HARDWARIO

Industrial IoT Kits for Active STEM Education

HARDWARIO brings engaging active STEM education based on real IoT projects

Education in crisis, economy in crisis

Traditional education systems and pedagogies have, historically-speaking, been based upon passive, receptive learning, where educators depend upon the didactic method and direct instruction. The limitations of this passive approach have been exposed by the rapid technological advances of this century, particularly the internet, meaning that it is increasingly difficult to teach subjects in isolation: the classic teacher-textbook-test model simply cannot keep up with exponential information flows. With more and more everyday applications for the technology, learners need to be able to actively experiment with and apply new devices. Otherwise, we will not just an education system in crisis but also an economy in crisis, due to the accelerating skills-deficit in STEM-related professions.

STEM to the fore in education

Numerous studies have been conducted on the need and benefits of teaching via the STEM approach. The results unambiguously favour this educational concept, whereby science, technology, engineering and mathematics are taught together to solve real problems. The importance of the STEM concept is demonstrated by the gradual development and implementation of national STEM education strategies. Many countries, led by the most advanced, are implementing their STEM strategies to maintain their competitiveness in a dynamically developing world of technology.

It is also undisputed that the best way to learn STEM is active learning. In this way, students are actively involved in solving a real problem. They read, write, experiment and discuss. They perform analysis, synthesis and evaluation. They do things and think about what they do, metacognitively. In active learning lessons, the question is always what problems should students solve and what tools they should use. To this end, HARDWARIO provides a unique system of active STEM learning in which students work on IoT projects.

IoT as a concrete context for active STEM learning

IoT is one of today's growing phenomena. The advent of new technologies makes it possible to connect almost any physical device to the Internet, thus creating the possibility to control such a device and work with its data remotely. IoT is a multidisciplinary field in which not only STEM knowledge is applied, but also other fields such as economics and geography. This characteristic of IoT addresses one of the basic requirements of STEM learning, namely that the selected problems should be solved in a holistic fashion. Working on real IoT projects generates excellent content for active lessons, thus their attractiveness for students is enhanced by meaningful use of personal digital devices.

HARDWARIO‘s active learning pedagogy

In cooperation with pedagogical experts from EDvisor Finland, HARDWARIO offers detailed STEM lessons using its research-based REALISE-EXPERIMENT-APPLY- REFLECT pedagogical framework.

Our pedagogical framework greatly facilitates the preparation, management and assessment of lesson content by constantly focusing upon its learning goals. The essential driver of HARDWARIO’s active STEM lessons is our ‘Plug & Make’ IoT Kit, with which students can easily build IoT equipment for their projects.

An equally important element of the HARDWARIO system is the technical and professional support of teachers in the form of detailed instructions, webinars, seminars and online chat. Active STEM learning with HARDWARIO is designed for students over 12 years of age, especially high school students. However, it is also used in corporate education.