eFPGA - Key solution for Automotive SoCs

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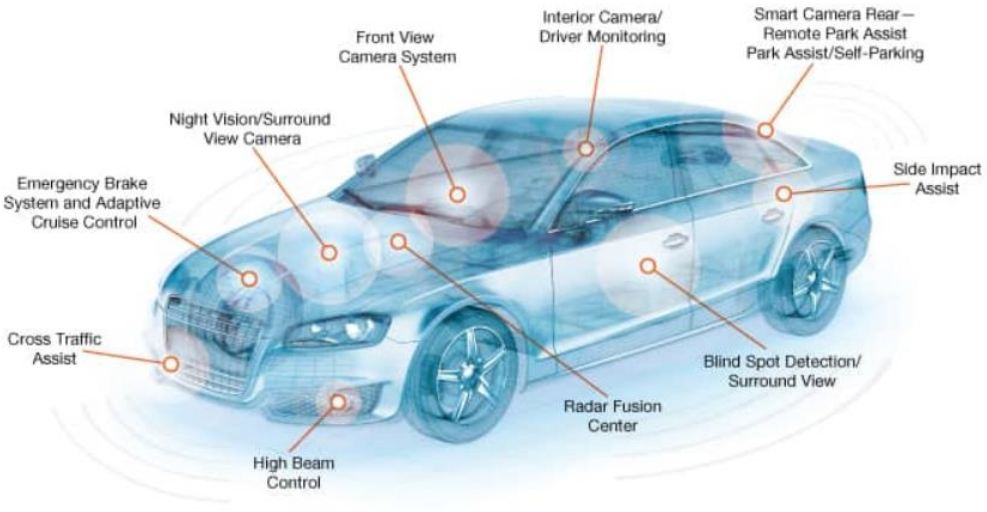
Classical Automous ADAS
Distributed Systems

Distributed architecture and thus ⇒ Distributed Intelligence !

Current - latest ADAS features are software driven and use data from many sources

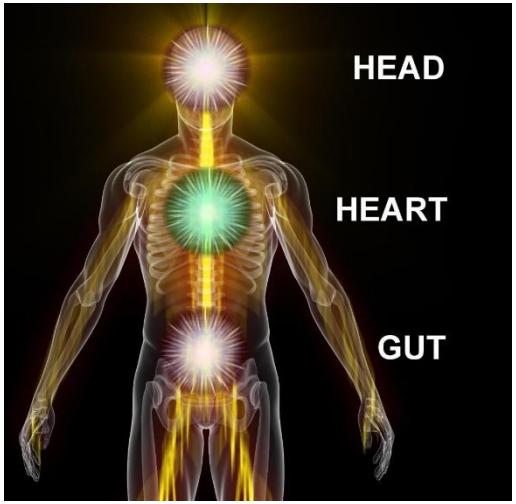
- ✓ Systems must work & communicate together
- ✓ Data must be shared



Classical Autonomous driving solutions

Full Distributed Approach issues & Level 5 autonomy ?

- ✓ Unacceptable System **Latency** in the transfer of safety critical information
- ✓ Loss of potentially useful data at the edge nodes
- ✓ Rapid increase in **Cost** and **Power** consumption as driver assist systems become more complicated (SW & HW)



How to scale up from this architecture to reach Level 5 autonomy ?

ADAS Systems Requirements using eFPGA

- **Real time processing**
- **Deterministic** - Situation Awarness & Decision-making
- Long period of life in the field and need to evolve overtime because of **evolving standards and/or algorithms**
  - **Reconfigurability**
- **Large BW & Very Low Latency**
- Sensors Fusion, Anticipation & Prediction for avoiding upcoming accidents - **Artificial Intelligence algorithms**
  - ✓ **Data parallel processing**
- Hardware & Software integration - Satisfying Embedded contraints - Small PCB
  - ✓ **Low system size as possible**
  - ✓ **Low cost**
  - ✓ **Low power**

ADAS Centralized Processing Approach

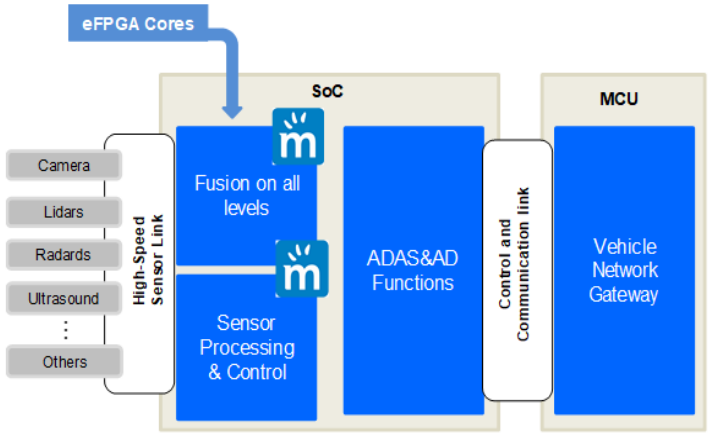
Think Centralized Processing approach to face Level 5 Autonomy Challenges !

Use eFPGA for performing Raw Sensor Data fusion inside a central ADAS processing unit:

- Raw Data Fusion Centralization
- Expand ADAS processor role to include fusion of raw data
- Avoid executing Image-processing separately from the CPU
- Remove as maximum as we can Chip-to-Chip useless high speed bus interfaces adding penalty latency

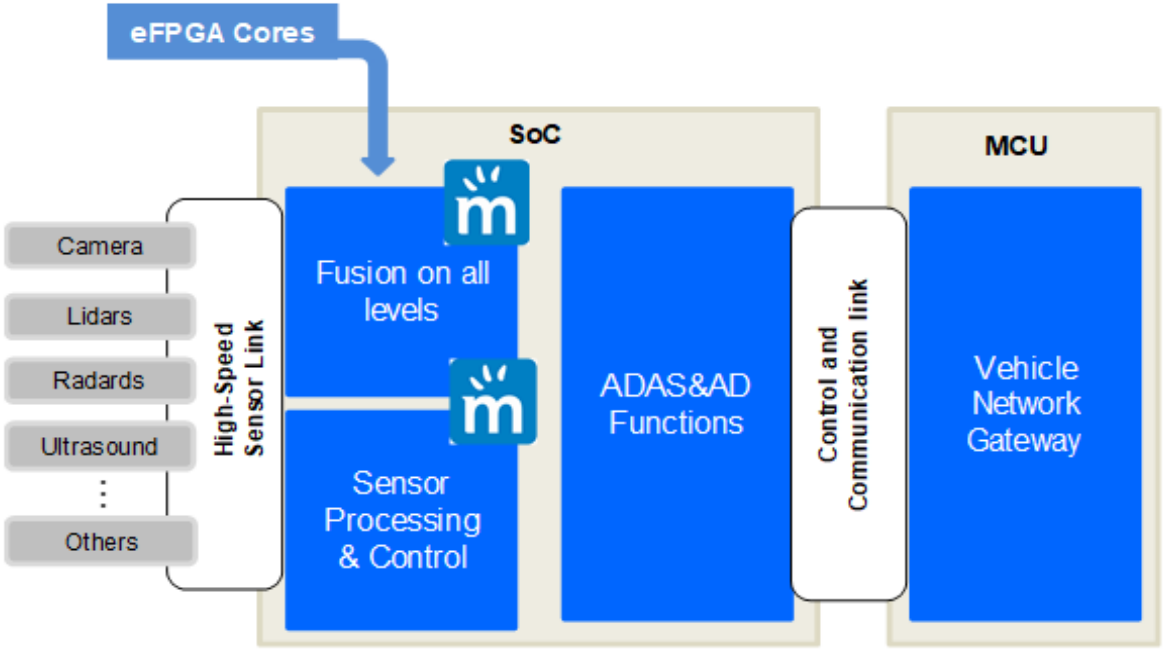
Architecture Solution ?

eFPGA IP combination with CPU in a unified ADAS architecture



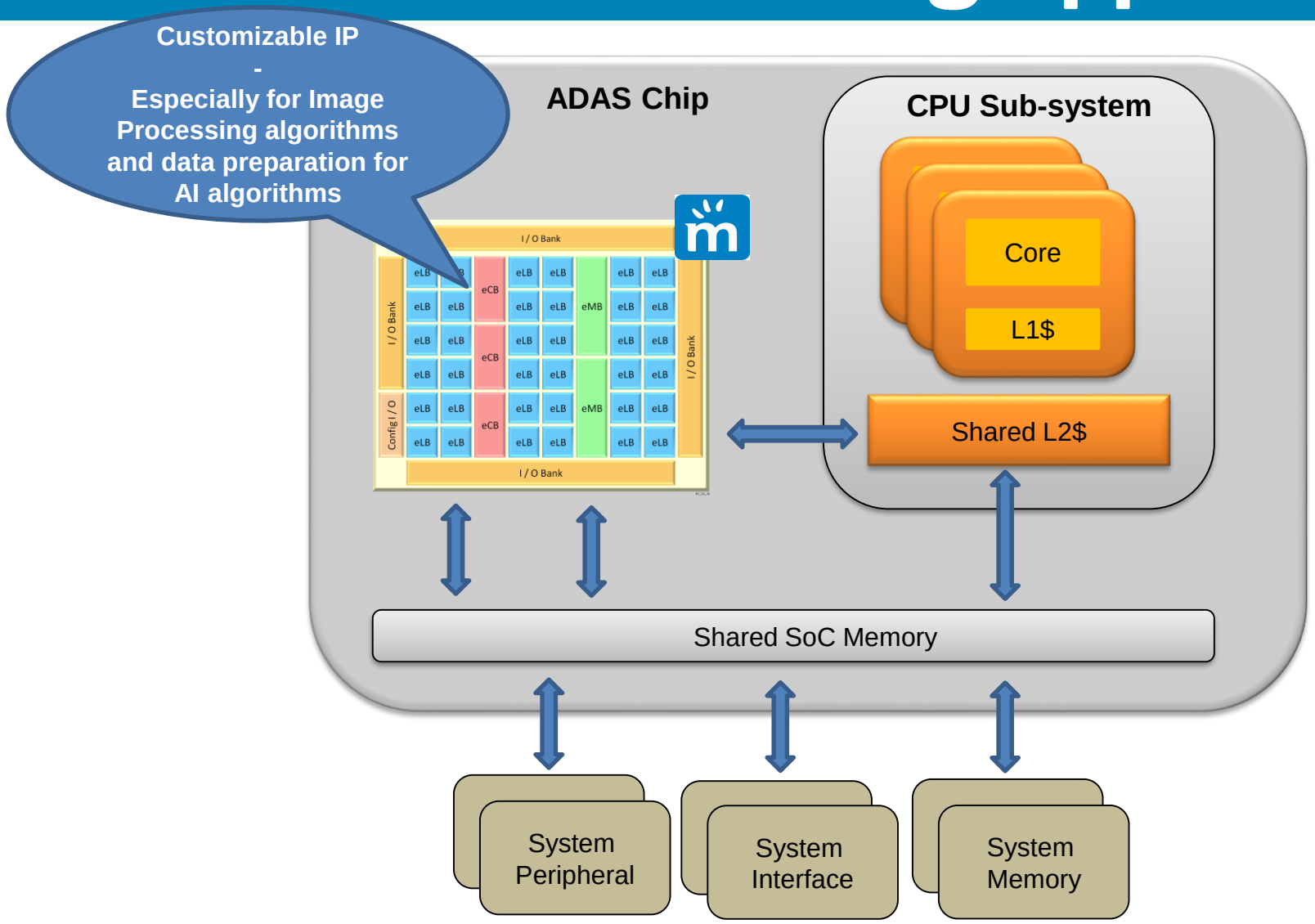
ADAS Centralized Processing Approach

In fact, in addition of the traditional sensor fusion, the raw data allow cars to view the external environment more clearly and to get "redundancy" checking!



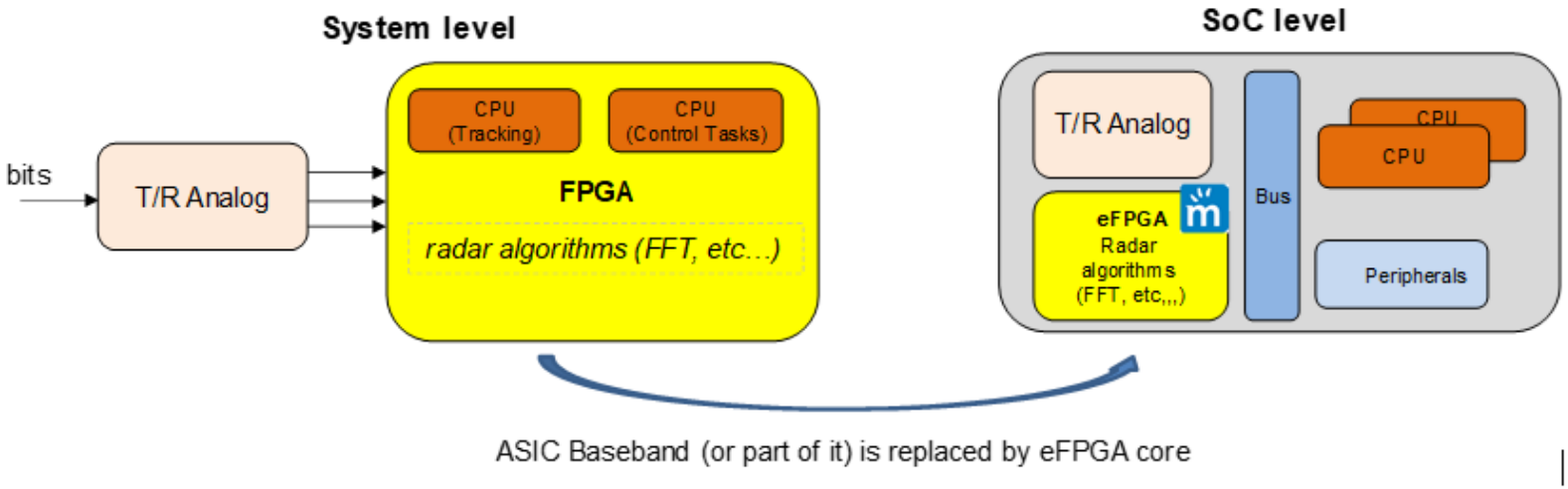
Menta is the only eFPGA vendor offering a standard scan chain interface with a TC in excess of 99.8%

ADAS Centralized Processing Approach



LIDAR Systems

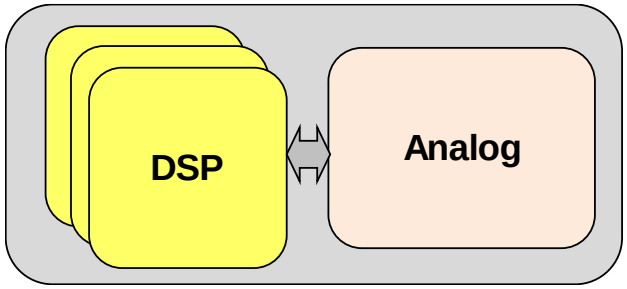
eFPGA in LIDAR Systems:



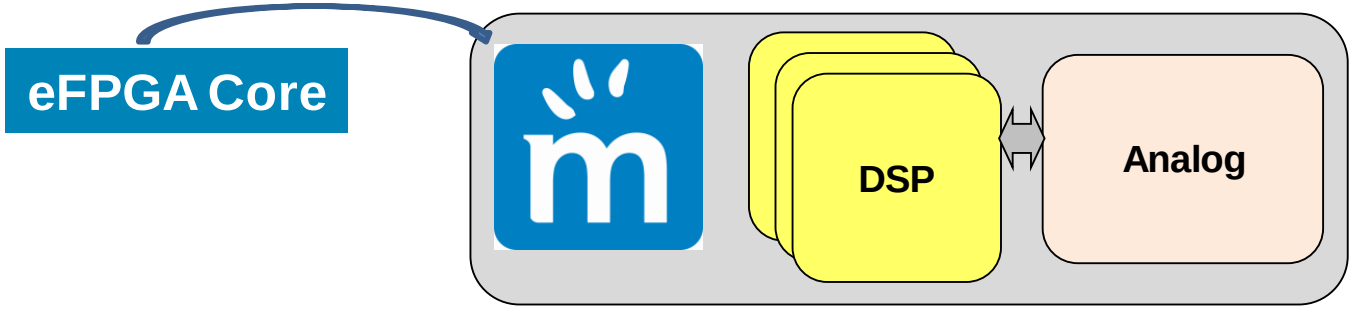
It improves also performance in term of Image Processing thanks to eFPGA dedicated blocks like complex DSP for FFT computing, complex multipliers and FIR Filters.

Battery Monitoring Systems

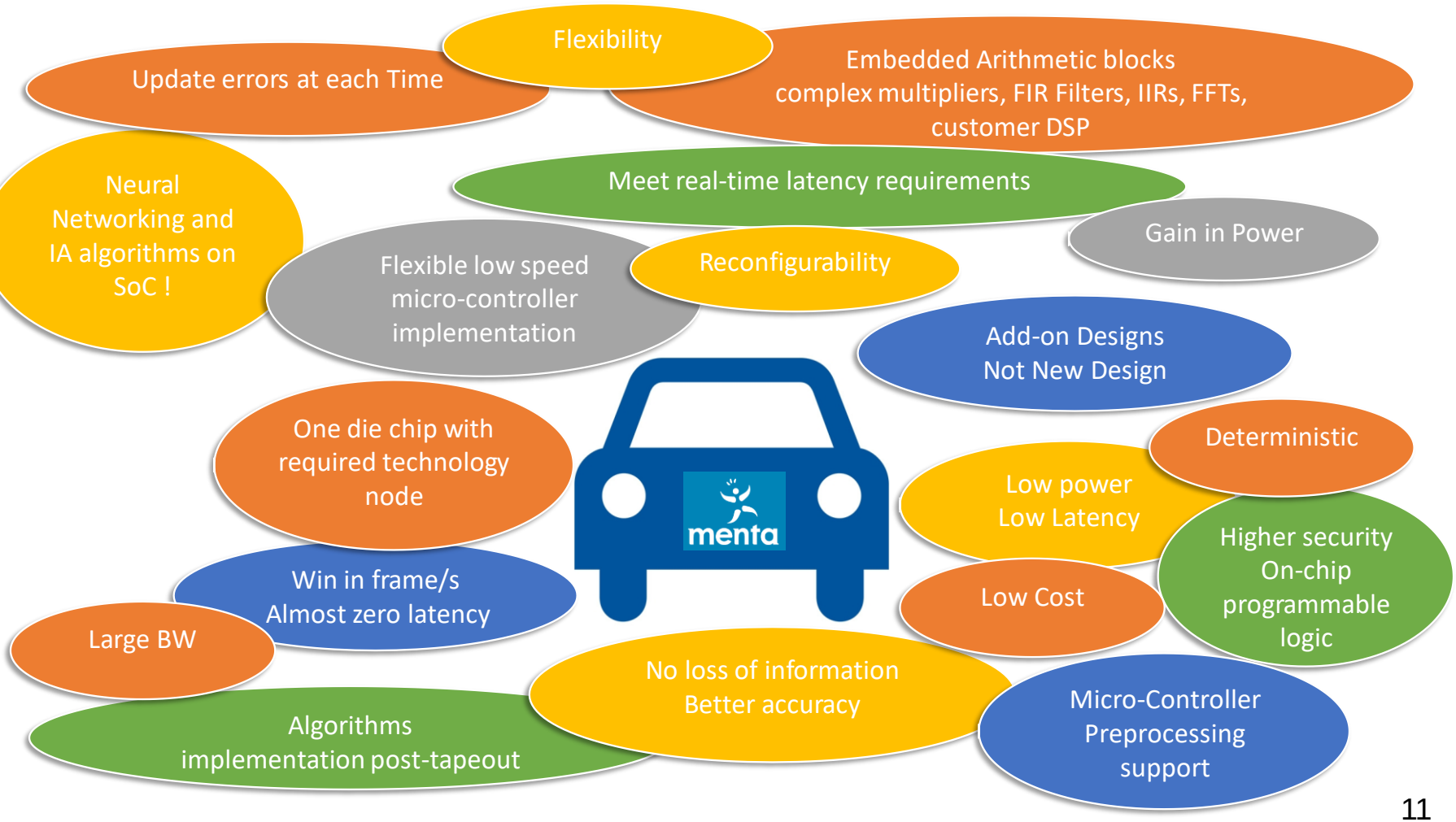
Battery Monitoring Systems - Legacy Hardware Architecture:



Battery Monitoring Systems - Proposal Hardware Architecture using Menta eFPGA:

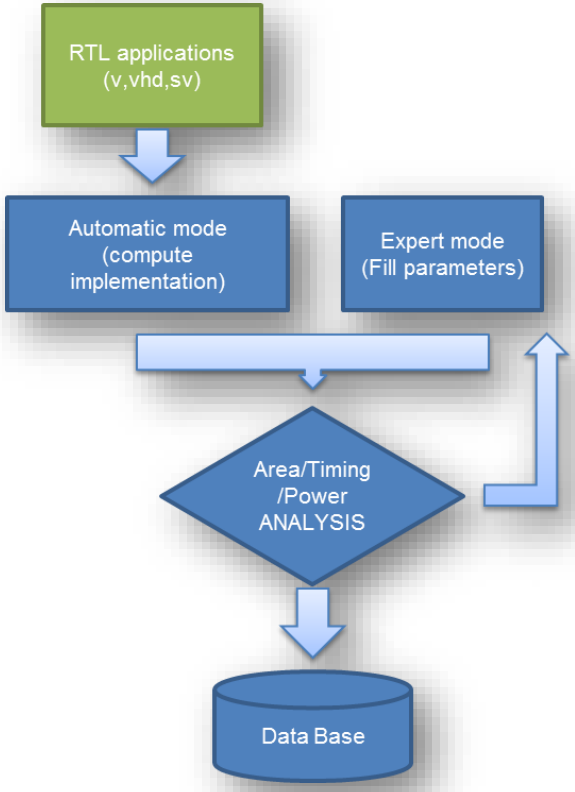


Menta eFPGA advantages in Automotive Systems



Menta eFPGA benefits

- All parameters can be defined based on customers need. Custom performances, power and area trade-off. Unique specification software
- Easy integration. Fully verifiable within customer flow and up to post place & route gate level simulation
- Catalogue of arithmetic blocks available from simple MAC to complex programmable DSPs for FIR filters, FFT, complex multipliers, etc.
- Multiple tapeouts in various technology nodes: STM 130, STM 65, TSMC 28HPC+, GLOBALFOUNDRIES 14LPP
  - Including MRAM based eFPGA
- TSMC OIP Symposium
- At GLOBALFOUNDRIES 32SOI & 14LPP catalogue
- Member of 22FDX Ecosystem



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Thank You