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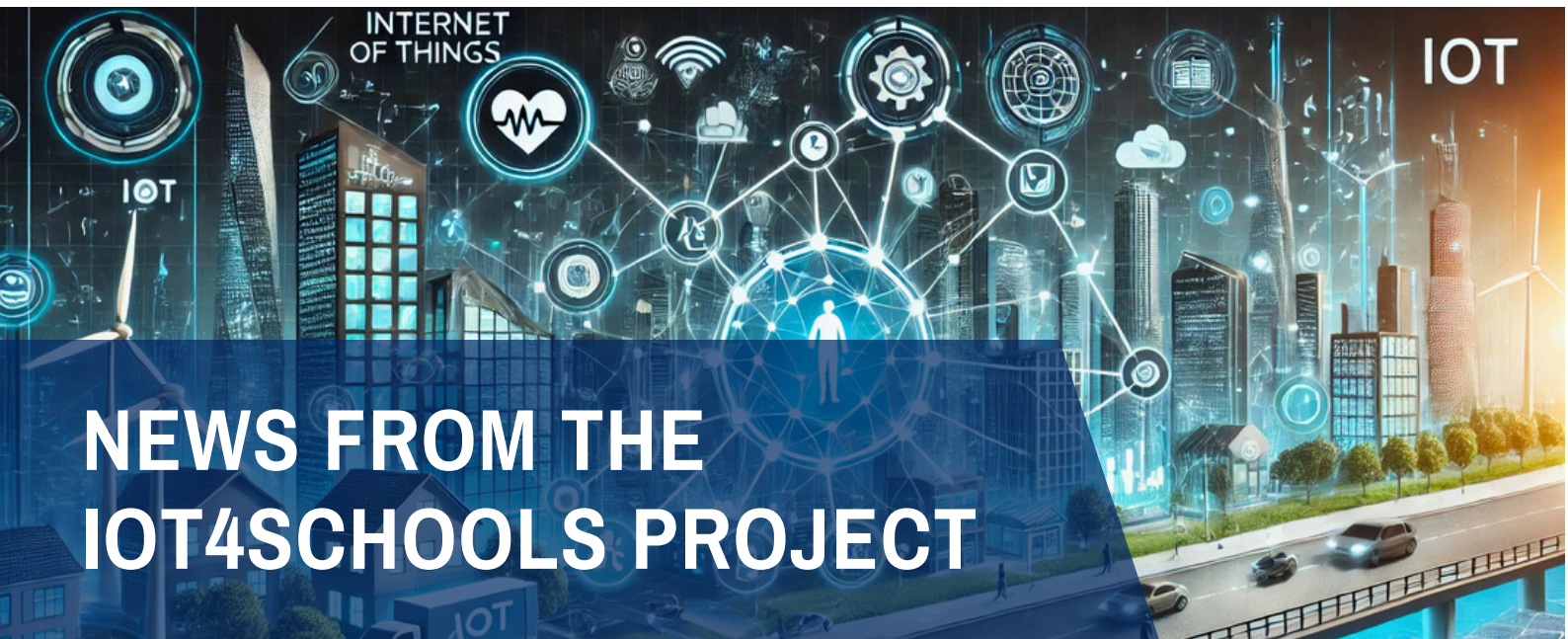JANUARY 2025

NEWSLETTER

NEWS FROM THE IOT4SCHOOLS PROJECT

Great news for the IoT4Schools Erasmus+ project. In the last few months the two technical guides for BBC micro:bit and Raspberry Pi Pico have been released.

Technical guide for BBC Micro:bit

The objective of technical guide for BBC Micro:bit is to assist educators and students in becoming familiar with the BBC micro:bit microcontroller in terms of both operational and programming aspects, as well as through the lens of the Internet of Things (IoT).

In order to achieve this objective, the guide includes a description of the board, its built-in sensors and actuators and a comprehensive overview of the official programming environment, namely the Microsoft Makecode software, with a particular focus on its block-based version.

Furthermore, instructions are provided on how to utilize the integrated Bluetooth radio antenna, accompanied by indicative examples of its implementation, thus inspiring readers on how the micro:bit can be effectively employed in the development of IoT projects.

The technical guide is available here.

Technical guide for Raspberry Pi Pico

The Raspberry Pi Pico W board, which can be utilized in Internet of Things projects, is introduced in this guide. The development of digitalization shows that we are increasingly using smart solutions that improve our quality of life and allow us to save resources like electricity or water. In our modern world, it is crucial to become familiar with the topic of IoT.

One of the boards that allows you to enter the world of IoT technology is the **Raspberry Pi Pico W**, which is compact, easy to use and cheap. Hence, this guide focuses on presenting the Raspberry Pi Pico W board and the microPython language used to program it. The guide is dedicated to pupils, students, teachers, educators and hobbyists who have not previously dealt with the Raspberry Pi Pico W board and is available here.
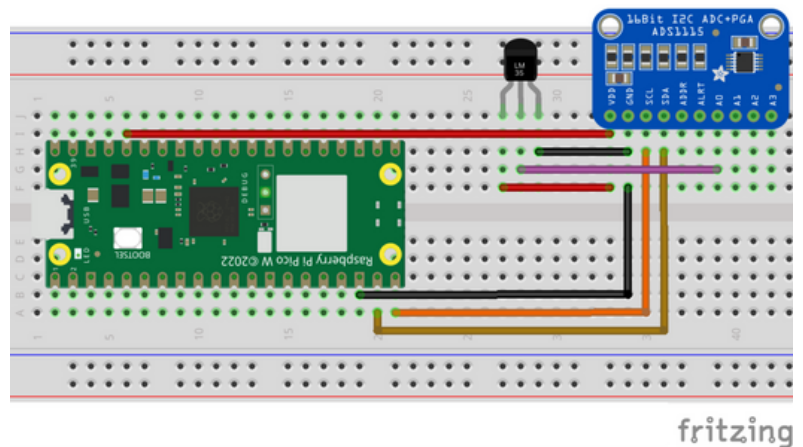
The first 2 IoT projects for schools are here!

The IoT4schools project is developing 6 interdisciplinary IoT projects to be implemented as part of classes in schools. These projects cover areas such as: health monitoring, environmental protection, smart cities and home automation. We have currently developed two projects:
- "Fitness tracker: creation of a pedometer" is based on the BBC Micro:bit board using the MakeCode block-based programming environment - designed for ages 12-15.
- "Smart waste bins: how to improve waste management in smart cities?" is based on the Raspberry Pi Pico W board using the MicroPython programming language - targeted at ages 15-18.

Fitness tracker: creation of a pedometer

The aim of this project is to introduce students to the concept of IoT in the context of health monitoring and through the lens of physical activity. They will learn how to create their own pedometer (i.e., a fitness tracker device that detects vertical movement and measures the number of steps, thereby providing an approximation of the distance covered), and how to develop an application that receives data from the pedometer and displays it in real time.
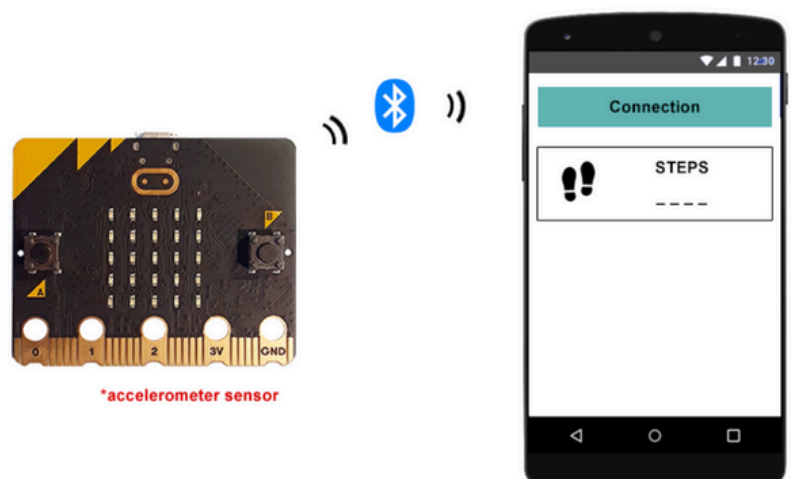
Specifically, using the BBC micro:bit microcontroller and the built-in accelerometer sensor, students will learn how to create and program their own pedometer that can monitor physical activity by counting steps and distance covered. Using the MIT App Inventor software, they will also learn how to design and program the application to receive and display the counted steps. The data will be transmitted via Bluetooth.

Educational materials for the project are available here: https://www.iot.fizyka.pw.edu.pl/results/

Smart waste bins: how to improve waste management in smart cities?

This project aims to introduce students to the IoT technology in the context of smart cities. For several years, the concept of smart cities has been developed, in which IoT solutions are and will be used to improve living conditions and help minimize cities' negative impact on the environment.

One of the important problems of modern cities is garbage collection. Currently, most cities collect garbage on a set schedule, driving past all properties regardless of the level of filling of the bins. The system is similar to bins that stand along the sidewalks and are used by passers-by to throw away garbage. Such a system is inefficient and causes significant fuel consumption.

The project aims to show how to create an intelligent waste bin using a Raspberry Pi Pico board and an ultrasonic distance sensor to measure the bin's filling level. The bin's filling level will be sent to the cloud to help optimize the garbage truck's route and thus minimize the carbon footprint. Such solutions are already slowly being introduced in some cities, e.g. in Antwerp (see the photo next to it).

Educational materials for the project are available here: https://www.iot.fizyka.pw.edu.pl/results/.
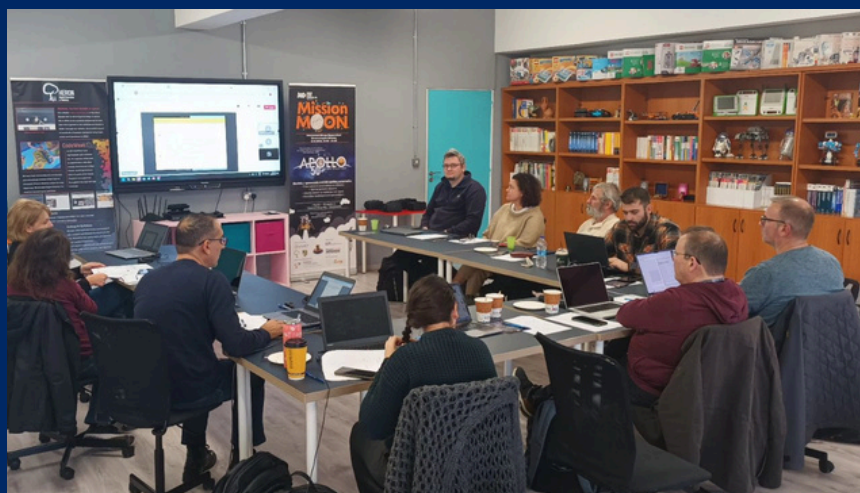
Meeting in Nicosia

On December 3-4, 2024, a meeting was held at Heron, Digital Education & Mathisis (Nicosia, Cyprus), during which we prepared a training plan for teachers from the first two interdisciplinary IoT projects. In the near future, we will organize training in Poland, Greece, Cyprus and the Netherlands. Follow our social media to learn more and sign up for training!

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ON SOCIAL MEDIA!