

Intelligent medical-assisted robot based on FPGA

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On board test by AMD ZYNQ7020

OpenHW2024

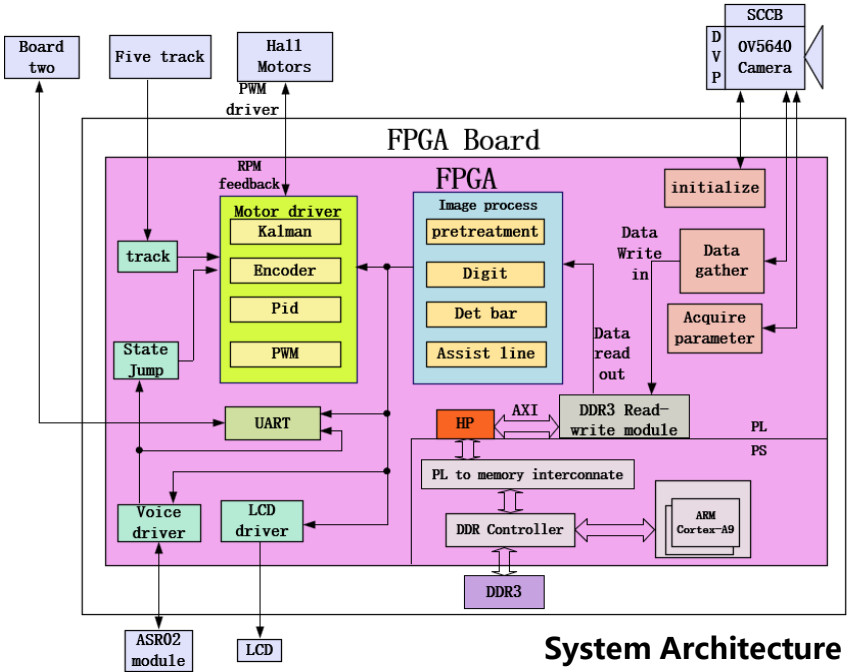


INTRODUCTION

In the context of population ageing, the shortage of medical personnel is becoming more and more serious, and medical assistant robots will play an important role in the "Smart Medicine". The intelligent medical assistant robot designed by our team focuses on the automatic transportation of medical supplies in hospital environment, which has considerable application value.

Key Technology and Innovation Point 1

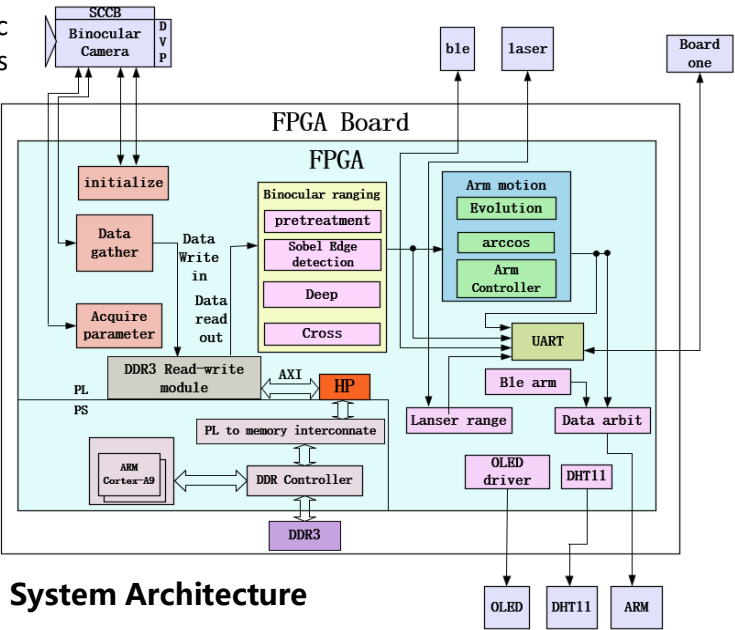
Build an image recognition system, design digital recognition based on digital features, barcode identification and biocular ranging algorithm based on similar edge distance algorithm.



System Architecture

Key Technology and Innovation Point 2

Build the mechanical arm grasping system, design the inverse kinematic Angle solution of the mechanical arm based on biocular ranging, and realize the automatic positioning of the mechanical arm grab.



System Architecture

Key Technology and Innovation Point 3

Through inter-board communication, multi-mode conversion and multi-peripheral sensors, fully automatic drug sorting and verification and point-to-point transportation of target wards are realized.

RESULT

At present, the system has successfully realized the drug distribution. Through the voice to achieve the automatic drug distribution mode and Bluetooth control mode switching.

In the fully automatic drug distribution mode, the monocular camera can correctly detect the correct barcode, number, and automatic alignment. The binocular camera can locate the position of the drug, and the mechanical arm grabs the drug with reverse kinematics. The laser module effectively detects obstacles, and the OLED displays the team information and the temperature and humidity collected by the temperature and humidity module.

Key performance indicators

1. Image recognition accuracy: more than 90% , binocular ranging accuracy to the millimeter level.
2. Manipulator positioning accuracy: in the range of 15cm-30cm, positioning error does not exceed 5mm
3. response time: from receiving instructions to the task response time does not exceed 0.1 s.

Future prospects

Deep learning related algorithms are added to improve the recognition rate of target items.
Add lidar and GPS positioning to achieve navigation.
Using collaborative control algorithm to control multiple subsystems to work together

CREATIVE DESIGN