Design your autonomous vehicle applications with NVIDIA DriveWorks components on RTMaps

Nicolas du Lac
CEO, Intempora
Brief introduction about Intempora
• Software editor company

• Created in 2000 - Over 15 years experience in ADAS/A.D. and embedded computing

• Over 15 years of experience

• Strong partnership with dSPACE
Over 15 years of experience in providing advanced solutions

Multisensor Technology since 1998!

- Darpa Challenge 2007 (Dotmobil Team)
- NAVYA ARMA

Video speed: 1x. Over 100 kmh | 65 mph
Challenges ADAS and AD

1. Time coherency in distributed/multi-core multisensor applications

2. Execution performance / Number crunching

3. Offline development

4. Ease of use / Ease for deployment

5. Development costs / Time to market

6. Test & validation
RTMaps middleware
RTMaps - Real-Time Multisensor applications

Sensors
Vision, RADAR, LiDAR, GPS, Maps, IMU, V2X

Actuators
Motor, Wheel, Brake, Database, V2X

DATA PROCESSING

Intempora © 2017 - 08
Features

- Graphical interface
- Large library of off-the-shelf components
- Record / Playback

- Optimized (multithread, pre-allocated buffers, copyless)
- Preserves time coherency
Applications

Positioning & Navigation

Machine Learning

Perception

SLAM

2D/3D

Data Fusion

Big Data / Cloud

Computer Vision

HMIs

Intempora © 2017 - 10
Interoperability

Simulators
(MotionDesk, ASM, PreScan, ProSiVIC+)

dSPACE ADAS toolchain
(VEOS, ControlDESK, MicroAutoBox)

Advanced HMIs
(Qt, QML)

Sensors / Actuators

RTMaps

Communication
(DDS, TCP, UDP, LCM, …)

Digital maps

Robotics
(ROS bridge)

ROS

Signal processing & Control Actuators
(Simulink, MathWorks)

Image processing
(OpenCV, others libraries…)

Intempora © 2017 - 11
SDK / Develop your own RTMaps components

A cross platform / multi-language API

C++
Python
Simulink
QML
Model based perception

Sensors

Data processing,
Data fusion,
tracking
Scene
Interpretation

Environment
Model

Perception

Applications

Actuators

Model-based perception

High performance sensor data processing

Model-based controller design

MATLAB/Simulink

fcn 1_{(ECU a)}

fcn 2_{(ECU b)}

fcn 3_{(ECU b)}

GigE
RTMaps workflow
From R&D to production

1. Offline Simulation
2. In-vehicle Data Recording
3. Offline Data Playback
4. Embedded in prototype (PC+ dSPACE)
5. Prototyping RTMaps apps to embedded targets
6. RTMaps applications to embedded ECU

From COTS solutions to custom developments
RTMaps on Nvidia boards since 2013

- ELA Project 2013
  Automotive Electronics and Software

RTMaps Embedded on ARM architecture

- Nvidia Jetson Tegra K1: 2014
- Nvidia Jetson Tegra X1: 2015
- Nvidia Drive PX: 2015
- Nvidia Drive PX2: Today
- dSPACE SPU: Q3 2017
- ?
Intensive computing taking advantage of hardware acceleration

- RTMaps Runtime engine runs on the ARM CPU
- Components (image processing for instance) can wrap intensive computing algorithms taking advantage of GPU
- Supported OS: Windows, Linux, Embedded Linux (Yocto/Poky)
- Supported OS: Windows, Linux, Embedded Linux (Yocto/Poky)
RTMaps Embedded

- **RTMaps Studio** operating on separate laptop with **direct SSL connection with the runtime engine on the target**. Used for diagrams edition (design and configuration).

- **RTMaps Runtime Engine** and components compiled on chosen target

- **RTMaps SDK** for cross-compilation on a Linux PC, or available directly on the target.
RTMaps & NVIDIA DriveWorks
RTMaps & NVIDIA DriveWorks

NVIDIA. DriveWorks Components (C++ / CUDA)

RTMaps

NVIDIA. DRIVE PX 2

DriveNet

LaneNet

Feature Tracker

eetc...

*Easily deploy on target with RTMaps Remote Studio (SSL)
Conlusion: Video Live Demonstration
Reduce and enhance your development cycles
Thanks for your attention

Evaluate RTMaps!
1- Download RTMaps from intempora.com
2- Send an activation request at eval@intempora.com

To see live demonstrations, meet us on booth #1105 with dSPACE Inc

https://intempora.com
@INTEMPORA #GTC17 #RTMaps

Nicolas du Lac
CEO, Intempora