



PRESS RELEASE

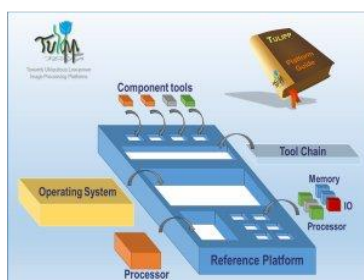
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EU's TULIPP project delivers outstanding results for embedded vision applications

- **New Use Cases focus on Medical X-Ray Imaging, Advanced Driver Assistance Systems (ADAS) and Unmanned Aircraft Vehicles (UAVs)**
- **Will be demonstrated for the first time at Vision 2018 (Stuttgart, 6-8 November 2018 – Hall 1, Stand 1A74)**
- **Practical workshop and in-depth tutorial sessions to be held at HiPeac 2019 (Valencia, 21-23 January 2019)**



Photocaption: TULIPP Use Cases



Photocaption: TULIPP reference platform components



Photocaption: TULIPP starter kit

Palaiseau, France – 30 October 2018. TULIPP (Towards Ubiquitous Low-power Image Processing Platforms), an EU initiative targeting the development of high performance, energy-efficient embedded systems for the growing range of increasingly complex image processing applications, has delivered its first three Use Cases covering Medical X-Ray Imaging, automotive ADAS (Advanced Driver Assistance Systems) and UAVs (Unmanned Aircraft Vehicles). The new Use Cases, coupled with the TULIPP embedded computing reference platform, deliver outstanding results for embedded vision applications.

The Uses Cases will be demonstrated for the first time at Vision 2018 in Stuttgart, Germany from 6-8 November 2018 (Hall 1, Stand 1A74). TULIPP will also hold a practical workshop on the Project at the HiPeac 2019 Conference, the premier European forum for experts in computer architecture, programming models, compilers and operating systems for embedded and general-purpose systems, in Valencia, Spain on 22 January 2019 as well as deliver an in-depth tutorial on 23 January 2019. Participants in the HiPeac workshop and tutorial will receive a free TULIPP development kit.

The Medical X-Ray Imaging Use Case combines an embedded computing board with a medical X-ray imaging sensor to eliminate the noise on images when radiation doses are reduced. The ADAS Use Case enables the implementation of pedestrian detection algorithms running in real-time on a small, energy efficient, embedded platform. The UAVs Use Case equips a UAV with real-time obstacle detection and avoidance capabilities based on a lightweight and low-cost stereo camera setup.

“At first glance, Medical X-Ray Imaging, ADAS and UAVs would appear to have very little in common,” said Philippe Millet of Thales and TULIPP’s Project Co-ordinator. “But that’s only true when viewed from the

perspective of the final application as they all have a requirement for high-performance image processing and they also suffer from the so-called SWaP (Size, Weight and Power) computing constraints typical of embedded systems. TULIPP has addressed these challenges by taking a diverse range of application domains as the basis for defining a common reference processing platform comprising the hardware, the operating system and its programming environment that captures the commonality of real-time, high-performance image processing and vision applications.”

TULIPP's Medical X-Ray Imaging Use Case demonstrates advanced image enhancement algorithms for X-Ray images running at high frame rates. It focuses on improving the performance of X-Ray imaging Mobile C-Arms, which provide an internal view of a patient's body in real-time during the course of an operation to deliver, increases surgeon efficiency and accuracy with minimal incision sizes, aids faster patient recovery and lowers nosocomial disease risks. Using TULIPP's embedded hardware reference platform, which is the size of a smart phone, the Use Case demonstrates how radiation doses to which patients and staff are exposed, which are typically 30 times ambient radiation levels, can be reduced by 75% at the same time as maintaining the clarity of the real-time X-Ray images which would otherwise be rendered useless by the increases in the noise level on the images that a reduced radiation dose can cause.

ADAS adoption is dependent on the implementation of vision systems or on combinations of vision and radar and the algorithms must be capable of integration into a small, energy-efficient Electronic Control Unit (ECU). An ADAS algorithm should be able to process a video image stream with a frame size of 640x480 at a full 30Hz or at least at the half rate. The TULIPP ADAS Use Case demonstrates pedestrian recognition in real-time based on Viola & Jones algorithm. Using the TULIPP reference platform, the ADAS Use Case achieves a processing time per frame of 66ms, which means that the algorithm reaches the target of running on every second image when the camera runs at 30Hz.

TULIPP's UAV Use Case demonstrates a real-time obstacle avoidance system for UAVs based on a stereo camera setup with cameras orientated in the direction of flight. Even though we talk about autonomous drones, most current systems are still remotely piloted by humans. The Use Case uses disparity maps, which are computed from the camera images, to locate obstacles in the flight path and to automatically steer the UAV around them. This is the necessary key towards totally autonomous drones.

“The TULIPP Use Cases, coupled with the development kit, comprising hardware platform, multi-core operating system, development tool chain and guidelines, have demonstrated that the computational demands of complex image processing can be delivered in a diverse range of embedded applications within the context of challenging size, weight and power constraints,” concluded Philippe Millet of Thales and TULIPP's Project Co-ordinator.

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About TULIPP and its Partners

TULIPP (Towards Ubiquitous Low-power Image Processing Platforms) is funded by the European Union's Horizon 2020 programme. It began work in 2016 with a view to completion in 2018. Its focus is on the development of high performance, energy-efficient embedded systems for the growing range of increasingly complex image processing applications, that are emerging across a broad range of industry sectors. TULIPP will focus on providing vision-based system designers with a reference platform that defines implementation rules and interfaces designed to tackle power consumption issues while delivering guaranteed, high performance computing power. For more information on TULIPP, please visit: <http://www.tulipp.eu>. For further information on the TULIPP consortium members see:

Thales - www.thalesgroup.com

Efficient Innovation SAS - www.efficient-innovation.fr

Fraunhofer IOSB – www.iosb.fraunhofer.de

Hipperos – www.hipperos.com

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TUL002 / EU's TULIPP project delivers outstanding results for embedded vision applications

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