The project

Contract number:	732642		
Key Action:	Research and Innovation Action – RIA H2020-ICT-2016-1 ICT-03-2016 : SSI - Smart System Integration		
Project coordinator and contact person:	Dr. Sylvain Saïghi, Université de Bordeaux, France		
Project Partners :	Université de Bordeaux (UBx) - *coordinator*	France	Contact
	Chronocam SAS (Chronocam)	France	Contact
	IBM Research GmbH (IBM)	Switzerland	Contact
	Robert Bosch GmbH (Bosch)	Germany	Contact
	Universiteit Twente (UTwente)	The Netherlands	Contact
	Université Pierre et Marie Curie - Paris 6 (UPMC)	France	Contact
	Centre National de la Recherche Scientifique (CNRS)	France	Contact
	Twente Solid State Technology B.V. (TSST)	The Netherlands	Contact
Duration:	January 2017 – December 2020 (48 months)		
Budget:	EUR 4 862 256,25 *= 3 876 396.25 granted to the consortium members within the EU* *+ 985 860 for a beneficiary not receiving EU funding*		
Project website:	http://www.ulpecproject.eu		
Keywords:	*Micro (system) engineering, ferroelectric memristor, neuromorphic engineering, event-based camera*		
Benefits:	The long term goal of ULPEC is to develop advanced vision applications with ultra-low power requirements and ultra-low latency. The output of the ULPEC project is a demonstrator connecting a neuromorphic event-based camera to a high speed ultra-low power consumption asynchronous visual data processing system (Spiking Neural Network with memristive synapses).		

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Publishable summary

The long term goal of ULPEC is to develop advanced vision applications with ultra-low power requirements and ultra-low latency.

The output of the ULPEC project is a demonstrator connecting a neuromorphic event-based camera to a high speed ultra-low power consumption asynchronous visual data processing system (Spiking Neural Network with memristive synapses).

Although ULPEC device aims to reach TRL 4, it is a highly application-oriented project: prospective use cases will be studied and an application roadmap will be developed, by considering interoperability for an integration in "systems of systems" as well as the definition of upper power consumption limits depending on future application.

The project consortium therefore includes an industrial end-user (Bosch), which will more particularly investigate autonomous and computer assisted driving. Autonomous and computer assisted driving are indeed a major disruption in the transport and car manufacturing sector. Vision and recognition of traffic event must be computed with very low latency (to improve security) and low power (to accommodate the power limited environment in a car, such as power budget and heat dissipation).

Substantial impact on innovation capacity and creation of market opportunities is expected under the ULPEC project: four enterprises (two SMEs) participate to the project.
The ULPEC project is an opportunity for European companies such as TSST to increase the competitiveness and increase the global market share in manufacturing tools for complex oxide thin film synthesis.
Besides, a compact, low-power vision system based on the technology intended to be developed in this project would generate a distinct competitive advantage over conventional solutions and would clearly boost Chronocam market potential.
ULPEC is also an opportunity for SMEs to develop stronger collaboration with the industrial leaders involved in the project, such as IBM and Bosch.

Expected outcomes

The goal of ULPEC is to demonstrate a microsystem that is natively brain-inspired, connecting an event-based camera to a dedicated Spiking Neural Network enabled by memristive synapses. This high-speed, ultra-low power consumption asynchronous visual data processing system will then manipulate the sensor output end-to-end without changing its nature.

ULPEC targets TRL4, as required by the ICT-03-2016 call, thanks to the functional realization of embedded smart event-based camera. The system demonstrator aims to prove that the underlying technology is viable and can be used for traffic road events and other applications. Such a level of integration has never been demonstrated so far, and no commercial equivalent exists on the market.

The target use case for ULPEC technologies is the vision and recognition of traffic event (signs, obstacles like other cars, persons, etc.) which is part of the major disruption of autonomous and computer assisted driving in the transport and car manufacturing sector.

Beyond transportation, our long-term vision encompasses all advanced vision applications with ultra-low power requirements and ultra-low latency, as well as for data processing in hardware native neural network.