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MICROELECTRONICDESIGN GMBH



AI Powered Digital Twin for Lighting Infrastructure in the Context of Front-End Industry 4.0

In all lighting sectors, warranty and customisation are becoming key product differentiators. In addition to that, the integration of more electronics and sensors in lighting systems will change what we call lighting today.

While the concepts of digitalisation and Industry 4.0 are progressing fast into the manufacturing world, in the lighting industry, the front-end product design is still using traditional simulation techniques and the back-end struggles to use all the data generated by sensors. An innovative approach is to couple digital twins with Artificial Intelligence to offer unlimited possibilities to the “first build and then tweak” approach.

The main goal of AI-TWILIGHT is to merge the virtual and physical worlds to pave the way for innovations in fields where the European lighting industry is likely to be competitive. Self-learning digital twins of lighting systems (LED source, driver of a lighting application) will be created and used as input for predicting performance and lifetime of product and infrastructure design and management in an autonomous world. Tests will be carried out in selected application domains, e.g. automotive, horticulture, general and street-lighting.

The key technical and exploitation objectives of the AI-TWILIGHT consortium are:

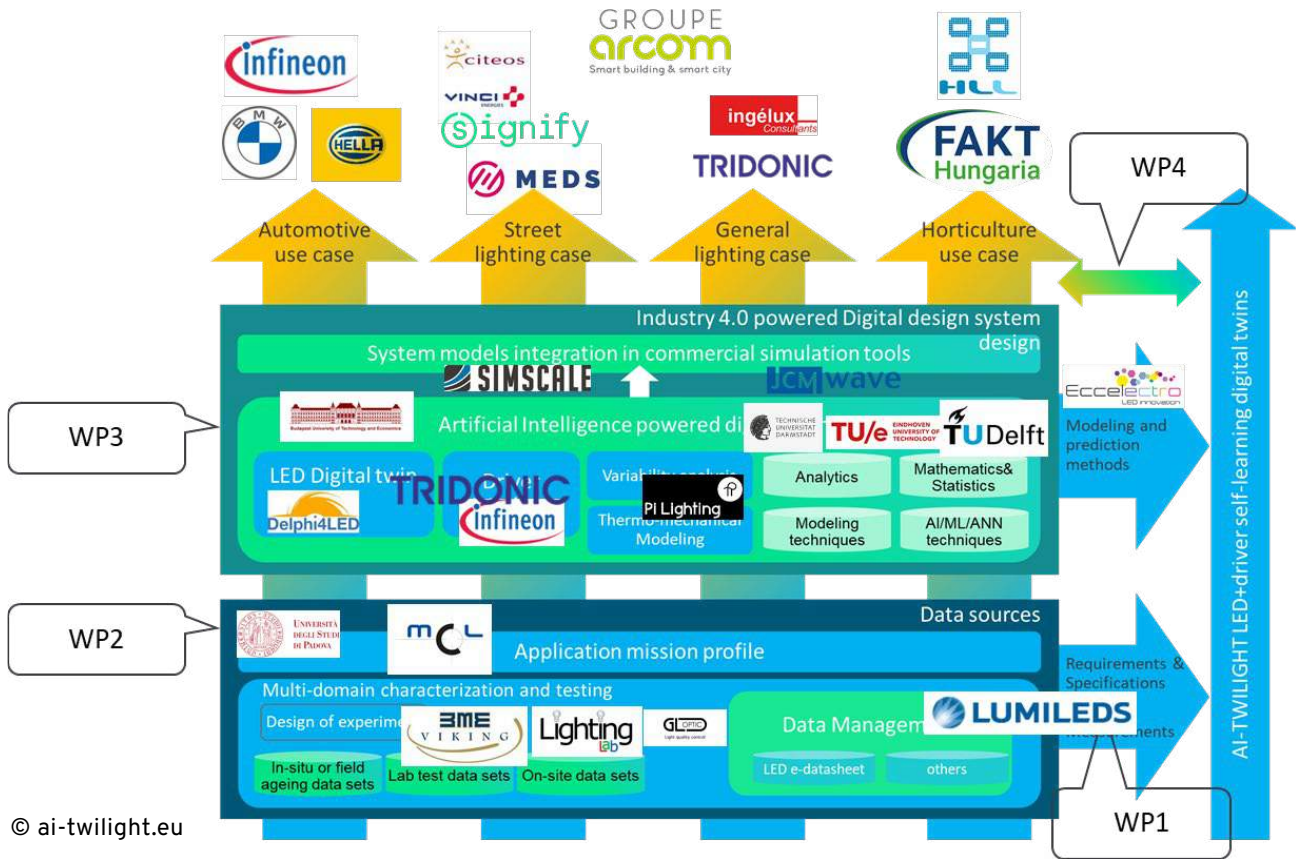
- ✓ To create digital twins of LED light-sources and electronics (driver)

- ✓ To create self-learning models using AI and analytics techniques
- ✓ To facilitate the implementation of the digital twins in digitalized design flow (for SSL product design) and facilitate their applications upstream, up to digital twins of lighting systems of large infrastructures (e.g. for building design).
- ✓ To implement the AI-TWILIGHT methods, models and tools within consortium partners to harvest its benefits

When translated to business goals, objectives will result in the introduction of more customised and connected products by 20% while reducing the time to market by 30%, and reducing by 25% the total cost of ownership of an AI-TWILIGHT powered system.

Austrian Consortium

The Austrian consortium consists of 2 industrial partners (TRIDONIC, MEDS) and 1 research institution (MCL). Tridonic is a leading global provider of lighting technology and supports its customers with intelligent hardware and software. As part of the project, Tridonic will develop predictive compact models that take electrical, thermal and optical properties of LED systems into account. MEDS, as an SME and as a specialist for customer-specific solutions in the electronics industry, offers hardware and software development for analog



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and digital switches as well as programmable logic development. MEDS will develop a sensor concept that can be used in field tests for LED applications to assess the reliability of LED applications. This is done in collaboration with MCL. MCL will use its extensive know-how in the areas of root cause analysis for failure and thermal management. In the project, MCL combines materials research with condition monitoring, lifecycle modeling and advanced process control for electronic systems. The said cooperation actions will establish activities as regional and European Digital Innovation Hub.

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