车开发板

加速开展学校内部社团培训 | 基于STM32F103RCT6的开发板，为四轮智能小车应用优化

- 参与**硬件设计。参与芯片选型、原理图绘制、布线审查、小批量制造(100片)和测试阶段。
- 主导**软件开发。基于STM32 HAL + CMAKE构建开发(C/C++)各外设的驱动以及示例；完成移植LVGL、FREE-RTOS等第三方框架
- * **参与**开展实验室培训。参与开展线下培训，制作幻灯片并讲解；参与制作线上线下教程和代码；参与解答同学的问题

无刷电机驱动控制板

机械臂项目的动力心脏 | 高性能低成本的无刷直流电机FOC驱动控制器

- 主导**完成方案验证、硬件设计(LC EDA Pro)、嵌入式(ESP32)软件开发(C++)、3D模型设计(Fusion 360)、文档编写、项目发布和维护
- * 发布在“[嘉立创·硬创社](#)”，获得318销量，25收藏，29点赞，位列社区前5% (2024年4月12日数据)
- * 助力“2022-2023大学生创业创新比赛”机械臂项目获得**北京市级大创作品**评级

MEMORIZE: 本地大语言模型单词记忆辅助

高效辅助英语学习 | 大语言模型评估单词难度，创建不同规模的例句，生成LATEX/PDF文档

- 独立完成**项目的开发和维护
- * 帮助我14天记忆2100个单词

技能树



PANCAKE: 分布式自动运输小车集群

降低80%的成本提升130%的效率 | 高承重能力的3D打印自动导航小车集群，分布式完成运输任务

项目目标

传统运输车（AGV）的劣势

- 初期投资高
- 负载死板
- 场景有限

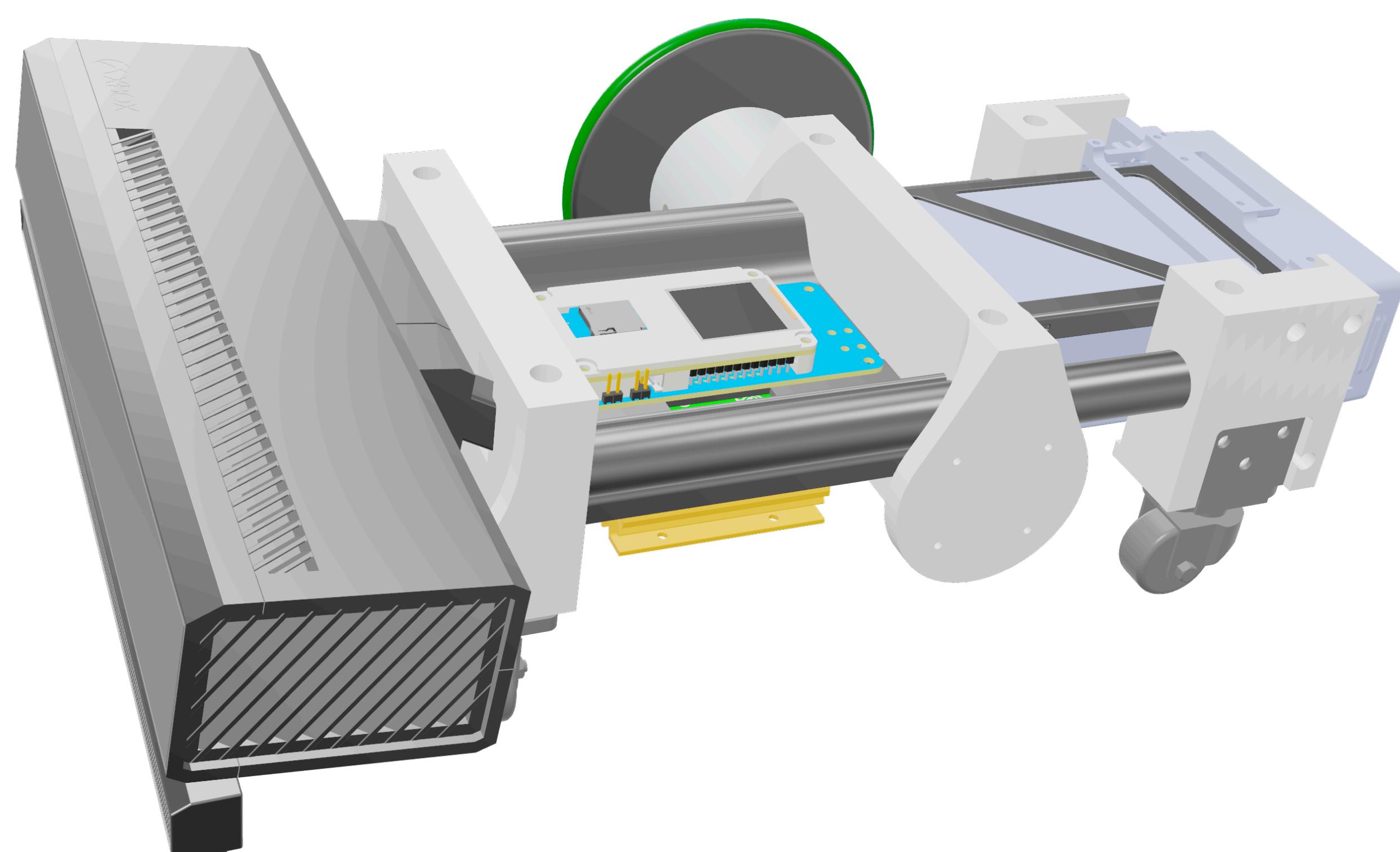
分布式自动运输小车集群的优势 + 保留传统运输车（AGV）的优势

- 低成本部署
- 广泛的使用场景
- 更高的可靠性

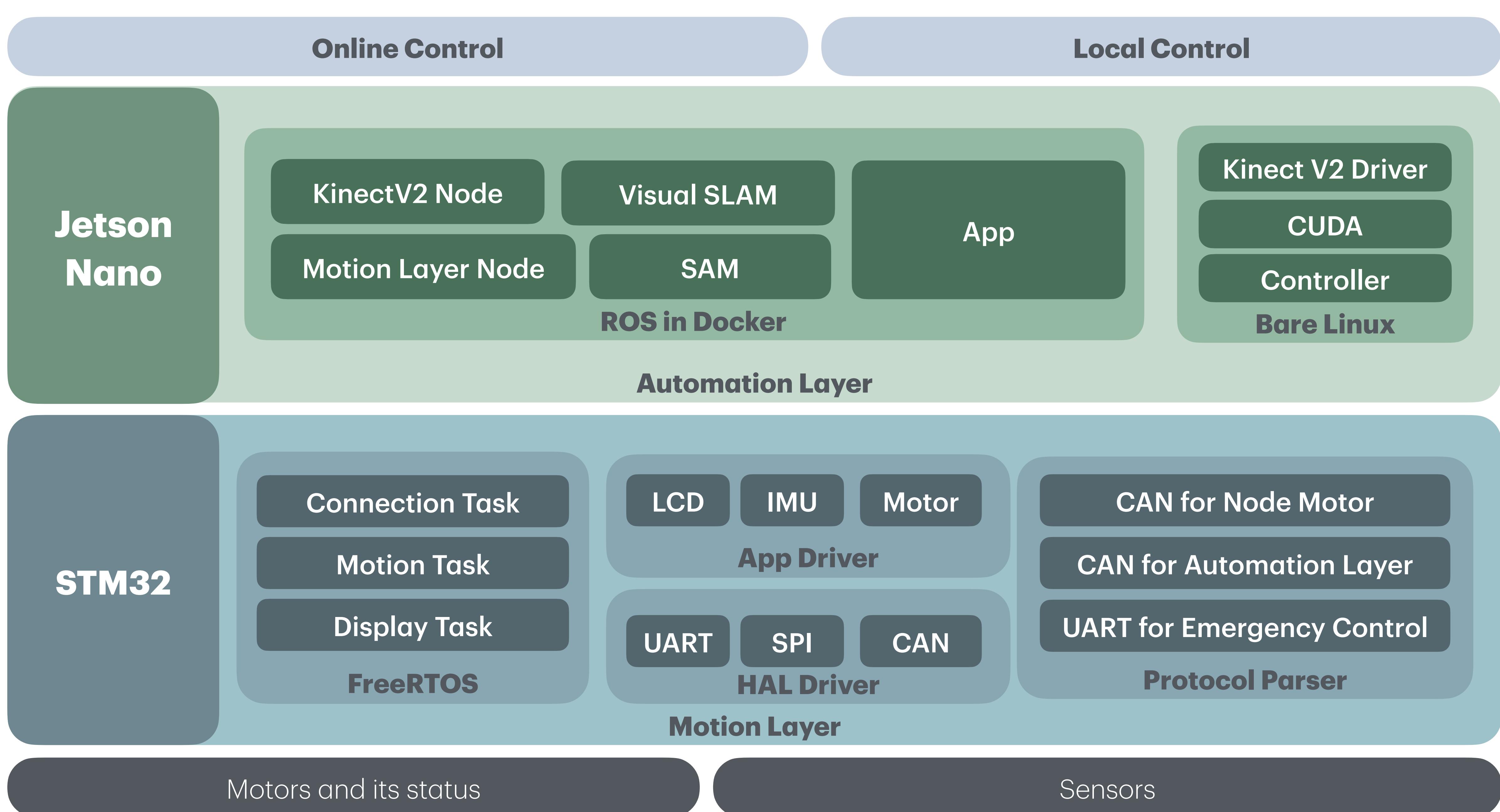
- 节省人力成本
- 智能化管理
- 高搬运负载能力

硬件方案

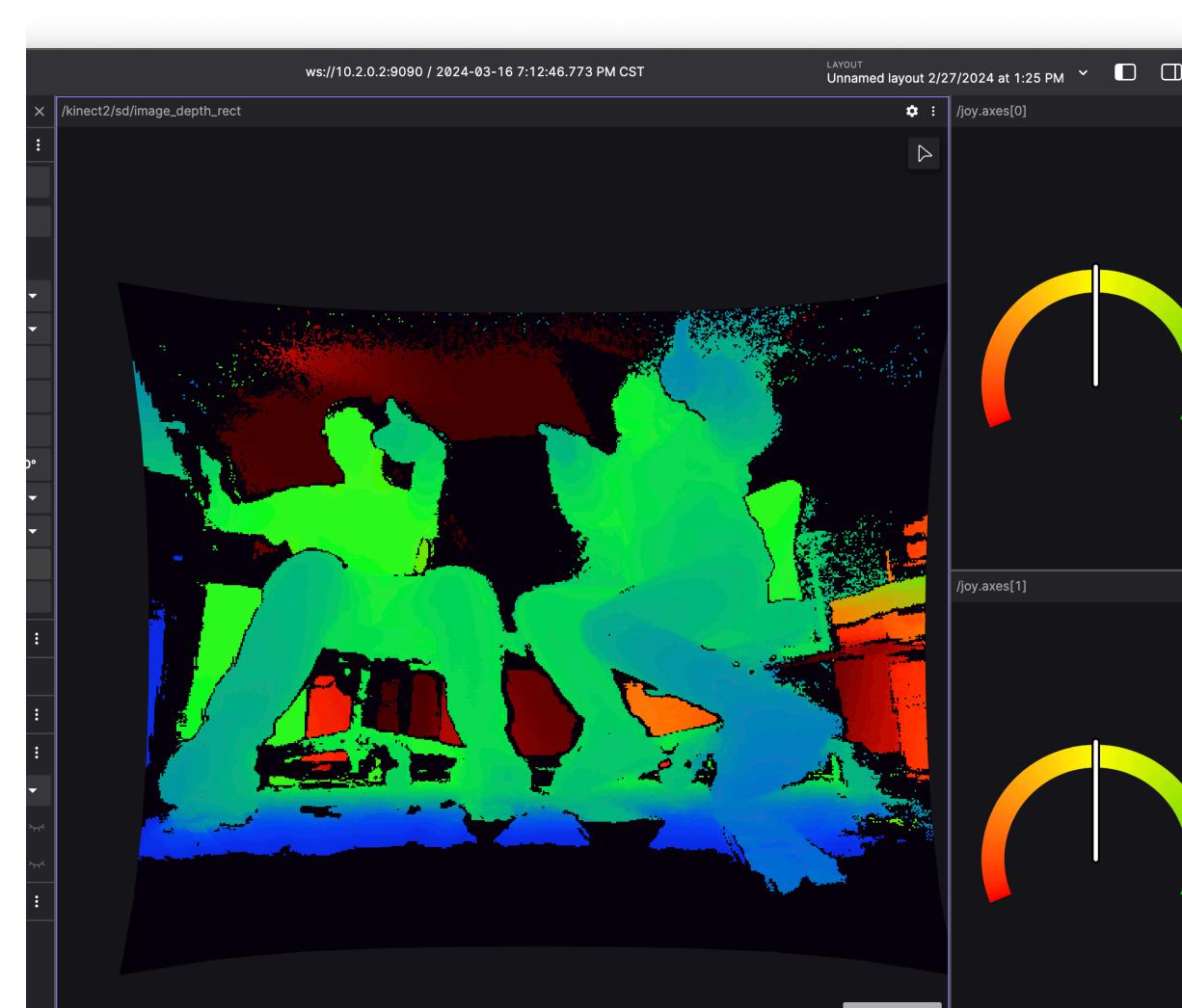
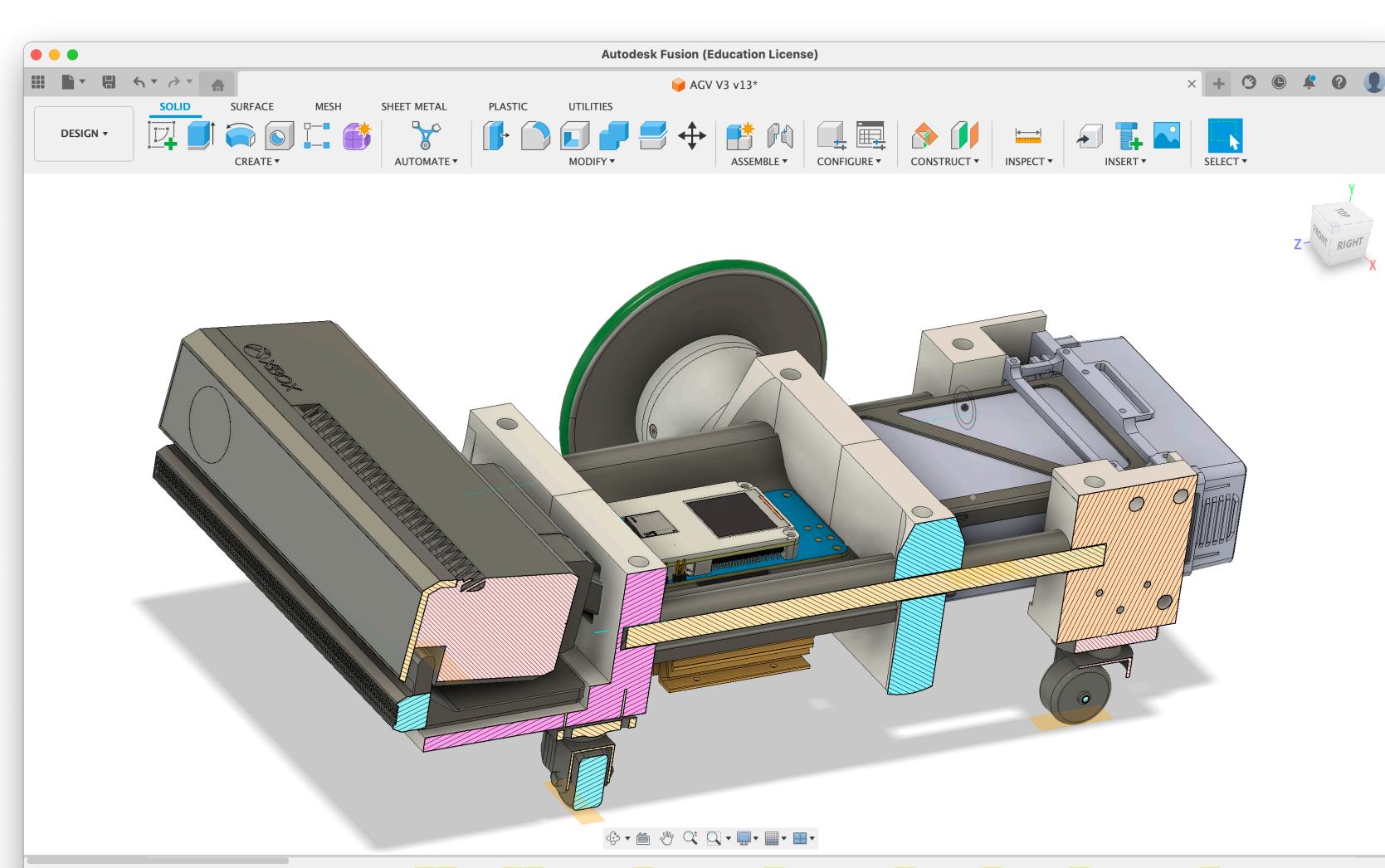
- Pioneer STM32 开发板（见下一页）
- Jetson Nano 开发板
- 无刷直流电机 + 行星减速器
- 100% 3D 打印连接件（白色部分）
- 2x 碳纤维管 + 铝合金面板支撑

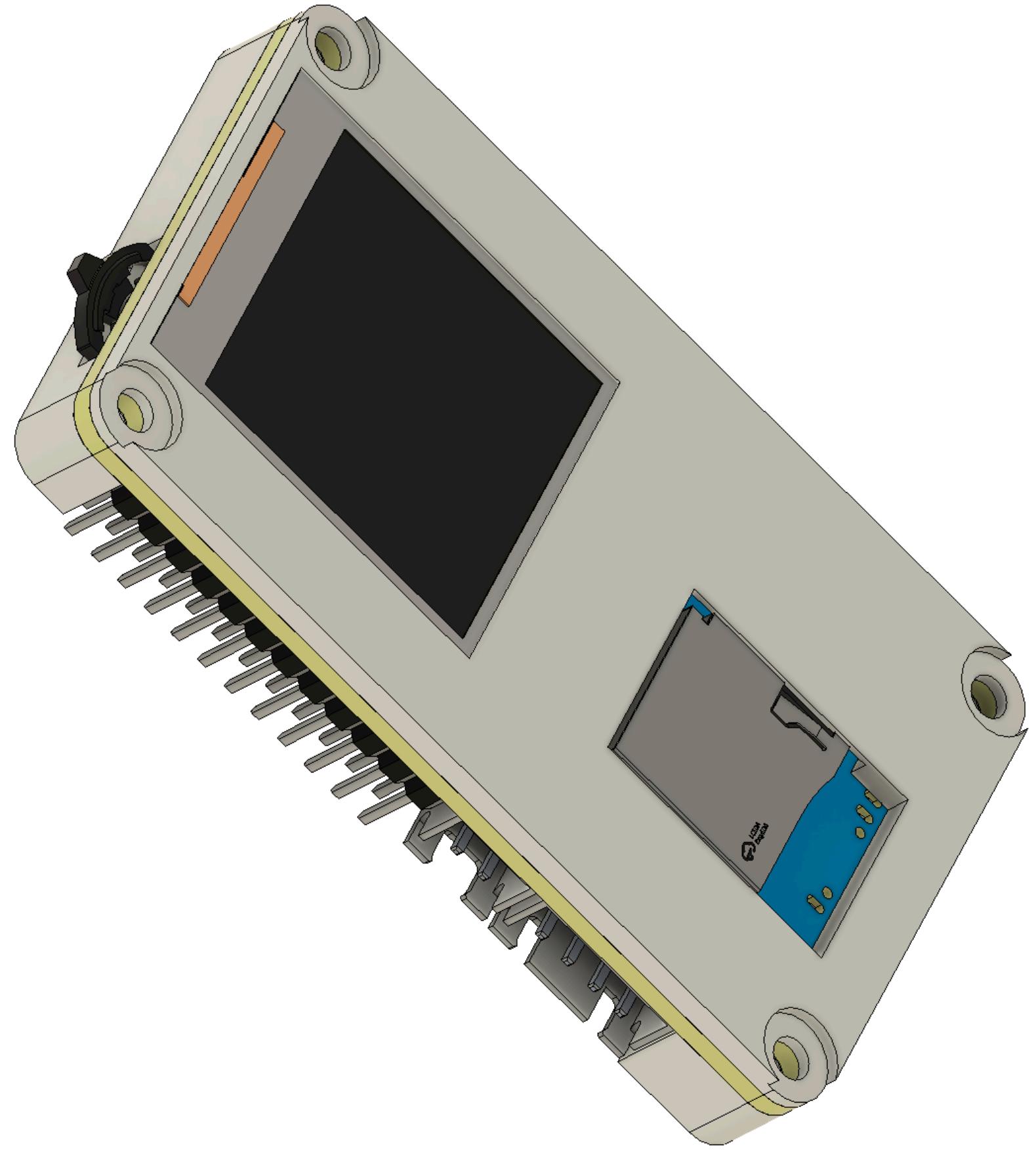


软件方案



效果展示





PIONEER: STM32F103智能小车开发板

基于STM32F103RCT6的开发板，为四轮智能小车应用优化
加速开展学校内部社团培训

STM32F103RCT6 · 72MHz · 48K RAM · 256K ROM

CAN transceiver | SPI Flash | IMU (MPU6050) | USB | LCD(SPI)

软件开发内容:

- 基本的示例: CLK、Debug、IT
- 所有外设的驱动示例: GPIO、UART (DMA/IT) 、SPI (DMA/IT) 、IIC (DMA/IT) 、CAN
- 四轮小车应用的示例: 蓝牙手柄 (需ESP32配合) , 控制驱动板
- 基于USB-DFU的Bootloader: 直接使用USB下载程序 (而不需要转UART或者使用ST-Link)
- 集成FreeRTOS

移植LVGL (GUI框架) : 逼近极限的性能优化 (SPI through DMA, manual malloc buffer, double frame-buffer) , 实现实际工程可用的 30fps@240*240分辨率与RAM/ROM消耗

Memory region	Used Size	Region Size	%age Used
RAM:	40232 B	48 KB	81.85%
FLASH:	184084 B	256 KB	70.22%

IELTS_Ver2_00_noline_nocon... Page 9 of 283

99 pertinent⁵ 102 insurance⁶

- He asked me a lot of very pertinent questions .
- The questions were pertinent to the discussion and helped to clarify the topic.
- pertinent data

100 certify⁶

- The accounts were certified by an auditor.
- The company certified the technician to ensure he was qualified to repair their equipment.

101 revenue⁵

- advertising revenue
- Strikes have cost £20 million in lost revenues .
- The company's revenue increased by 20% last quarter.
- tax revenue
- sales revenue
- revenue and expenditure
- inland revenue
- fiscal revenue

103 authority⁷

- an agreement between the US and Colombian authorities
- The principal exercised his authority over the school by enforcing strict rules and regulations.
- competent authority 【法】主管当局, 主管部门
- authority on 有关…的权威; …的专家
- local authority 地方当局; 地方政权
- administrative authority 行政当局
- tax authority 税务机关
- public authority 公共机关; 政府当局

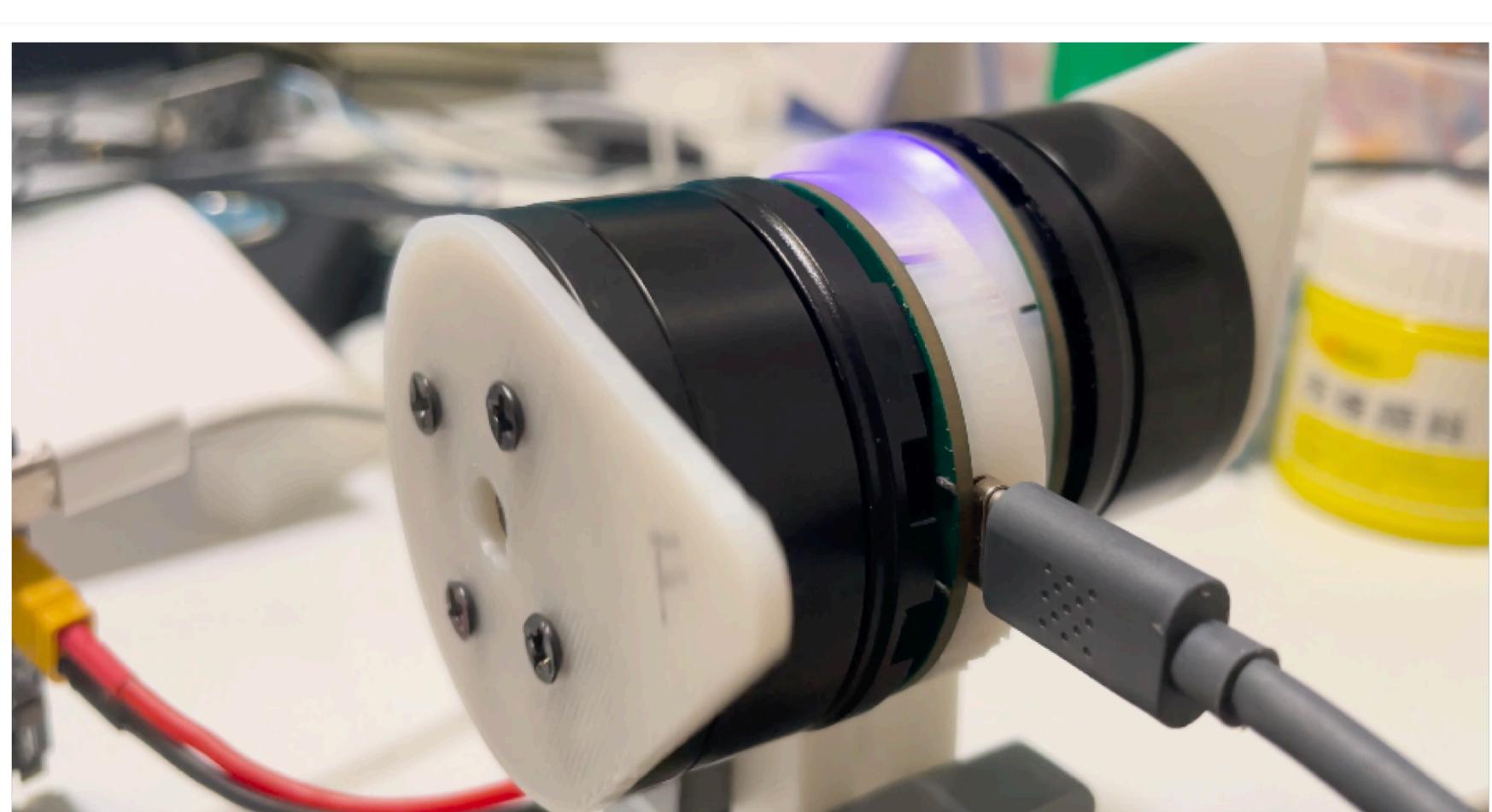
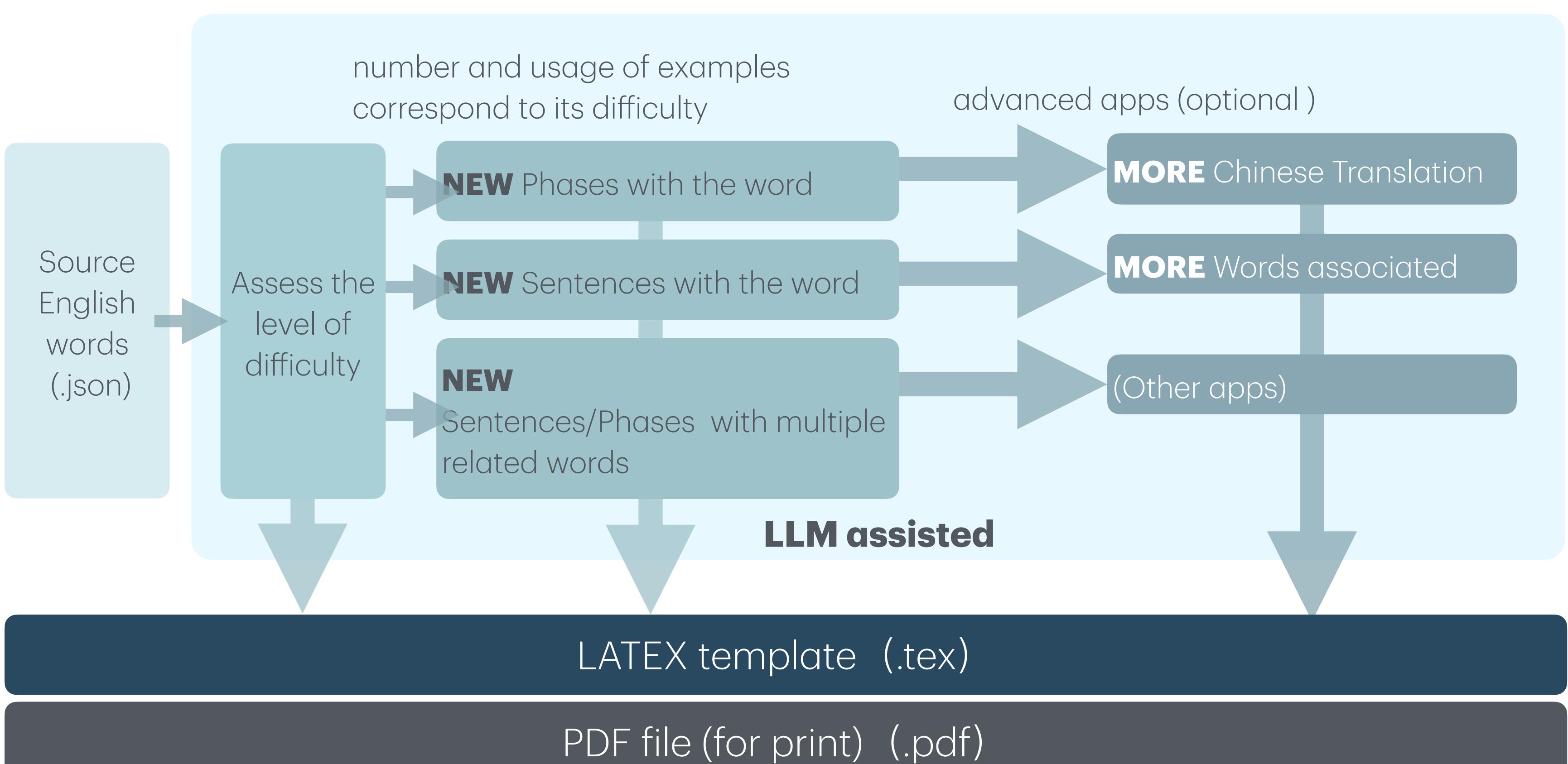
104 endorse⁶

- I can endorse their opinion whole-

MEMORIZE: 大语言模型单词记忆辅助

大语言模型评估单词难度, 创建不同规模的例句, 生成LATEX/PDF文档

- 本地大语言模型
- 评估单词在真实语境下的难度 (而非依据单词长度) , 右上角数字即为难度等级



无刷电机驱动控制器

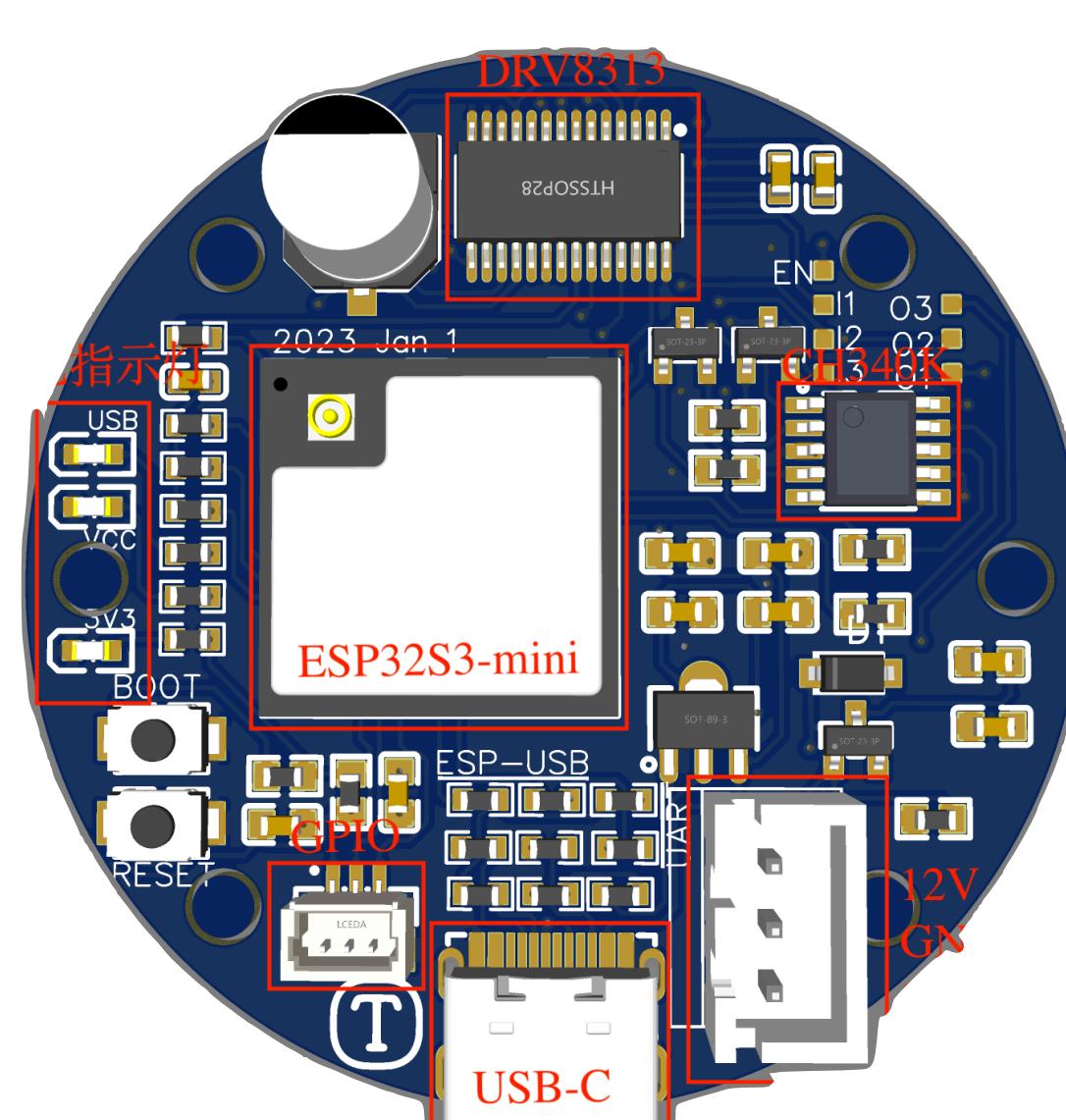
© TAng 发布于2023-02-02 11:58:06 CC BY-NC协议 分类: 嵌入式 侵权投诉

销量: 319 ★ 25 29 0

¥0 下载我的方案

无刷电机驱动控制板

高性能低成本的无刷直流电机FOC驱动控制器



- ESP32-S3 主控
- DRV8313驱动器 (集成MOS)
- AS5600 磁编码器
- C/C++编写
- 移植FOC算法
- Wi-Fi/BLE调试

Li Tang

Education

Beijing Jiaotong University

2021, Sep - Present

Undergraduate · Class of 2021 (Junior) · Communication Engineering · Tien-Yow Jeme Honors College

- Courses: Advanced Mathematics/Algebra, Digital/Analog Circuits, Communication Principles, Digital Signal Processing, Computer Principles
- Self-study: Automatic Control Principles, Introduction to Robotics, Computational Graphics

Projects

2023 - Present

Partly, visit [Github](#) for more

PANCAKE: Distributed Automated Transport Vehicles

High-load capacity 3D printed autonomous vehicle swarm, completed transport tasks using distributed control. Reduced costs by 80% and increased efficiency by 130% at the same time.

- **Lead hardware design.** Complete research, feasibility studies, and schematic design; complete PCB fabrication and electronic hardware debugging.
- **Lead 3D design.** Complete 3D Modeling, 3D printing testing, metal prototyping, and assembly.
- **Lead software development.** Complete embedded software development (STM32+ESP32); establish ROS environment, deploy drivers, and develop software; coordinate hardware-software integration.
- **Lead a team of three** in the "2023-2024 College Students Entrepreneurship and Innovation Competition"; manage project progress and organize regular meetings. **Project is currently under evaluation.**

PIONEER: STM32F103 Smart Vehicle Development Board

Optimized for four-wheel smart car applications, accelerated and improved the tutorials in lab.

- **Contribute to hardware design.** Include chip selection, schematic drawing, layout review, small-scale manufacturing (100 units), and testing phase.
- **Lead software development.** Build STM32 HAL + CMAKE development environment for various peripheral drivers (C/C++), and integrate third-party frameworks like LVGL and FreeRTOS.
- **Conduct lab trainings.** Create both online and offline tutorials and resolve student inquiries.

Brushless Motor Drive Control Board

High performance BLDC driver with FOC algorithm.

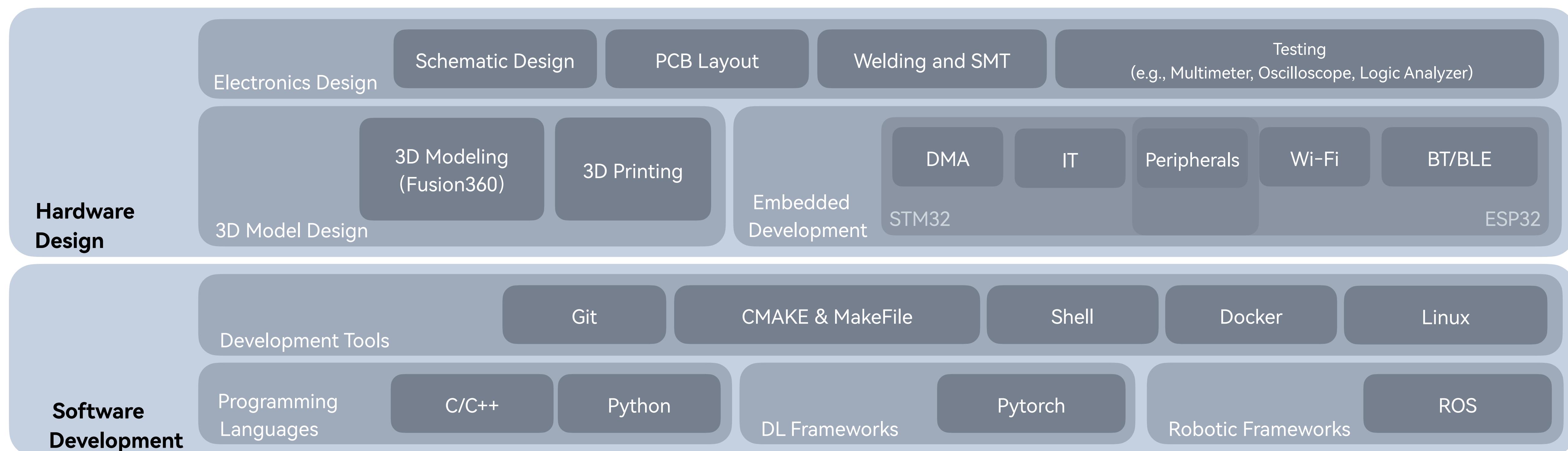
- **Independent Development.** Include validation, hardware design, embedded (ESP32) software development, 3D model design, documentation, project release, and maintenance.
- Feature on "[JLC Hardware Community](#)," achieving 318 sales, 25 favorites, and 29 likes, ranking in the top 5% of the community as of April 12, 2024.

MEMORIZE: Local Language Model Assisted Word Memorization

Generate example sentences of varying difficulty for words and create Latex-formatted documents.

- **Independently develop and maintain** the project,
- Aid me in learning 2100 words in 14 days, preparing for an IELTS exam.

Skill Map



PANCAKE: Distributed Automated Transport Vehicles

High-load capacity 3D printed autonomous vehicle swarm

Completed transport tasks using distributed control.

Reduced costs by 80% and increased efficiency by 130% at the same time.

Project Target

Disadvantages of Traditional AGV

- High one-time investment
- Limited scene
- Limited goods

Advantages of Distributed Automated Transport Vehicles

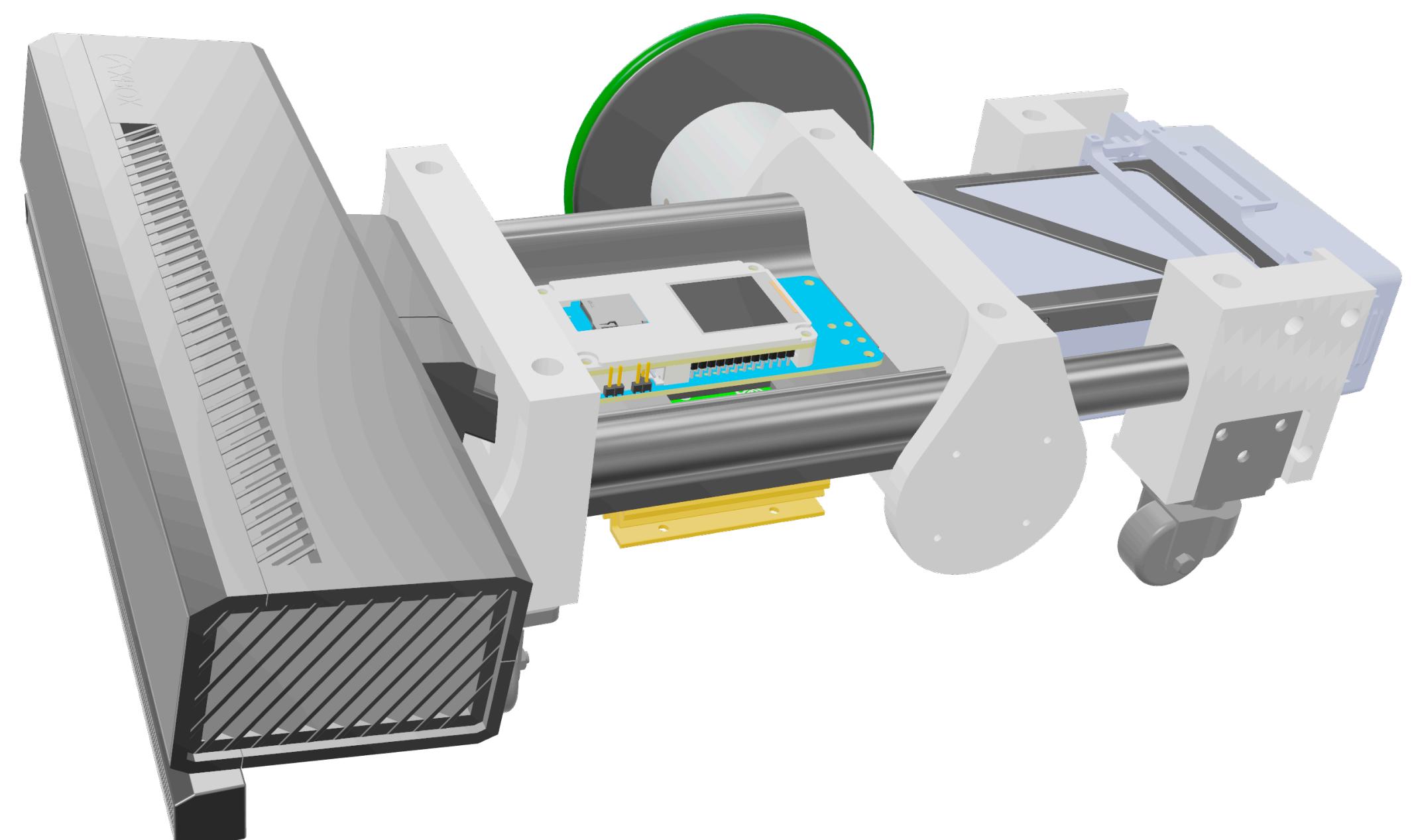
- Lower cost at deploy
- Wider scene
- Higher reliability

Keep Advantages of Traditional AGV

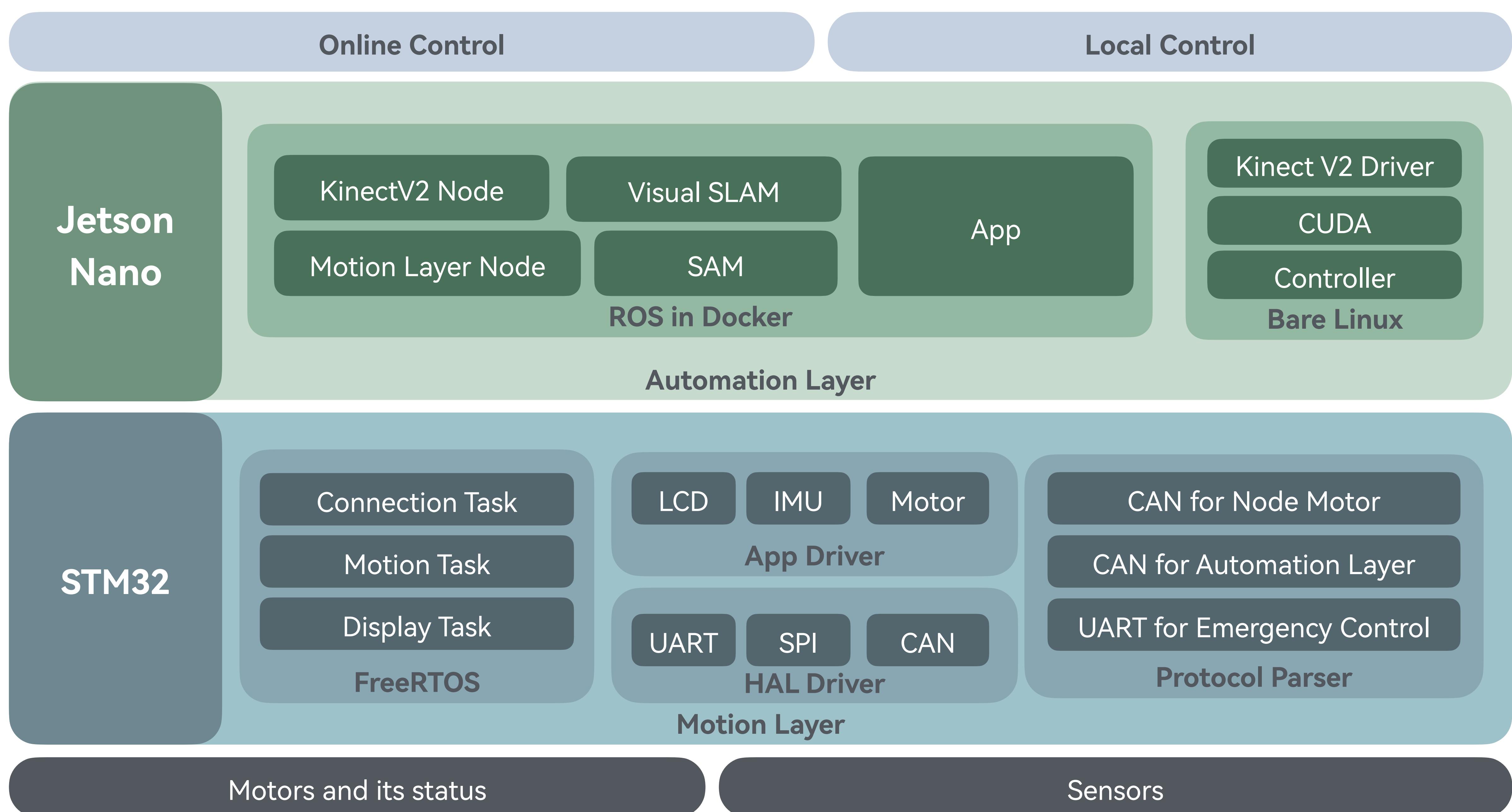
- Reduce costs for labor
- Smart management
- Hight-load capacity

Hardware Solution

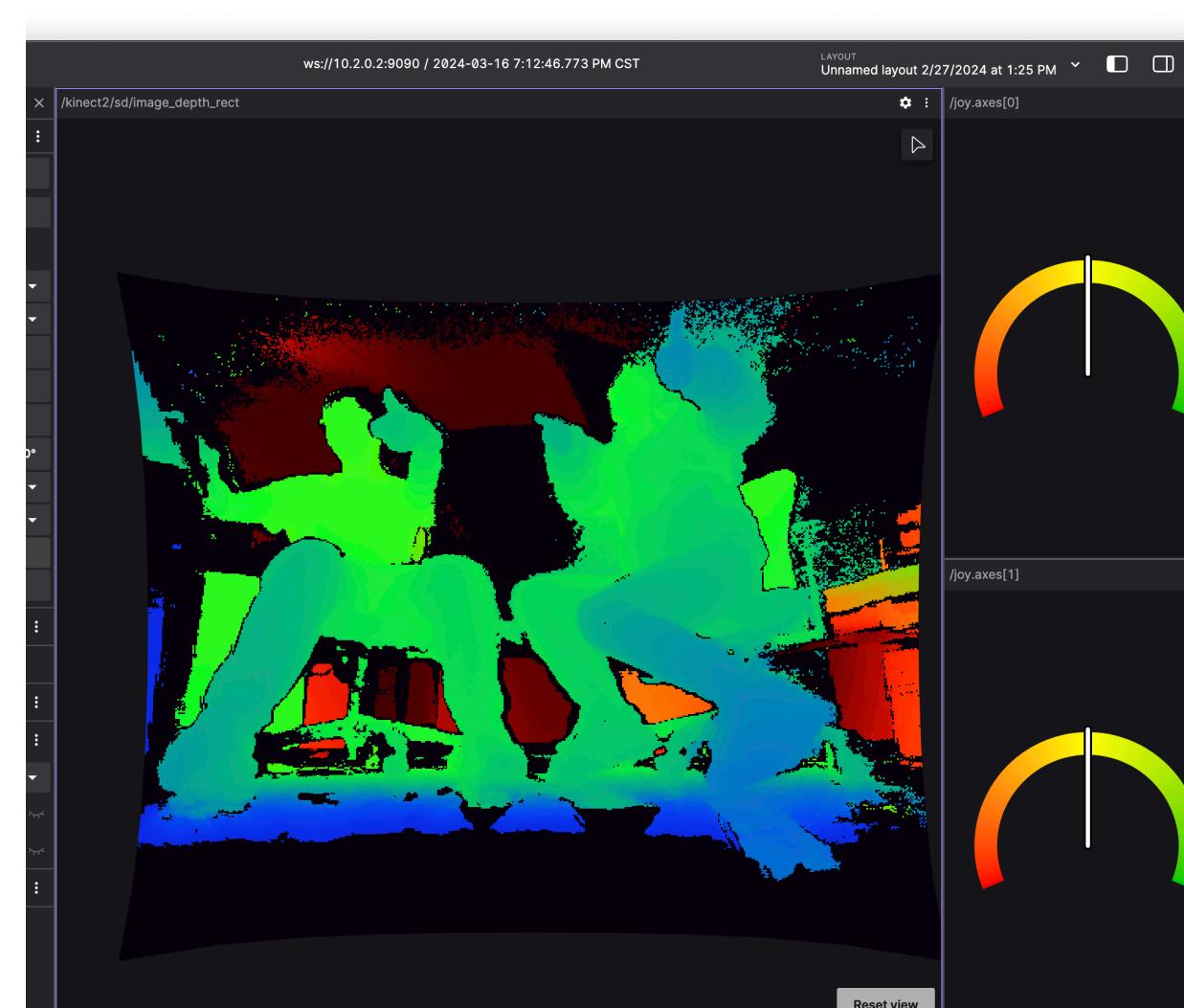
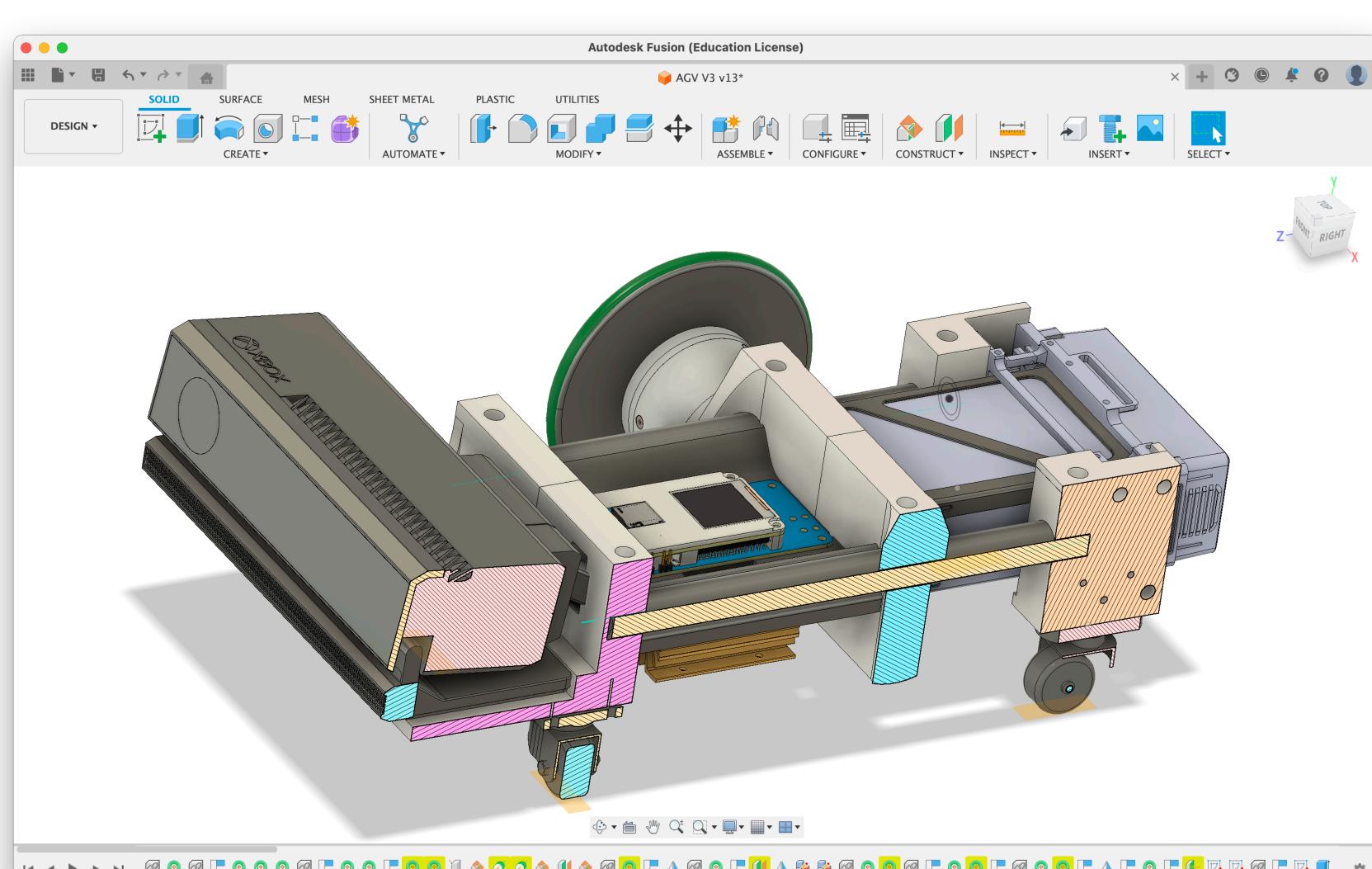
- Pioneer STM32 Dev-Board (more on next page)
- Jetson Nano 4G
- BLDC + Planetary reduction gear
- 100% 3D Printed structure parts (parts in white)
- 2x Carbon-fiber tube + Aluminum alloy panel

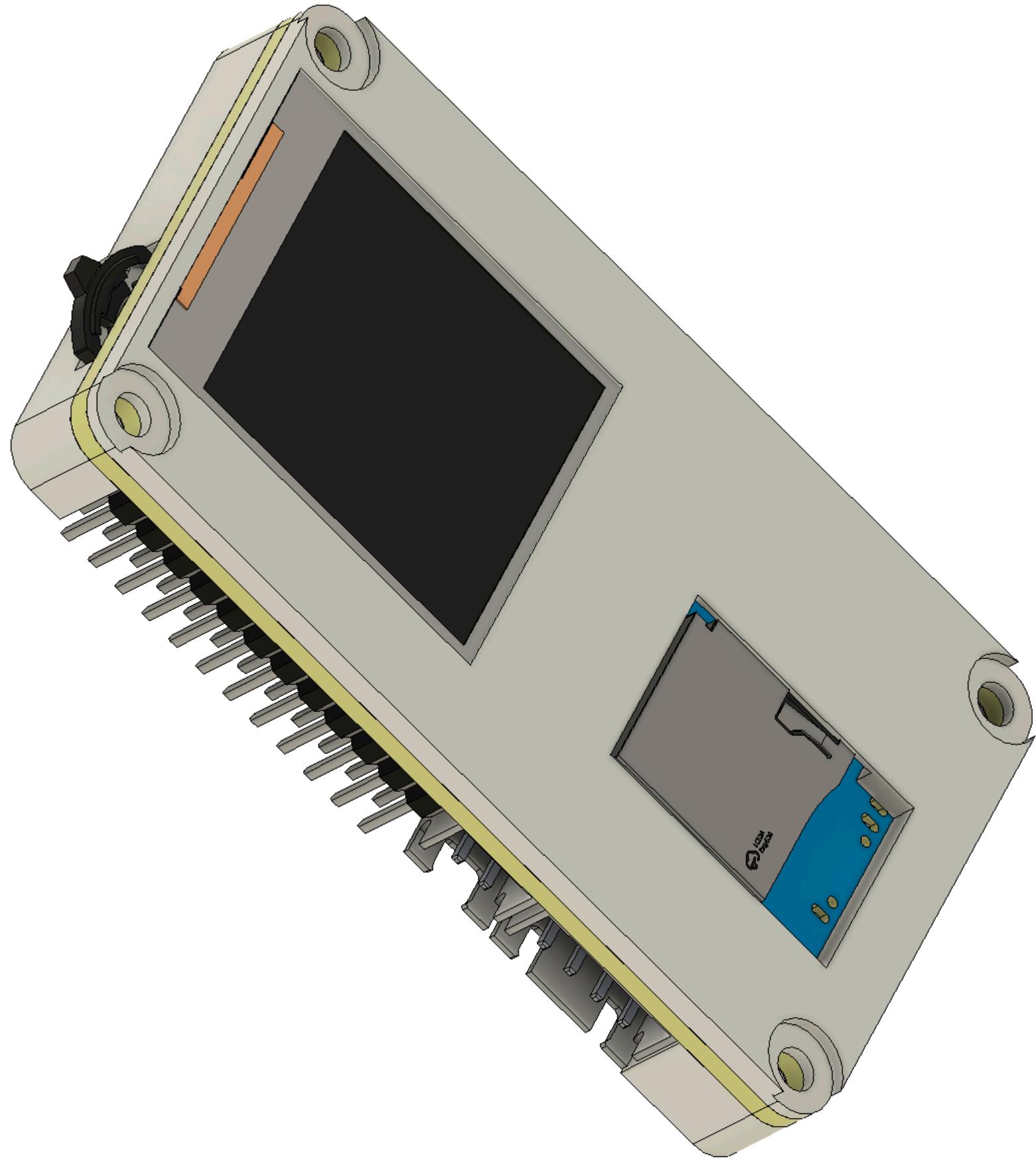


Software Solution



Demonstration





PIONEER: STM32 Smart Vehicle DevBoard

Optimized for four-wheel smart car applications
Accelerated and improved the tutorials in lab

STM32F103RCT6 · 72MHz · 48K RAM · 256K ROM

CAN transceiver | SPI Flash | IMU (MPU6050) | USB | LCD(SPI)

Embedded Software Development :

- Basic Examples: CLK、Debug、IT
 - Examples for all peripherals : GPIO、UART (DMA/IT) 、SPI (DMA/IT) 、IIC (DMA/IT) 、CAN
 - Examples for smart vehicle application: BLE controller (with ESP32) , Connect to control-board
 - Bootloader based on USB-DFU: Download firmware directly rather than through UART nor ST-Link
 - FreeRTOS integrated
- Port LVGL (a GUI framework) :
- Optimization approaching performance limits (SPI through DMA, manual malloc buffer, double frame-buffer)
 - Achieve 30fps@240*240 resolution with acceptable RAM and ROM usage

Memory region	Used Size	Region Size	%age Used
RAM:	40232 B	48 KB	81.85%
FLASH:	184084 B	256 KB	70.22%

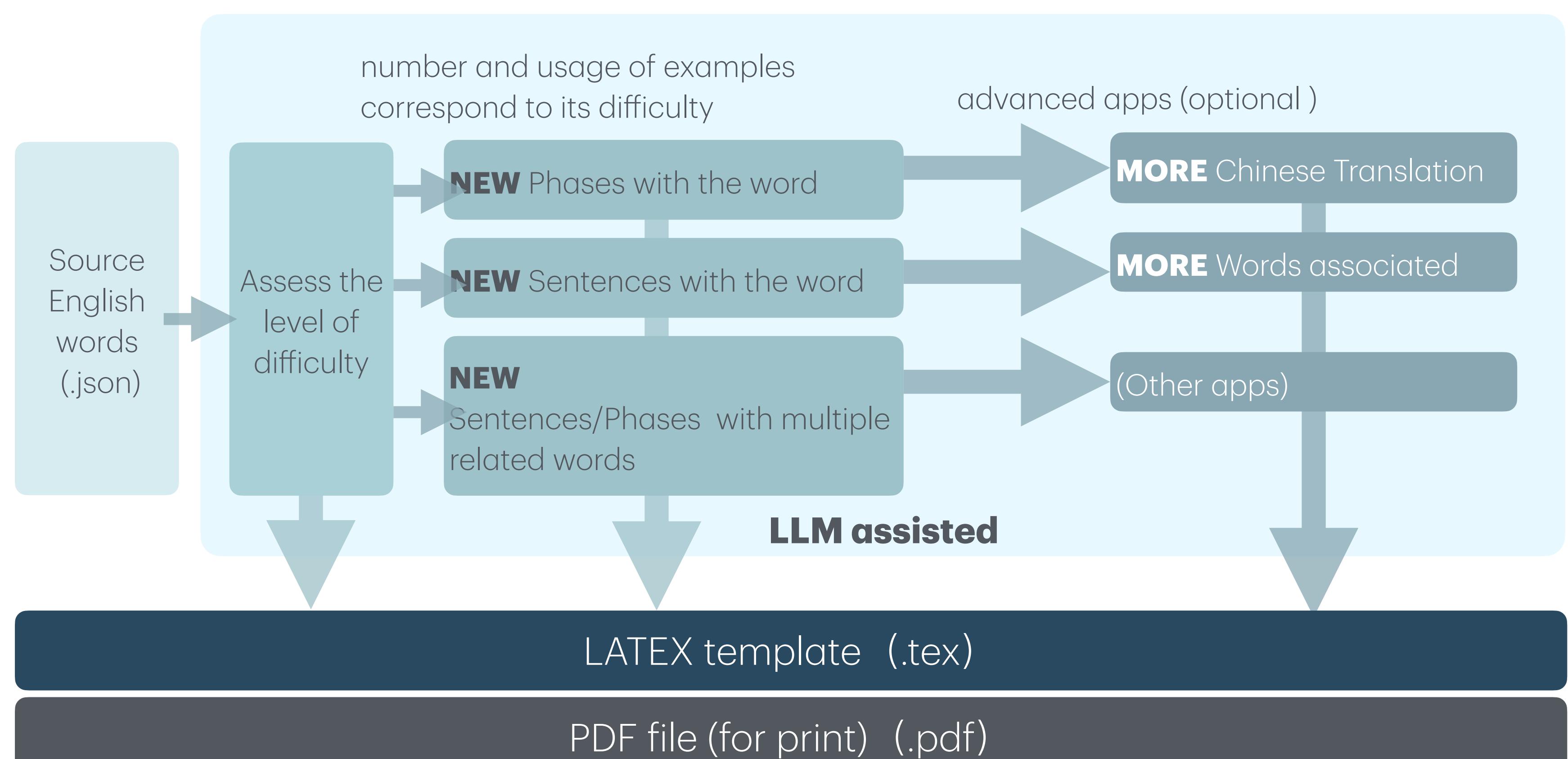
IELTS_Ver2_00_noline_no... Page 9 of 283

99 pertinent ⁵	102 insurance ⁶
<ul style="list-style-type: none"> He asked me a lot of very pertinent questions . The questions were pertinent to the discussion and helped to clarify the topic. pertinent data 	<ul style="list-style-type: none"> Your father took out insurance to cover the mortgage. The small business owner purchased insurance to protect against potential losses. insurance company medical insurance health insurance life insurance social insurance insurance industry
100 certify ⁶	
<ul style="list-style-type: none"> The accounts were certified by an auditor. The company certified the technician to ensure he was qualified to repair their equipment. 	
101 revenue ⁵	
<ul style="list-style-type: none"> advertising revenue Strikes have cost £20 million in lost revenues . The company's revenue increased by 20% last quarter. tax revenue sales revenue revenue and expenditure inland revenue fiscal revenue 	<ul style="list-style-type: none"> an agreement between the US and Colombian authorities The principal exercised his authority over the school by enforcing strict rules and regulations. competent authority 【法】主管当局, 主管部门 authority on 有关…的权威; …的专家 local authority 地方当局: 地方政权 administrative authority 行政当局 tax authority 税务机关 public authority 公共机关; 政府当局
104 endorse ⁶	
	<ul style="list-style-type: none"> I can endorse their opinion whole-

MEMORIZE: LLM Assisted Word Memorization

Generate example sentences of varying difficulty for words
Create Latex-formatted documents.

- Local large language model
- Assess the difficulty of words in real contexts (rather than based on word length), with the difficulty level indicated by the number in the top right corner.



Brushless motor drive controller

TAng Published on 2023-02-02 11:58:06 CC BY-NC protocol

Category: Embedded Complaints about infringement

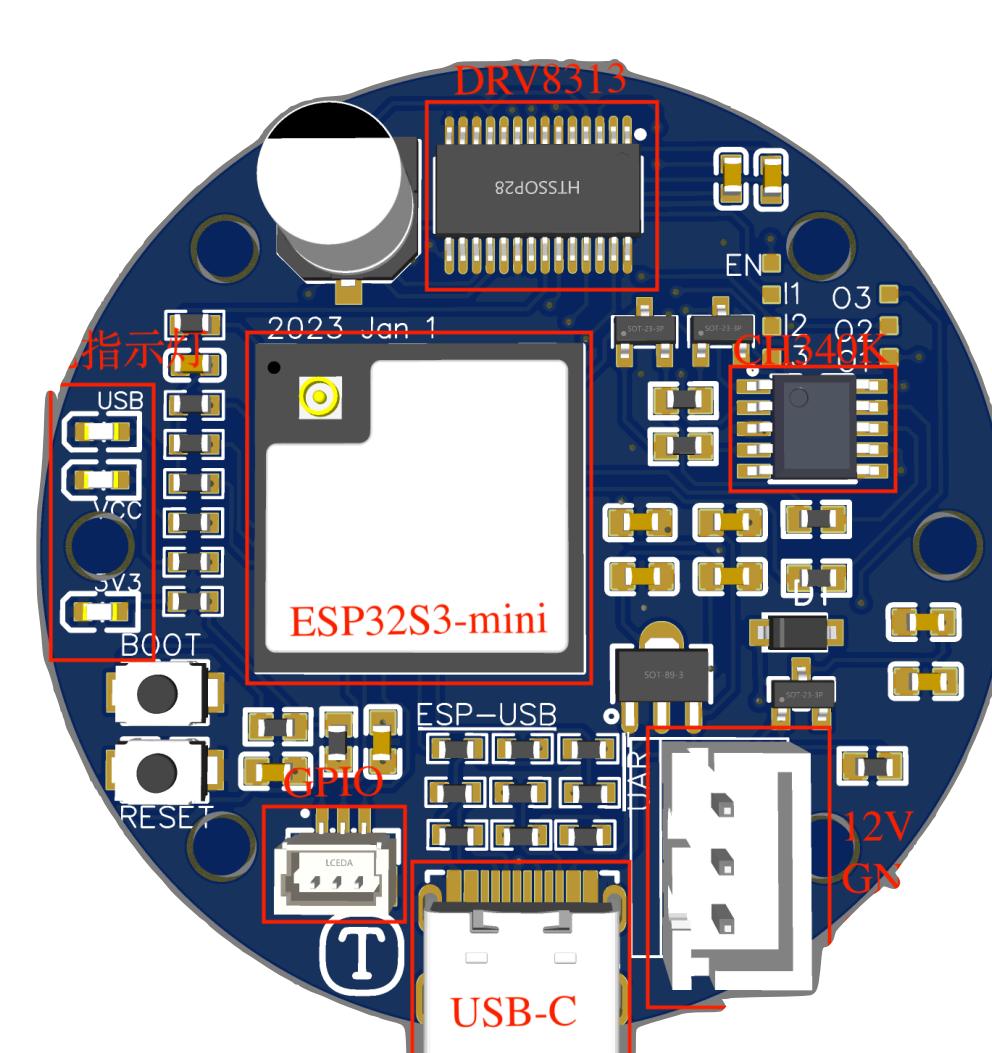
Sales: 319 ★ 25 ▲ 0

¥0 Download my plan

Brushless Motor Drive Control Board

High performance BLDC driver with FOC algorithm

- Achieve 318 sales, ranking in the top 5% of the [JLC·Hardware Community](#).



- ESP32-S3 SOC
- DRV8313 driver (MOS integrated)
- AS5600 magnetic encoder
- Program with C/C++
- Port FOC algorithm (with open-source SimpleFOC)
- Wi-Fi/BLE for command and debug