



ICT-56-2020 - Next Generation Internet of Things

# Open Call announcement: Next-generation AIoT applications – VEDLIoT-Open



The VEDLIoT project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957197.

Project acronym: VEDLIoT

Project grant agreement number: 957197

Project full name: Very Efficient Deep Learning in IoT

Project VEDLIoT, co-funded from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No. 957197, foresees as an eligible activity the provision of financial support to third parties, as a means to achieve its own objectives.

For this Open Call, the types of activities to perform that qualify for receiving financial support are the next generation of AIoT applications in areas such as wearables, transportation, agriculture, homes, health, energy, and manufacturing.

Call identifier: VEDLIoT - Open

Call title: Next-generation AIoT applications – VEDLIoT-Open

Publication date: 01/03/2022

Deadline: 08/05/2022 at 23:59h CET.

Indicative budget for the call: 840.000 €

Expected duration of participation: 9 to 12 months

Maximum amount of financial support for each third party: up to 120,000 € (including 25 % indirect costs, at a funding/reimbursement rate of 70 %)

Language in which proposal must be submitted: English

Official project site: <https://vedliot.eu/use-cases/open-call/>



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## 1 Executive Summary

VEDLIoT is an EU H2020 ICT-56-2020 funded research project running for 36 months, driven by challenging use cases in key sectors like automotive, automation, and smart home. This open call for cascaded funding is foreseen to explore new opportunities by extending the application of the VEDLIoT platform to a more extensive set of new and relevant use cases. It is expected that open call projects leverage VEDLIoT technologies for their own AI-related IoT use case, thereby broaden the VEDLIoT use-case basis and help making the overall concept more robust.

## 2 Next-generation AIoT applications – VEDLIoT-Open

This call will launch on 1st of March 2022 and will have a deadline on 8th of May 2022 at 23:59 CET.

Applications must be submitted in one pdf file via e-mail to [opencall@vedliot.eu](mailto:opencall@vedliot.eu) or [vedliot-open-submission@vedliot.eu](mailto:vedliot-open-submission@vedliot.eu).

### Expected Impact

The main objective of VEDLIoT is to develop the next generation of connected IoT devices utilising distributed deep learning. We expect to fund around ten research experiments incorporating additional use cases in the project utilising the developed technologies. This novel, application-driven approach to cascaded funding enables delivering solutions that are close to the market readiness for both the VEDLIoT technology and the particular third-party application.

### 2.1 Open Call timeline



### 2.2 What type of projects are we looking for?

Proposals should be focussed on next generation of IoT applications in areas such as automation, manufacturing, transportation, automomotive, wearables, agriculture, homes, health, or energy.

Furthermore, these proposals should address **specific technology challenges** related with one or more of the following application domains:

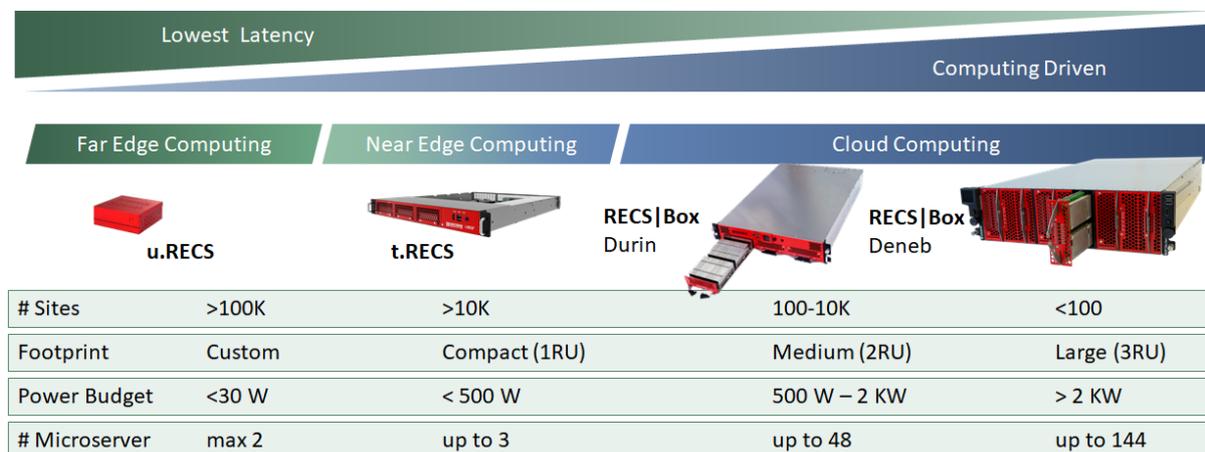
- Machine learning
- Artificial Intelligence of Things
- Hardware acceleration
- Heterogenous computing
- Near and far edge computing
- Reconfigurable computing and run-time reconfiguration
- Energy and Resource-efficient system architectures
- Security and Privacy for IoT and Edge computing
- Federated learning



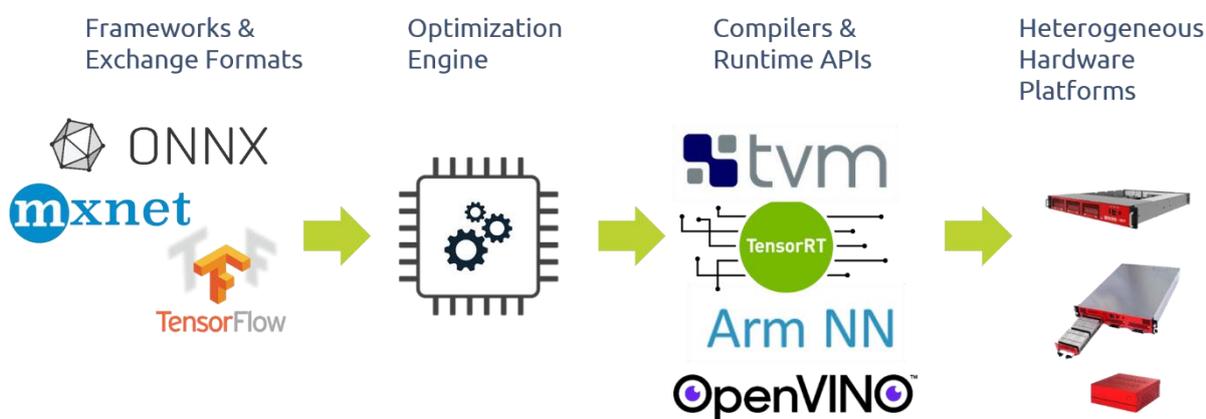
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## 2.3 Usage of the VEDLIoT platform and toolchain

VEDLIoT aims to provide a **modular, scalable hardware platform** for the next generation of AIoT devices (Artificial Intelligence of Things), covering the full spectrum from the cloud via near edge to far edge or embedded applications. Based on a modular approach, the platform provides a flexible and scalable architecture that supports the full spectrum of heterogeneous processing technology and supports regular CPU technology based on x86, ARM, RISC-V, and specialized accelerator ASICs.



The **VEDLIoT toolchain** addresses the task of interfacing AI software to hardware in a comprehensive fashion leveraging and building on existing open source components.



Using VEDLIoTs **security mechanisms** like the Secure IoT Gateway, an easy to configure network security and VPN solution, and further CPUs built-in security features can enhance the security trustworthiness and safety of applications massively.

VEDLIoT is driven by the challenging project use cases in the key sectors of automotive, industry, and smart home. In addition, the projects selected in the open call will explore additional, new opportunities by extending the application of the VEDLIoT infrastructure - **VEDLIoT toolchain, security mechanisms** and the **cognitive IoT hardware platform** - to a larger set of relevant and new use cases.



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**Selected projects will be supported by technical VEDLIoT mentors, who will help to extend the application of the VEDLIoT platform to a more extensive set of new and relevant use cases.**

## 2.4 VEDLIoT Use Cases

The original VEDLIoT project use-cases were defined to demonstrate the effectiveness of the VEDLIoT toolchain and hardware platform with respect to resource efficiency, robustness, safety and security in the domains industrial IoT, automotive, and smart home.

They are described here as examples for the already wide range of ambitious requirements, that will be extended by the selected Open Call projects.

### 2.4.1 Industrial

Representative for a large variety of industrial applications, VEDLIoT develops and optimizes two different use-cases, covering aspects of Industry 4.0/5.0 topics:

#### **Arc detection in DC distribution cabinets**

- DL-based protection device for energy distribution systems
- Focusing on DC supplies and distribution setups
- Very low latency from first spark till inference, including sensing and preprocessing
- Arc localization for faster fault detection and repair
- Main challenge: Ultra-low false negative error rate for a reliable operation

#### **Electrical motor condition monitoring**

- Battery driven, low power device with DL-based data processing
- Integrated sensing, data processing and communication capabilities
- State estimators for operational, thermal and mechanical conditions
- Robustness against external disturbing events e.g. neighboring drives
- Main challenge: usage of up to three DL models with a ultra-low energy budget

### 2.4.2 Automotive

This use-case focuses on increasing the processing efficiency DL tasks over the resources that are present in the traffic environment. This will be achieved through distribution of the processing tasks over resources such as the ego vehicle, cellular base station(s) in the close proximity, as well as the cloud.

The key research areas are:

- Distributed processing including vehicle, base station and cloud
- Ensuring safety of the function, security and robustness of the distributed system
- AEB Vehicle to Pedestrian Use Case
- Increased performance using cellular base station processing resources

### 2.4.3 Smart Home

The **Smart Mirror** serves as a demonstrator for the class of smart home applications. It serves as interface between residents and the smart environment and is constructed of a combination of a mirror and a display. It visualizes personalized information (e.g., news or the status of the smart home environment) and features face, object, gesture and speech recognition.



Goals within VEDLIoT:

- Virtual mirror image using 3D point clouds
- Optimizing commonly used DNN models like Yolo
- Utilizing embedded edge computing for resource efficiency (t.RECS)
- Combining GPU, CPU and FPGA computation
- Porting of individual parts (e.g. speech recognition as voice assistant) on minimal specialized embedded hardware ( $\mu$ .RECS)

## 2.5 Who can apply?

Applicants can be **small consortiums** or **single participants** (legal persons e.g Universities, Research Institutes, SMEs, startups or bigger companies) with proven experience in AIoT application areas such as wearables, transportation, agriculture, smart homes, health, energy and manufacturing.

Legal persons must have a registered office in one of the eligible countries. Financial support will be provided to legal entities with a permanent Participant Identification Code (can be a provisional one at the moment of proposal submission).

Eligible countries are:

- The Member States of the European Union
- Associated Countries according to the H2020 rules<sup>1</sup>

### **Administrative (and other) criteria are as follows:**

- Proposals must be written in English in all their parts in order to be eligible.
- The applicants must base their proposals on original work and, going forward, any foreseen developments should be free from third party rights, or they are clearly stated in a specific section (Previous IP background – see Section 7 of the Proposal Template).
- Applicants are not allowed to submit multiple applications. If that is the case, only the first submitted application will be considered. However, submitting refined versions of one application is allowed.
- No entity with economic interest, family or emotional ties or any other shared interest ('conflict of interest') towards VEDLIoT consortium partners will be accepted as candidates for funding.
- All cases of conflict of interest will be assessed case-by-case, based on pertinent EU stipulations.
- Incomplete proposals will not be evaluated.

## 2.6 What's in for selected applicants?

VEDLIoT-Open provides monetary support to selected project, as well as in-kind contribution in terms of access to the VEDLIoT platform and toolchain and guidance in how to apply this to the specific case.

### **Monetary support**

- A maximum budget 120.000 € per project can be requested
- The budget typically includes 25% overhead / indirect costs

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<sup>1</sup> [https://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-a-countries-rules\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-a-countries-rules_en.pdf)

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- The funding / reimbursement rate is 70 %

**Additional support**

- Support and guidance for the selected OpenCall project
- Access to the VEDLIoT platform and toolchain
- VEDLIoT hardware loan for appropriate projects

