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教育背景

2020.09-2024.06

西安理工大学

专业: 机器人工程

均分: 87.2 GPA: 4.17/5

相关课程: 机器人操作系统 (97) 自动控制理论 (93) 微机原理与嵌入式系统 (93) 机器人控制 (95) 电机与控制 (94)

荣誉奖项: 国家奖学金(Top 0.2%), 西安理工自动化学院十佳学生, 连续两年校优秀学生奖学金

语言: 托福 (TOEFL) 105 (阅读 28, 听力 29, 口语 24, 写作 24), CET-6 六级 519 分, CET-4 四级 529 分

实习经历

江西省智能产业技术创新研究院

2021.8-2021.9

嵌入式开发实习生 智能产业研究所

江西, 南昌

- 使用 RAPID 编程语言控制 ABB 机器人, 使 ABB 机械臂能够执行物料搬运、物品翻转和码垛等任务。
- 负责七轴机械臂的用户功能开发, 编写了一套基于 Python 与 PyQt5 等库的机械臂随动用户的书写功能, 即用户在 UI 界面中实时书写, 七轴机械臂使用毛笔跟踪用户的书写轨迹在更大画幅上的白板中完成补墨, 书写, 复位等功能
- UR 六轴机械臂的仿真测试
- 熟悉企业中的机器人开发流程, 受到系统性的规范化的代码与项目培训, 锻炼了自我学习和信息检索的能力

科研/项目经历及获奖

- 2023 年 10 月——至今 RoboMaster2024 赛季西安理工大学机器人战队导航开发负责人
 - a) 负责开发全自动机器人的定位, 导航, 决策系统, 硬件系统采用 livox mid360 多线雷达, Fast_lio/Point_Lio 里程计与建图算法, ICP 点云重定位, 基于 move_base 框架使用 A*算法进行全局规划, 采用 DWA 算法进行局部规划。
 - b) 基于 Gazebo 搭建赛场地形仿真, 并基于仿真系统迭代上述系统, 并用于开发新算法 sim2real。基于并修改 CMU 的 Autonomous_exploration_development_environment 导航系统以满足在复杂地形下的上下坡的地形分析, 可通过性分析, 局部导航规划需求, 同时并修改上层探索全局规划器以适配比赛已知场景的需求。
- 2022 年 10 月——2023 年 9 月 RoboMaster2023 赛季西安理工大学机器人战队副队长兼视觉组组长

第二十二届全国大学生机器人大赛 RoboMaster2023 机甲大师高校联盟赛 3V3 对抗赛二等奖; 超级对抗赛三等奖

 - a) 负责开发队内第一套视觉算法, 且搭载自瞄的哨兵在 2023 高校联盟赛中有着较好的自动识别和自主反击能力
 - b) 负责轮腿平衡步兵的 webots 仿真和控制算法搭建, 搭建出了一套鲁棒的轮腿机器人控制算法, 构建了较好的的五连杆轮腿机器人平衡与运动算法, 运动学逆解, 重心自适应算法, 机器人腿长控制和 roll 轴平衡算法
 - c) 负责开发哨兵的上位机建图和导航算法, 初期采用 T265 相机基于 ORB_SLAM3 进行建图导航, 同时也根据 TagSlam 对机器人进行了视觉识别 apriltag 消除 Slam 累计误差的功能适配, 后期使用 gazebo 搭建了一套哨兵在 RMUC2023 地图场景上的使用 3D 激光雷达的导航算法测试仿真平台, 极大地方便了在硬件还未适配的情况下的算法开发与地图构建
 - d) 熟练使用各个版本下 Ubuntu 的 ROS 和 ROS2 开发, 同时积累了丰富的 python, C/C++ 与 OpenCV 开发经验
 - e) 掌握机器人坐标系转换, 视觉图像处理, 轮廓和特征点运算处理, 卡尔曼滤波等算法
 - f) 除了技术工作外, 负责队内的统筹管理, 经费预算规划, 新生培训, 日常例会等等工作, 有良好的团队沟通能力和抗压能力



科研/项目经历及获奖

● 2021 年 10 月——2022 年 10 月 RoboMaster2022 赛季西安理工大学机器人战队硬件组组长

第二十一届全国大学生机器人大赛 RoboMaster2022 机甲大师高校联盟赛(线上)3V3 对抗赛三等奖；算法技术组别奖三等奖；嵌入式技术组别奖三等奖；

- a) 负责战队内机器人的 STM32 代码开发和机器人的硬件开发与维护
- b) 积累下位机和 FreeRTOS 开发经验，可熟练使用 CubeMx 和 Keil 等开发软件
- c) 掌握对于传感器的一阶低通滤波，卡尔曼滤波等滤波算法，与 PID 等控制算法
- d) 熟练使用立创 EDA，AD 等电路板开发软件
- e) 自队伍重建后，与队友一并从零开始制作了三台全新的机器人，熟悉机器人的系统性的开发流程，各个组别之间的合作管理方式，对机器人开发有一个全面且深刻的认识

● 2020 年 9 月——至今 其他项目经历与竞赛获奖

- 1) 2022 年第十二届 MathorCup 高校数学建模挑战赛本科生组全国三等奖（队长）
- 2) 2022 全国大学生数学建模竞赛陕西赛区省级一等奖（队长）
- 3) 第十届全国大学生机械创新设计大赛陕西赛区省级一等奖（组内第三）
- 4) 陕西省第八届大学生(TI)杯模拟及模数混合电路应用设计竞赛本科组省级三等奖（队长）
- 5) 第二十四届中国机器人及人工智能大赛(陕西赛区)智能文化创意赛项目省级三等奖（组内第二）
- 6) 《一种基于嵌入式技术的智能语音收纳装置》原始取得实用新型专利一项（第一发明人）
- 7) 其他省级奖项与校级奖项若干

三 个人技能

● 计 算 机：

能够熟练掌握使用 Linux 桌面版和命令行开发，熟悉 shell 语言，XML 等语言，在 ubuntu18，20，22 都有开发经历，同时能够熟练使用 WSL2 进行 Linux 开发，具有丰富的 vscode 等开发工具的使用经验，具有很强的信息检索能力，熟练使用 MATLAB，SPSS 等软件进行数据处理，MATLAB 进行仿真与机器学习等相关工作

● 嵌 入 式 开 发：

具有较好的 Linux 与 ROS/ROS2 的 C/C++ 与 Python 嵌入式开发能力，同时能够使用 webots 机器人仿真软件进行控制算法仿真，熟悉基于 OpenCV 的计算机视觉开发，熟悉基于 STM32 HAL 库与标准库的单片机开发，能够利用 AD，立创 EDA 等电路板设计软件进行原理图，PCB 绘制



在校活动

- 西安理工大学 RoboMaster 机器人队伍 2022 赛季硬件组组长，2023 赛季副队长兼视觉组组长，组织视觉组与电控硬件组培训若干，组会例会若干
- 西安理工大学新星杯自动化与信息工程学院篮球队成员
- 入选西安理工大学“知行班”（西安理工大学“拔尖人才培养计划”教改试点班，两阶段双导师制培养模式）
- Github 个人仓库 <https://github.com/66Lau>
- CSDN 博客约 1w 浏览量，200+收藏，[主页地址](#)



自我评价

- **自学能力和信息检索能力强：**通过参加各种科研竞赛活动，极大程度提升了自己的自学能力和分析解决问题能力，不断拓展自己的知识面并且学以致用，拥有很强的动手能力，喜欢将理论与实际结合
- **英语能力强：**由于托福的学习得到的良好的英语能力，可以无障碍地阅读大部分的外文文献和查阅代码库与文档，同时也有不错的英语口语表达能力
- **团队领导，沟通能力，责任心强：**在 RoboMaster 的队伍中我不断地磨合自己与团队其他人的较好的合作关系，能够用合理的方式协调各个组别，达到团队的效率最大化

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Education

Xi'an University of Technology

September.2020 – June.2024

*Major in **Robot Engineering**(Ranking:4/30)*

Xi'an, Shaanxi

Overall Average Score: 87.2/100 **Major Average Score:** 89.1/100

Key Courses: Robot Operating System(97/100), Object-Oriented Programming for Video Processing(94/100), Microcomputer Principles and Embedded Systems(93/100), Automatic Control Theory(93/100), Robot Control(95/100)

Publication & Patent

Intelligent voice storage device based on embedded technology

November.2021

Patent Publication Number:CN216212333U

Espacenet/CN216212333U

Epidemicshield ROS robot control embedded system

October.2022

Software Copyright Register Number:2023SR0324403

Epidemicshield ROS robot intelligent mapping navigation system

August.2022

Software Copyright Register Number:2023SR0235263

Research & Project Experience

RoboMaster Robotics Competition(Organized by DJI)

2022-2023

Xi'an University of Technology NEXT-E robot team Deputy Team Leader & Head of the Visual Team

- Designed a multi-threaded autonomous targeting system for a robot that uses OpenCV(including Contour extraction, expansion/corrosion, image filtering and other algorithms) in order to identify target objects. Simultaneously, using feature matching algorithms and Kalman filtering for multi-object matching and motion prediction across several frames at the same time. Finally, the robot was able to achieve a recognition frame rate of 80+ frames per second and a recognition accuracy of 98% within a 5-meter range for the robot.
- In charge of simulating and making control algorithms for a hybrid jumping robot with both legs and wheels based on Webots. Lagrangian dynamics modeling was used to build a state space, and the LQR algorithm was used to build a robust control method for the wheeled-legged robot.
- Create upper-level control and navigation algorithms for a robot employing the T265 camera and ORB-SLAM3 for mapping and navigation. TagSLAM was also implemented to reduce cumulative errors in the SLAM process. Created a simulation platform in GAZEBO for testing 3D laser-based navigation algorithms in challenging terrains.

National University Students' Opt-Sci-Tech Competition

2021-2022

Undergraduate Researcher, Instructed by Prof.Jingyi Wang

- Designed a firefighting robot that uses deep learning to detect fire occurrences, autonomous robot navigation and positioning, and a two-degree-of-freedom gimbal to discharge firefighting projectiles to suppress fires.
- Developed and deployed target detection techniques within the team, utilizing the YOLOX object identification algorithm, model training with PyTorch, and deployed with OpenVINO to optimize inference speed.
- Initiated and managed the development of control software for the team's robot using the STM32 microcontroller, utilizing the FreeRTOS operating system for multi-threaded motor control to reach desired positions. The chosen algorithm employed was forward-feed PID.

China Undergraduate Mathematical Contest in Modeling

July.2022 – December.2022

Undergraduate Researcher, Instructed by Prof.Wenyan Guo

- I aspired to use machine learning and quantitative analytic approaches to help archaeologists acquire a more rational understanding of the links between artifact chemical composition, classification, and weathering
- Used chi-square tests to determine the asymptotic significance of various chemical components on the weathering of artifacts, built a multiple linear regression model to predict the pre-weathering composition of weathered artifacts, model error less than 5%, and investigated the impact of chemical components on artifact weathering.
- Applied the Random Forest and Decision Tree algorithms to analyze the association between the chemical composition of artifacts and their respective categories, yielding an AUC of 0.94. Subsequently, used the K-means algorithm to cluster artifact data into subcategories, resulting a more rational classification system for artifacts.
- Employed Grey Relational Analysis to investigate the interaction between chemical components, resulting in the identification of compositional disparities among different categories of artifacts.

Working Experience

Jiangxi Intelligent Industry Technology Innovation Research Institute

August.2021

Embedded Development Intern

- In charge of developing user functions for a seven-axis robotic arm. Using Python and libraries such as PyQt5, I created a real-time handwriting capability for the robotic arm's end-effector. Users can now write directly on a user interface (UI) in real time. The brush-equipped seven-axis robotic arm replicates these trajectories and conducts ink supplementing and resetting functions on a wider canvas.
- Tested the UR6-degree-of-freedom robotic arm in a simulated platform.
- Created ABB robots with the RAPID programming language, allowing ABB robotic arms to execute tasks including material handling, item flipping, and palletizing.
- Researched the robot operating system and architecture while actively contributing to the development of documentation.

Honors & Awards

- China National Scholarship 09/2023
- Third Prize in the National University Students' Opt-Sci-Tech Competition 08/2022
- Second Prize in the 22nd National College Student Robotics Competition RoboMaster2023 RMUL 04/2023
- Third Prize in the 22nd National College Student Robotics Competition RoboMaster2023 RMUC 06/2023
- Third Prize in the 21st National College Student Robotics Competition RoboMaster2022 RMUL 11/2022
- Third Prize in the MathorCup University Mathematical Modeling Competition 06/2022
- First Prize in the National College Mechanical Innovation Competition (Shaanxi Region) 07/2022
- First Prize in the China Undergraduate Mathematical Modelling Contest (Shaanxi Region) 12/2022
- Third Prize in the National Undergraduate Electronic Design Contest (Shaanxi Region) 09/2022
- XAUT Excellent Student Scholarship 12/2022

Technical Skills

- **Programming:** C/C++, Python, OpenCV, Shell, XML, Markdown
- **Tools:** ROS/ROS2, WSL and Linux, Webots, Matlab, CubeMx, Keil, Git, AutoCAD, SolidWorks, Altium Designer

Additional Information

- Made all of my projects available as open source on GitHub. My tutorial blogs on robot vision processing have garnered over 10,000 views and more than 100 bookmarks on the CSDN website.
- XAUT New Star Cup Basketball team member from the School of Automation and Information Engineering.
- Organized multiple machine vision training sessions and embedded development workshops as a senior student, assisting many freshmen in embarking on their journey towards competitions and research opportunities.