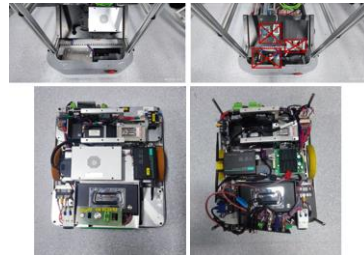# A Multi-Autonomous Mobile Robot Controller for Autonomous Agent Perception and Collaboration

Ding Yan, Chongshan Jiao, Tingbang Liang
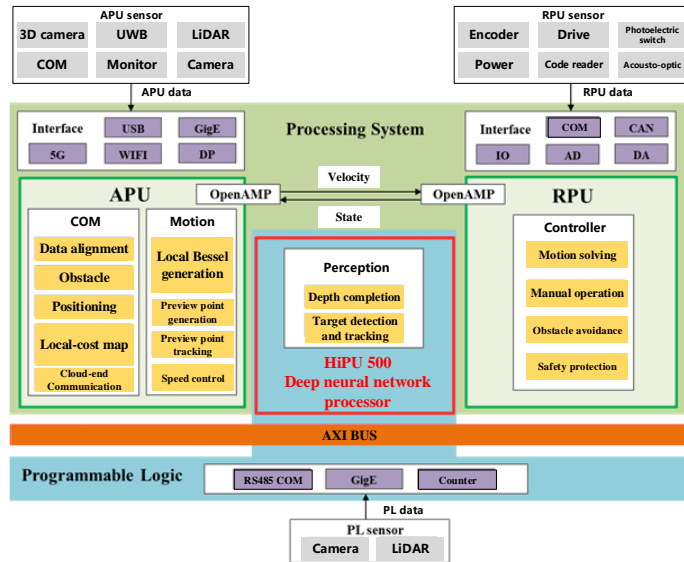Xi'an Jiaotong University, Shanxi Province

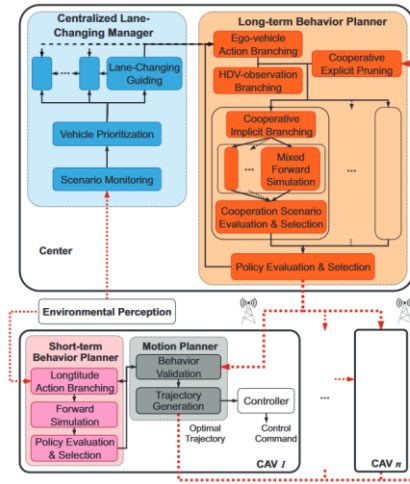## OpenHW2023

AMD

On board test by AMD ACU3EG

INTRODUCTION

Multi Autonomous Mobile Robots (AMR) represent the most diverse and widely applied category of autonomous agents in current industrial automation. They autonomously handle cargo transportation and have become a crucial component of automated production systems for enterprises.

The multi-AMR controller targeting edge-cloud collaboration to utilizes heterogeneous multi-core processors, making full use of resources such as multiple cores in the Zynq MPSoC's processing system (PS) and programmable logic (PL).
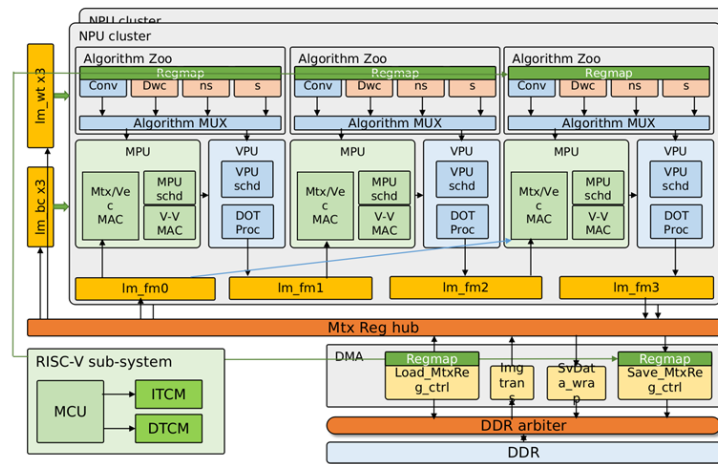

A real-time framework for AMR

Introducing a real-time framework for AMR lane changing, merging decision-making and motion planning. Extending POMDP for multi-AMR scenarios with cooperation mechanisms for improved efficiency and safety.
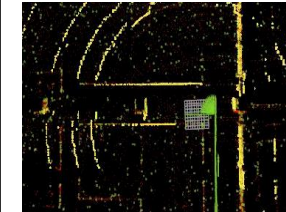
Dynamically Clippable Neural Network Acceleration Kernel

Heterogeneous multi-core computing architecture

CREATIVE DESING

RESULT

Perception results

1. Positioning result

2. Object detection result

Repeated positioning accuracy:20mm
Output frequency: 100Hz
Point cloud matching frequency: 0.5Hz

Detect frame rate: 10Hz
2D detection accuracy: >0.75
2D detection recall rate: >0.90
Network parameter quantity: 2.59M

Planning results

Multi AMR cooperation to avoid dynamic obstacles