DEEP LEARNING ROBOT ARM BASED ON ARDUINO
(基于 ARDUINO 的可深度学习机械臂)

Yun·PuZhi (云普郅), Luo·JiaHui (罗嘉晖), Zeng·XiangRui (曾祥瑞)

Shenyang Institute of Technology (沈阳工学院)

Abstract: *This work is a 5-DOF manipulator arm grasping system based on Arduino control. It can carry out intelligent recognition through image processing in a certain area and grasp specified objects through real-time action planning.*
Keywords: *Robot Arm，Deep Learning，TensorFlow.*

摘要： *本作品为一款基于 Arduino 控制五自由度机械臂抓取系统,可通过对某区域内的图像处理进行智能识别,经过实时动作规划抓取指定物体。*
关键词： *机械臂，深度学习，TensorFlow.*

In order to ensure the operation safety of the manipulator arm, the whole system can be controlled by mobile APP. This system can display the situation of the operating platform in real time, and the user can control the mobile phone to realize the grab function. After many times of optimization, improvement and hardware and software joint debugging, the required functions are finally realized. This system is suitable for the selection of incomplete products in the automatic industrial production line, or the classification and sorting of different products, aiming to improve the operation efficiency of the factory, save the operation cost of the factory, and enhance the competitiveness of the enterprise.

The robot arm is based on the deep learning development platform of TensorFlow, Google's artificial intelligence system. CNN convolutional neural network algorithm and PID control theory technology are used to identify and grasp objects with higher accuracy. The platform reads the target point of the object motion state through the camera. The desired trajectory is generated by the neural network. A recursive neural network is added to optimize the grasping behavior. Accurate identification of image data. Building a communication network. Remote transmission of image data to the manipulator controller. Combined with the manipulator motion control algorithm. Make the mechanical arm complete the corresponding action. The experimental results show that.

The trained model has high accuracy in image recognition. This system is suitable for the selection of incomplete products in the automatic industrial production line, or the classification and sorting of different products, aiming to improve the operation efficiency of the factory, save the operation cost of the factory, and enhance the competitiveness of the enterprise.

为保证机械臂的运行安全性,整个系统可由手机 APP 来控制。本系统可以实时显示操作台上的情况,用户可通过手机控制来实现抓取功能,经过多次优化、完善和软硬件联合调试,最终实现所需功能。本系统适用于自动化的工业生产流水线中对残缺产品的选取,或者不同产品的分类分拣,旨在提高工厂的运行效率,节省工厂运营成本,增强企业的竞争力。该款机械臂基于 Google 人工智能系统 TensorFlow 的深度学习开发平台;采用 CNN 卷积神经网络算法与 PID 控制理论技术对物体进行更高精度的识别与抓取;平台通过摄像头读取物体运动状态目标点;由神经网络生成期望轨迹;并添加递归神经网络优化抓取行为;可精准识别图像数据;在搭建通信网络;将图像数据远程传输到机械臂控制器;结合机械臂运动控制算法;使机械臂完成相应的动作;实验结果表明;训练好的模型在识别图像时具有非常高准确性。本系统适用于自动化的工业生产流水线中对残缺产品的选取,或者不同产品的分类分拣,旨在提高工厂的运行效率,节省工厂运营成本,增强企业的竞争力。