Blueprint: Robotaxi

Baidu
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General Blueprint Introduction

- The Robotaxi Blueprint focuses on establishing an open source MEC platform combined with AI capabilities at the autonomous driving scenario.
- The first release of the Robotaxi Blueprint is targeted at Q2, 2020.
- The Robotaxi Blueprint is sponsored by Baidu, Intel, Arm, and VMware.
- Contact: Hechun Zhang (zhanghechun@baidu.com)
- Refer to: https://wiki.akraino.org/display/AK/The+AI+Edge%3A+RoboTaxi
Blueprint Use cases

Urban Scenarios with autonomous driving vehicles

Avoiding blind spots or safer autonomous driving and accelerating efforts in implementing driving fleet solutions.

- Autonomous drive sharing: reducing the cost-per-kilometer by 50% compared to current private car and taxi costs
- Low-speed unmanned logistics vehicles
- Unmanned minibuses in closed parks
- Unmanned buses on city roads
Blueprint Use cases

- Use cases for Valet Parking
  - Deploy sensors on vehicles and parking lots, combined with high-precision positioning, allowing vehicles to engage in fully autonomous parking.

- Regional upgrade for autonomous driving vehicles
  - With roadside sensing equipment, the vehicles can get more road condition information and make the driving mode more intelligent.
RoboTaxi Network Components
RoboTaxi Network Architecture

1.1 video capturing
1.2 traffic lights collecting

2 real-time AI computing

3.1 data sending to RSU
3.2 data sending to server

MEC / IDC

4.1 data sending to autonomous car
4.2 data for third-party service

APP
RoboTaxi Network Architecture

3\textsuperscript{rd} party system

Internet

10 Gigabit switch

Traffic lights signal collector

Gigabit NIC

100Mbps Cable

Camera

RSU

RSCU

RSCU

RSCU

Telecom operator private line

MEC/ Edge site
RoboTaxi MEC platform software architecture

- **Service Layer**
  - V2X Client
  - V2X AI Perception

- **PaaS**
  - OTE
  - Baetyl
  - OpenNESS

- **IaaS**
  - Network Platform
    - Virtual Switch
    - DPDK
    - Visualization Platform
    - Operating System

- **Hardware**
  - Baidu RSCU

- **Road-side Computing Unit**
- **Server**
  - V2X Service
  - Baetyl
Future Plan

- The first demo of the RoboTaxi Blueprint is targeted at Q1, 2020.
- The first Akraiino version will be released in Q2, 2020.
## The Robotaxi Blueprint Criteria

<table>
<thead>
<tr>
<th>Case Attributes</th>
<th>Description</th>
<th>Informational</th>
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<tbody>
<tr>
<td>Type</td>
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<tr>
<td>Blueprint Family - Proposed Name</td>
<td>The AI Edge</td>
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<tr>
<td>Use Case</td>
<td>Autonomous driving taxi</td>
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<tr>
<td>Blueprint proposed Name</td>
<td>Robotaxi</td>
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<tr>
<td>Initial POD Cost (capex)</td>
<td>Leverage Unicycle POD - less than $150k</td>
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<tr>
<td>Scale &amp; Type</td>
<td>Up to 4 servers, x86 server or deep edge class</td>
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<tr>
<td></td>
<td>With nVIDIA Tesla P4/T4 GPUs</td>
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<tr>
<td>Applications</td>
<td>Autonomous driving taxi</td>
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<td>Power Restrictions</td>
<td>Less than 10Kw</td>
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<td>Infrastructure orchestration</td>
<td>Docker 1.13.1 or above</td>
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<td>K8s 1.12.5 or above- Container Orchestration</td>
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<td>OS – CentOS 7.0 or above</td>
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<td>PaaS</td>
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<td>SDN</td>
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<tr>
<td>Additional Details</td>
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