Distributed Artificial Intelligent Systems – DAIS

A pan-European project bringing faster, more secure and energy efficient data processing solutions through the development of edge AI software and hardware components.

With the revolutionary change brought on by the **Internet of Things (IoT)** and the rapid increase of data from more and more ubiquitous connected devices the vulnerabilities in the system have been brought to the forefront. How can we collect and process the ever-growing amount of data while also addressing the challenges regarding privacy, speed and energy efficiency? And how can Europe take the lead in a domain which is already predominated by America and Asia? These are some of the questions which the project **Distributed Artificial Intelligent Systems (DAIS)** is looking to answer.

DAIS is a pan-European effort spanning three years with a total budget of **€33 million** and a consortium of **47** partners from **11** countries. Coordinated by **RISE, research institute of Sweden**, the project will strengthen Europe's position by putting European values at the core of the **Electronic Components and Systems (ECS)** that will shape a new era by self-organization, privacy by design, low use of energy and delivering the technology needed to protect these values.

AI at the edge – prerequisites for DAIS

The new paradigm of **Edge Computing** provides new solutions by bringing resources closer to the user, keeps sensitive & private data on device, and provides low latency, energy efficiency, and scalability compared to cloud services while also reducing the network bandwidth. At the same time there is an increasing need to use **Artificial Intelligence (AI)** at the edge. The bringing together of these innovations and the subsequent migration of the AI functions from the cloud to the edge will serve as the next step in the evolution where the DAIS project will be a major contributor. In the future **Edge Intelligence** scenario, advanced AI and machine learning algorithms will be optimized to run on the edge capable of dealing features like video frames, natural speech information, and unstructured data generated by cameras, microphones, and other sensors without uploading data to the cloud and waiting for the response.

DAIS objective – Competitiveness for a strong European Industry

DAIS has ambitious objective to develop **intelligent** and **secure Edge** solutions for **industrial applications** for European industry throughout the whole Supply Chain. More precisely DAIS aims at:

- Providing **intelligent processing** of data and communication locally **at the edge** to enable real-time and safety-critical industrial applications.
- Developing industrial-grade **secure, safe** and **reliable** HW and SW solutions that can cope with cyberattacks and difficult network conditions.
- Providing **AI techniques on the edge** that match with diverse computing powers contrary to relatively consistent computing power on the cloud.
- **Distributing and dividing the complex AI operations between the cloud and edge**, with edge undertaking early intelligent data processing reducing the bandwidth of data being transmitted to cloud; and building the infrastructure (including hardware and software) to provide for this in Europe.

- Providing data sharing and collaborating solutions on the edge to handle the temporal-spatial diversity of edge data.
- Developing solutions for **IoT**, i.e., mostly wireless devices with energy- and processing-constraints, for heterogeneous and hostile/harsh environments.
- Providing re-usable solutions **across industrial domains**.
- Using a methodological approach with the **Integral Supply Chain**, from academic, to system designers and integrators, to component providers, applications and services developers & providers and end users.

Overall DAIS concept

In order to achieve and validate the stated impact, the DAIS consortium has defined so-called supply chains (SC). Each supply chain addresses a specific DAIS objective, and its results are used as input to other supply chains and project activities. **DAIS** defines two types of supply chains:

- **The enabling technology supply chains** (SC 1-5) **develop** the fundamental core software and hardware technology elements (such as components, systems and architectures) required by other supply chains (6-8).

- **The application supply chains** (SC 6-8) will **apply** and **validate** the results achieved in the enabling technology supply chains. The advancements achieved during the DAIS project will be showcased by dedicated demonstrators of the supply chains 6-8.

Every effort and activity of a specific partner in a supply chain is mapped into work packages, starting with requirements and ending with validation and test. The matrix structure supports the effective and efficient collaboration between the partners in a focused manner.

Statement by Dr. Ali Balador, DAIS coordinator

DAIS is a huge step forward in the area of artificial intelligence and edge computing. While Artificial Intelligence is getting the momentum up, Cloud Computing has a key role for this evolution. This approach is however challenging because Cloud-based AI systems run their core AI algorithm at a data center. While it works to continuously transfer information between devices and data centers, but inherently involves latency and security problems for the integration of a robust artificial intelligence system. DAIS aims at providing edge computing architecture, including both hardware and software for industrial applications. With the support of Europe's industry, Europe's leading Research Organizations, the European Union via the ECSEL Joint Undertaking and the participating national funding agencies such as Vinnova in Sweden, it is possible to bring together European and International key players to the benefit of Europe’s economy and society.

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To learn more about DAIS visit our website:

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RISE, research institute of Sweden

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DAIS has received funding from the ECSEL Joint Undertaking (JU) under grant agreement No 101007273. The JU receives support from the European Union's Horizon 2020 research and innovation programme and Sweden, Netherlands, Germany, Spain, Denmark, Norway, Portugal, Belgium, Slovenia, Czech Republic, Turkey.

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