

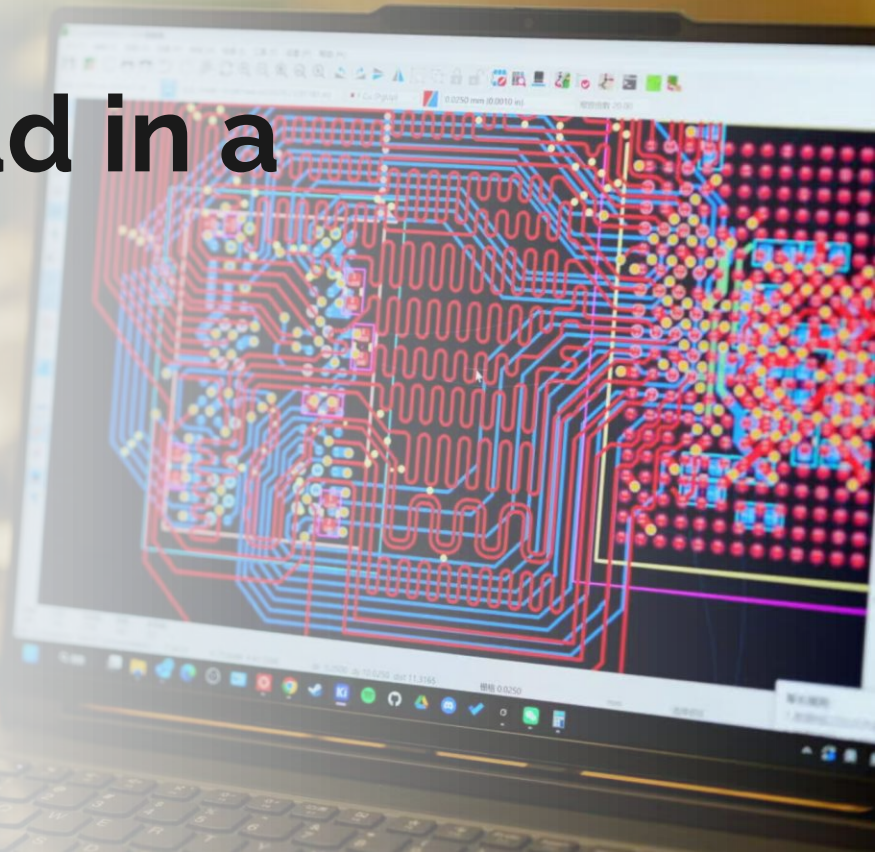


How we use KiCad in a robotics team?

机器人团队 KiCad 使用经验分享

Speaker
2025/11/14

钟梓洋 Baoqi
Shenzhen, China



Intro

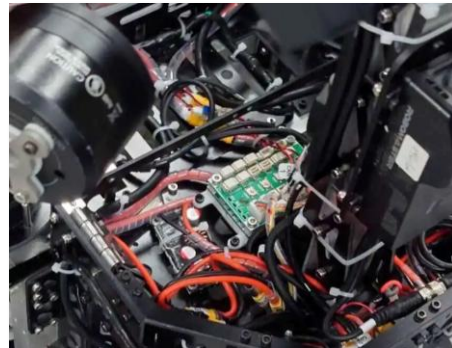
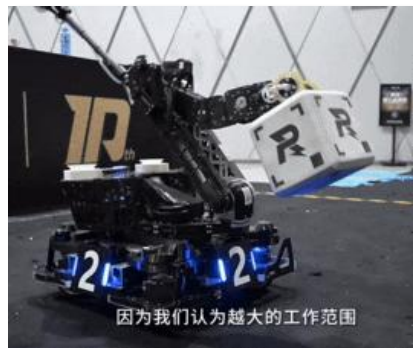
演讲者

钟梓洋

- 香港科技大学 RoboMaster 战队硬件组成员
- 全栈开发者, 专注于嵌入式软硬件开发

RoboMaster 机甲大师赛

- 全流程设计、制造机器人
- 强技术性的机器人对抗赛: 涉及机械结构, 板级硬件设计, 嵌入式软件控制, 顶层决策/视觉算法



About the Speaker

Baoqi

- Hong Kong University of Science and Technology RoboMaster Team Senior Hardware Member
- Full-stack developer specializing in embedded systems and PCB design.

About RoboMaster Competition

- Full-process design and manufacturing of robots.
- A highly technical robot competition involving mechanical, board-level hardware, software, and top-level computer vision algorithms.

演讲目录 Outline



1. 工作流与版本管理

标准化设计流程, Git 管理 KiCad 项目

2. 跨部门协作

机械结构交互, 软件文档

3. 开源硬件与社区贡献

基于 KiCad 设计的开源机器人模块。

1. Workflow & Version Control

Design Pipeline, Git for KiCad Project Management

2. Cross-Team Collaboration

Co-Design with Mechanical, HW/SW Handoff & Documentation

3. Open-Source & Community

KiCad-Based Robotic Modules

硬件工作流 Hardware Workflow

来自其他部门的需求

机械尺寸/孔位要求
软件MCU外设资源

Requirements From Other Department

Mech shape/size.
Software MCU
peripheral resources.

架构选择/芯片选型

整理参考资料
讨论验证可行性

原理图/Layout

实时提交 项目进度汇报

Architecture/chip selection

reference materials.
Discuss/verify feasibility

Schematic/Layout

Progress report

互相审图 发加工

Gerber Release

文档输出/调试反馈

嵌入式/机械测试

Mutual review/ manufacture

Gerber Release

Document output/ feedback

Embedded/mechanical
testing.

稳定版本归档/开源

三维图纸输出
开源报告

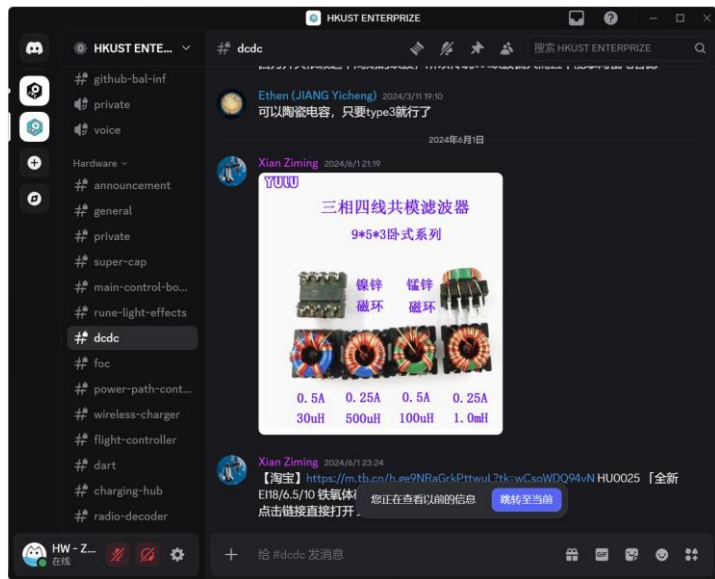
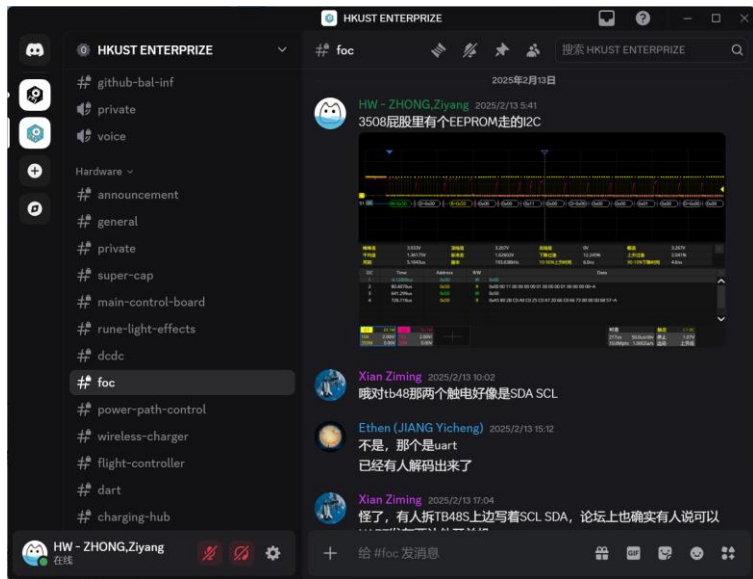
Stable version archive/open source

3D model output
Open-source report

需求&选型讨论 Requirements&Discussion

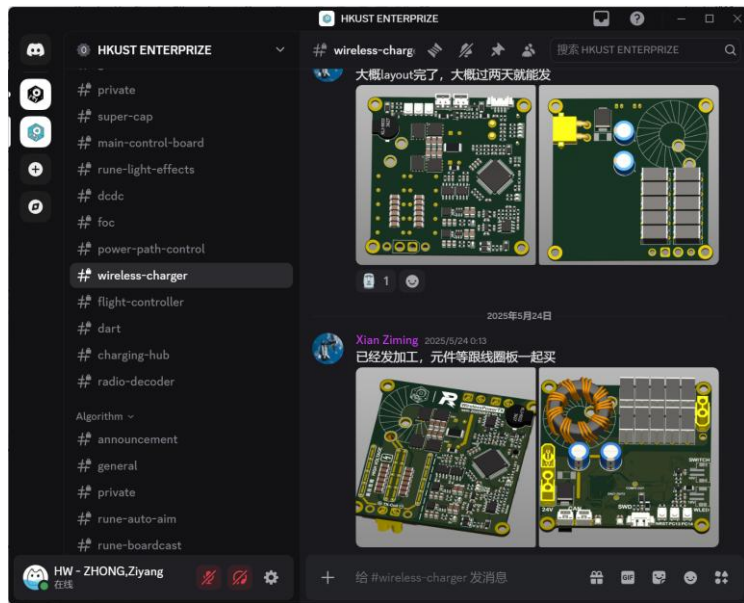
使用 **Discord** 沟通记录需求/方案讨论, 而非聊天软件.
研发&吹水分开; 划分 Channel 方便归档; 新人可看记录

Use **Discord** for technical discussions instead of chat software.
Separate development and casual talk; use channels for easy archiving; newcomers can easily view the records.

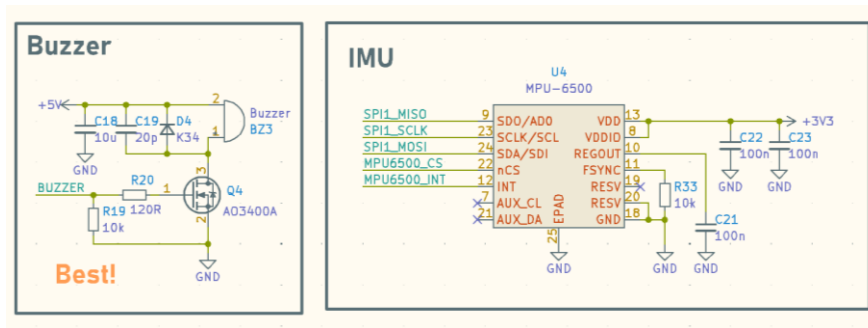
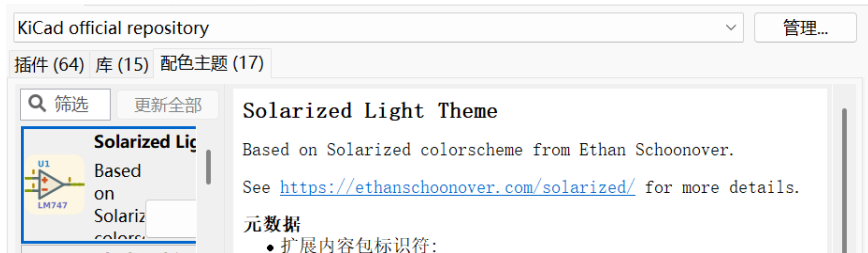


原理图/Layout Schematic/Layout

使用 Git 作为备份和版本回溯工具。
在 Discord 上定期 进度汇报



Git for backup and version rollback tool.
Regular progress report on Discord.



审图/发加工/文档

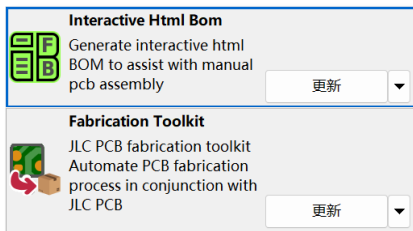
Review/Fabrication/Document

找 Senior 或者其他硬件组成员审图
加工焊接最重要的两个插件
交付软件之前将引脚分配输出为文档
导出 Step 三维图纸给机械

Senior teammate review the drawings.

2 useful plugin.

Output pin assignments as documentation. Export the Step 3D model.



RM2025-G473主控板硬件说明

使用前请先确认好主控板的版本是 2024 还是 2025

主要功能和外设

外设引脚定义

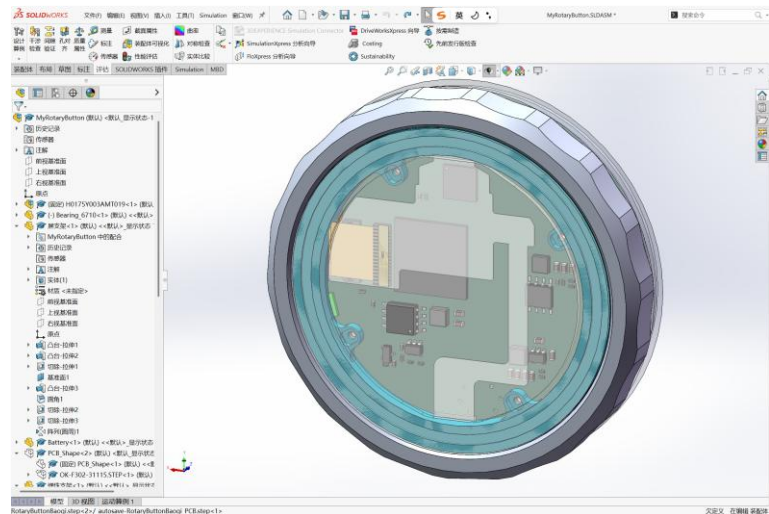
CAN

CAN (SIT1042T/3)	CAN_TX	CAN_RX
CAN1	PD1	PD0
CAN2	PB6	PB5
CAN3	PB4	PB3

RS485

RS485 (SN75176AD)	TX ¹	RX ¹	DE ²
RS485 (UART4)	PC10	PC11	PA15

- 不使用RS485功能时 UART4 可作为 独立UART 使用。
- 不使用RS485功能时 DE引脚 需要配置为 高电平, 需要确保 RS485接口 没有连接。

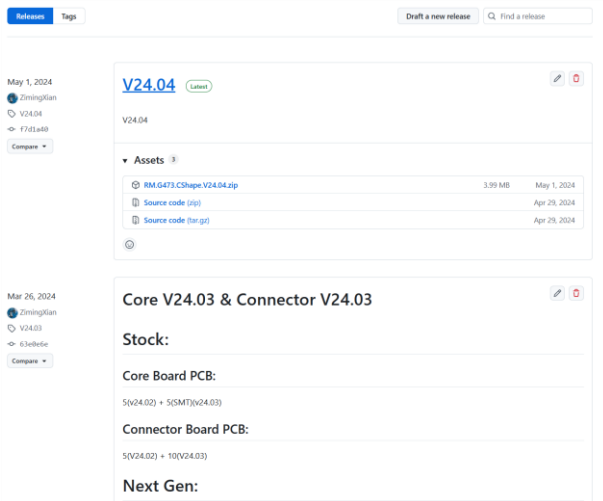
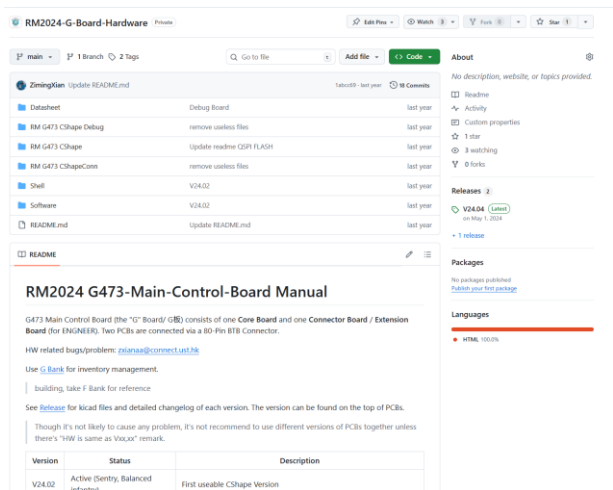


归档/开源

Archive/Open Source

发加工版本同步到 Github Archive
开源时发布详细的 开源报告

Put fabrication version to Github Archive.
Publish a detailed open-source report when open-sourced



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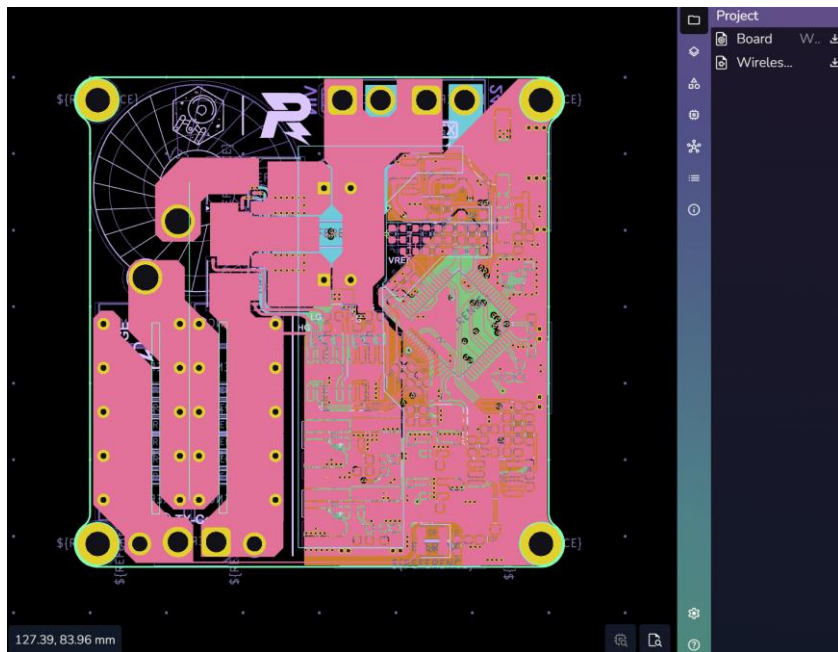
归档/开源

Archive/Open Source

KiCad 工程在线预览 kicanvas.org

KiCad project online preview: kicanvas.org

[Online Demo](#)

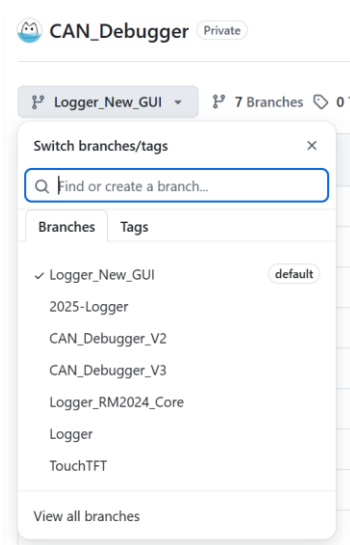
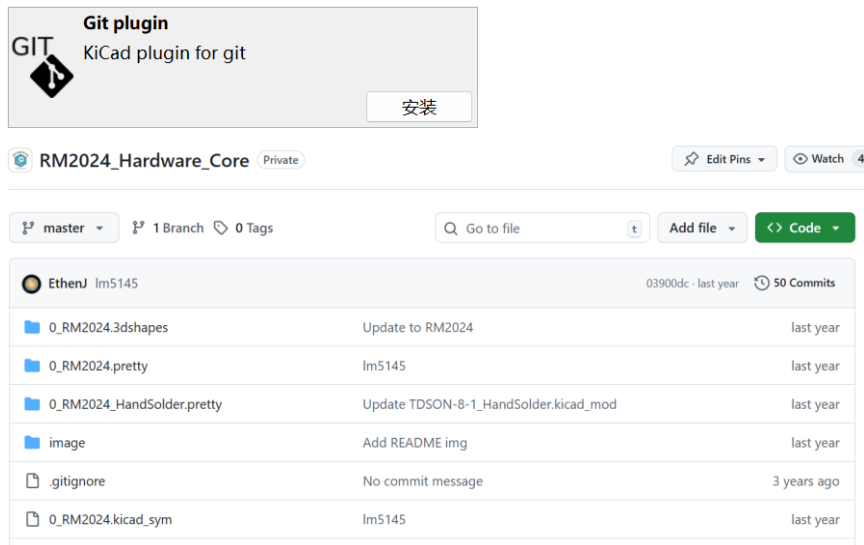


版本管理

Version control

Git 可同时管理软硬件版本, 切换方便, 也可以使用插件
另有共享的封装/符号/3D模型库
缺点是无法 merge.

Git can manage both software and hardware versions.
Plugins are also available.
A shared footprint/symbol/3d library is used.
But comes with merge issues uh.



跨部门协作 Cross-departmental collaboration



机械 <-> 硬件

板边绘制/机械禁区: Solidworks -DXF-> KiCad

对于复杂3d关系, 可以导出 Step 作为封装添加到 KiCad

软件 <-> 硬件

要求硬件成员有基本软件素养

硬件成员直接负责 MCU 外设资源分配

Mechanical <-> Hardware

Edge cut/no-go zone: Solidworks -DXF -> KiCad

For complex 3D relationships, Steps can be exported as packages and added to KiCad.

Software <-> Hardware

Requires hardware team members to have basic software skills.

Hardware directly responsible for the allocation of MCU peripheral resources.

开源项目分享 Open source projects

基于双向 DCDC 的超级电容充放电控制器 与无线充电系统

高能量密度, 峰值电流环超快响应
无线充电自研协议双向通信

A supercapacitor charge/discharge controller
based on a bidirectional DC-DC converter
with wireless charging system

High energy density, ultrafast peak current
loop response

Self-developed bidirectional communication
protocol



超级电容与无线充电系统 **R**

RM2025 香港科技大学 ENTERPRIZE战队



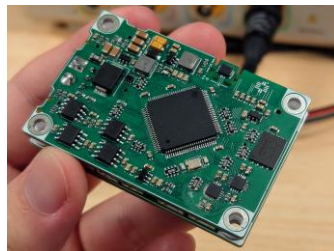
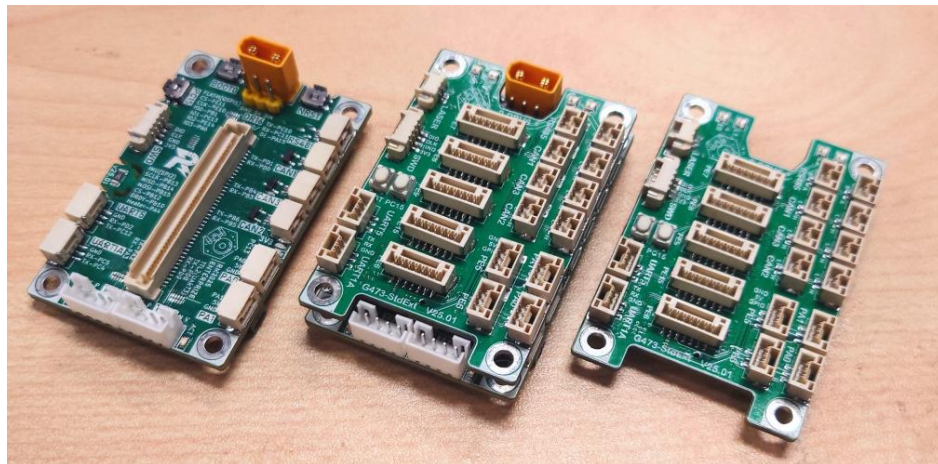
开源项目分享 Open source projects

STM32G4 高集成度主控板

叠板设计灵活性强, 资源丰富

STM32G4 Highly Integrated Main Control Board

Highly flexible stacked board design with abundant resources



开源项目分享 Open source projects

超级电容模组
SuperCapacitor Module



无线 Jlink 烧录器
Wireless Jlink Debugger



无刷电机 FOC 电调
BLDC FOC Driver



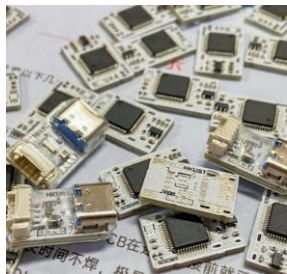
触屏调试器
Touch Screen Debugger



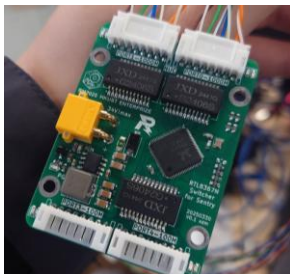
KiCad Inside!



Jlink/STLink V2



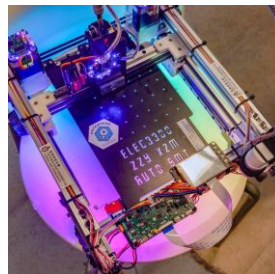
交换机 Ethernet switch



步进电机 FOC
Stepper Motor FOC Driver



贴片机 SMT Machine



开源项目分享 Open source projects



Bilibili 上每年都会公开硬件培训视频
6节课手把手入门 KiCad 与硬件设计



HKUST RM2026 Hardware Tutorial 2: KiCAD
09-26



HKUST RM2026 Hardware Tutorial 1: Introduction to Hardware
09-23



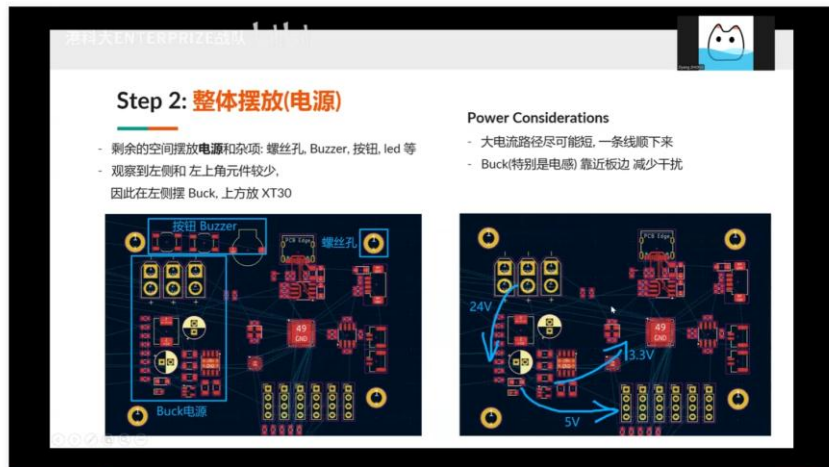
HKUST RM2026 Hardware Tutorial 6: Main Control Board Layout
10-11



HKUST RM2026 Hardware Tutorial 5: Schematic Diagram Drawing
10-06

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