Piccolo - In-network compute for 5G services

Use cases

1. Risk Monitoring - philip.eardley@bt.com
   jag@sensingfeeling.com
   Dennis.Grewe@de.bosch.com
   alex.tsakrilis@gmail.com

2. Smart factory - peer@stritzinger.com

COINRG
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Automotive real-time ‘Risk Index’

What
- A real-time measure of the ‘situational risk’ of a vehicle

Why
- Modification of vehicle occupant/driver behaviours
- Decision support for remote fleet operations & control entities
- Ecosystem optimisation:
  - underwriting & insurance, policing
  - urban planning

How
- Visual sensing of the situation and behaviours outside the vehicle
  - Environmental conditions
  - Humans and animals
  - Objects & hazards
- Visual sensing of the situation inside the vehicle
  - Human behaviour
- State of the vehicle and its subsystems
  - Vital signs
  - Subsystem health etc.
Current architectural state of the art

Fixed allocation of resources

Vehicle

Visual Processing Engine

Vehicle Data Systems

Data Centre

Analytics Engine

Network

Wireless 4G/5G

End to end view of network as a flow path

Dynamic allocation of resources
Piccolo architecture

Dynamic allocation of resources

Vehicle
- Edge node
  - Vision
  - Processing
- Vehicle Data Systems

Piccolo node
- Vision
- Processing

Network
- Wireless 4G/5G

Data Centre
- Analytics Engine

Dynamic allocation of resources

End to end view of network as a compute path
PoC design - Automotive real-time ‘Risk Index’

Modification of Sensing Feeling edge processor for transport vehicles

Vehicle

Edge node
Vision Processing

Vehicle Data Systems

Vehicle Telemetry

Eclipse KUKSA

BOSCH

Fluentic trusted node running Sensing Feeling VPE DNN model server

Piccolo node
Vision Processing

IoTea

Network Wireless 4G/5G

Opportunities for data augmentation and privacy filtering (value-add)

Data Centre

Analytics Engine

Existing Sensing Feeling Analytics Engine

Bosch IoT Suite

Picture of Piccolo node

Vision Telemetry

Vehicle Data

Vision

Telemetry

OBD Dongle

Opportunities for data augmentation and privacy filtering (value-add)
Topics under development & Research questions

- Re-engineer the in-network logic to be able to handle multiple edge nodes
- Orchestration/control function eg to deliver algorithms to the network nodes
- Capabilities of in-network nodes: just ML/DNN inferencing or arbitrary logic?
- Flex resources up or down to handle concurrent demand
- Ensure the in-network execution is secure & private, as the vehicle moves
Piccolo – key facts

• Collaborative project under the Celtic framework
• Jointly funded by Partners and Innovate-UK (UK) & BMWi (Germany)
• 2 years from October 2020
• https://www.piccolo-project.org/
• Keen to collaborate through fora such as COINRG

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<tr>
<th>Partner</th>
<th>Key people</th>
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<tr>
<td>Arm</td>
<td>Chris Adeniyi-Jones</td>
</tr>
<tr>
<td>Bosch</td>
<td>Dennis Grewe</td>
</tr>
<tr>
<td>BT (UK lead)</td>
<td>Philip Eardley</td>
</tr>
<tr>
<td>Uni Emden/Leer (German Lead)</td>
<td>Dirk Kutscher</td>
</tr>
<tr>
<td>Fluentic Networks</td>
<td>Yiannis Psaras</td>
</tr>
<tr>
<td>InnoRoute</td>
<td>Andreas Foglar</td>
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<tr>
<td>Sensing Feeling</td>
<td>Jag Minhas</td>
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<tr>
<td>Stritzinger</td>
<td>Peer Stritzinger</td>
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<td>TU Munich</td>
<td>Joerg Ott</td>
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