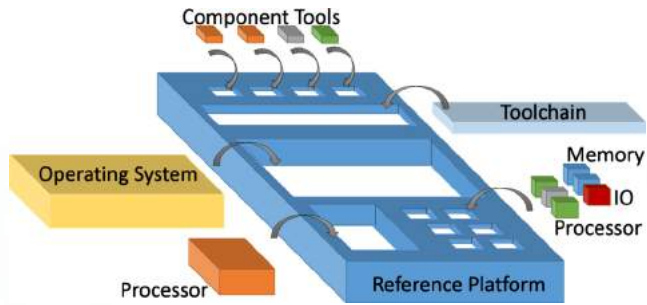


# Tulipp solution: Reference Platform Concept



Define implementation rules and interfaces between heterogeneous off-the-shelf HW, OS and Toolchain



### All Programmable FPGA and SoC Modules

Same 5x4 cm form factor



- Extended device life cycle
- Rugged for industrial applications
- Mechanically compatible
- Small and powerful
- Customizable

### A Tulipp Hardware Instance

Improvements compared to 2013	End of Tulipp 2018	5 years later 2023
Peak perf. per watt	x 4	x 100
Average perf. per watt	x 10	x 200

# Consortium members:

Ruhr-University of Bochum  
(Germany)



Norwegian University of Science and Technology  
(Norway)



Fraunhofer  
(Germany)



Synective Labs  
(Sweden)



Efficient Innovation  
(France)



Hipperos  
(Belgium)



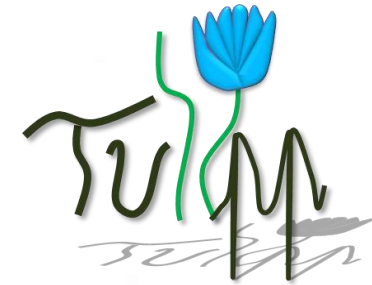
Sundance Multiprocessor Technology Ltd.  
(United Kingdom)



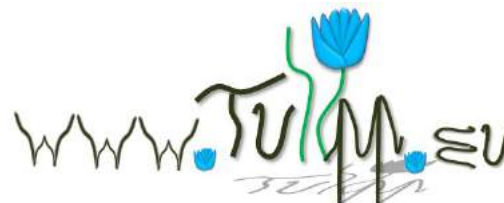
Thales  
(France)



WE NEED YOU!



Towards  
Ubiquitous  
Low-power  
Image  
Processing  
Platforms



Contact@tulipp.eu

## Use Case

### Surveillance and Rescue UAVs



#### Bring intelligence to the drones

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Suspendisse efficitur, nisl in hendrerit iaculis, dui turpis euismod tortor, vitae aliquet mauris nunc id magna. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Duis odio diam, auctor nec tempus eu, posuere vel lectus. Suspendisse suscipit id velit eu tempus. Praesent sit amet magna tellus. Aliquam maximus, lectus vel dignissim luctus, orci lacus facilisis urna, ut ullamcorper nisl nulla id nulla. Etiam tincidunt nisl mi, vel ultrices justo ultricies sed. Curabitur vestibulum id odio elementum lacinia.

Donec aliquet bibendum nisl vel hendrerit. Fusce semper tincidunt purus, nec vehicula lorem auctor nec. Fusce pretium mauris non massa accumsan varius condimentum et nisi. Fusce vitae arcu eleifend, suscipit odio faucibus, tempor nulla. Sed vel orci augue. Suspendisse potenti. Cras elementum nibh sed velit imperdiet, eget porta felis ultricies. Duis nisi mauris, pellentesque vitae placerat et, faucibus dignissim magna. Etiam a finibus metus. Morbi at enim volutpat lectus placerat sagittis. Nullam et erra turpis consectetur id.

## Use Case

### Medical X-Ray Imaging



#### Divide by 4 Radiation Dose

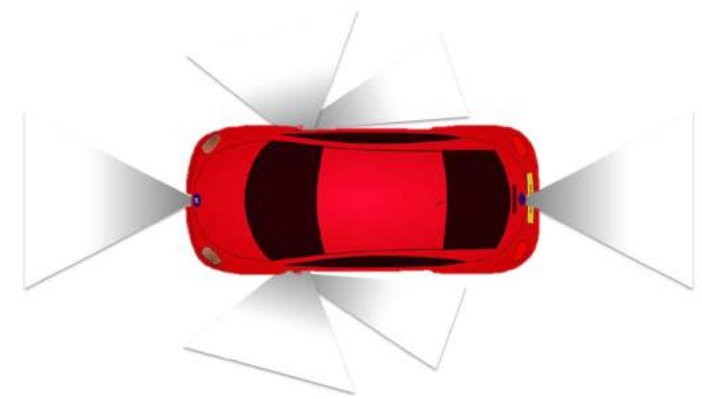
Surgery requires that the practitioner controls his movements inside the body of the patient or the way blood flows in arteries and veins but cannot see inside with his own eyes and need imaging systems. Depending on the kind of surgery, X-Ray imaging will be used. Now days X-Ray sensors are working just like digital camera sensors and are very sensitive to noise when the level of incoming radiation is too low. This is problematic for both the patient and the surgeon while the system will not only emit radiation for one X-Ray picture but for a real-time video with tens of pictures per seconds.

In the Tulipp project, we want to reduce this radiation dose by 75%. Doing that, the noise from the sensor would blur the image and make it unusable to see the many little details of the body. A solution is to add image processing to “clean” the image and cancel the noise.

Since the surgery room is small and the device mobile, the processing solution must be compact, consume low power and yet deliver the processing at real-time which is a challenge as for the design of a matching solution.

## Use Case

### Advanced Driver Assistance



#### Safer driving experience

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Suspendisse efficitur, nisl in hendrerit iaculis, dui turpis euismod tortor, vitae aliquet mauris nunc id magna. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Duis odio diam, auctor nec tempus eu, posuere vel lectus. Suspendisse suscipit id velit eu tempus. Praesent sit amet magna tellus. Aliquam maximus, lectus vel dignissim luctus, orci lacus facilisis urna, ut ullamcorper nisl nulla id nulla. Etiam tincidunt nisl mi, vel ultrices justo ultricies sed. Curabitur vestibulum id odio elementum lacinia.

Donec aliquet bibendum nisl vel hendrerit. Fusce semper tincidunt purus, nec vehicula lorem auctor nec. Fusce pretium mauris non massa accumsan varius condimentum et nisi. Fusce vitae arcu eleifend, suscipit odio faucibus, tempor nulla. Sed vel orci augue. Suspendisse potenti. Cras elementum nibh sed velit imperdiet, eget porta felis ultricies. Duis nisi mauris, pellentesque vitae placerat et, faucibus dignissim magna. Etiam a finibus metus. Morbi at enim volutpat acerat sagittis. Nullam e Morbi quam, ut viverra turpis consectetur id.