



Internet Society
Armenia Chapter

Accessibility-related activities



The overall project goal was to train IoT-educated groups of teenagers in 5 major Armenia cities, who will be able to implement IoT projects in the local communities.

Experienced coaches were interviewed and chosen, helping the groups during IoT classes. The classes were provided qualified trainers. The announcement about the courses was widely advertised and groups were formed. They included teenagers with impairments.

In total 82 adolescents were trained. Among them 12 adolescents with the following impairments:

Visual impairment - 1

Locomotor function disorder - 2

Musculoskeletal disorder - 2

Hearing and musculoskeletal disorders - 2

Central nervous system disorder - 2

Problems of musculoskeletal system development - 2

Infantile cerebral palsy – 1

Each group was supplied with the IoT equipment.

The areas of the IoT, in which the participants were trained, were the following:

Smart home

Lighting control

Voice assistants

Smart city

Agriculture

Trade

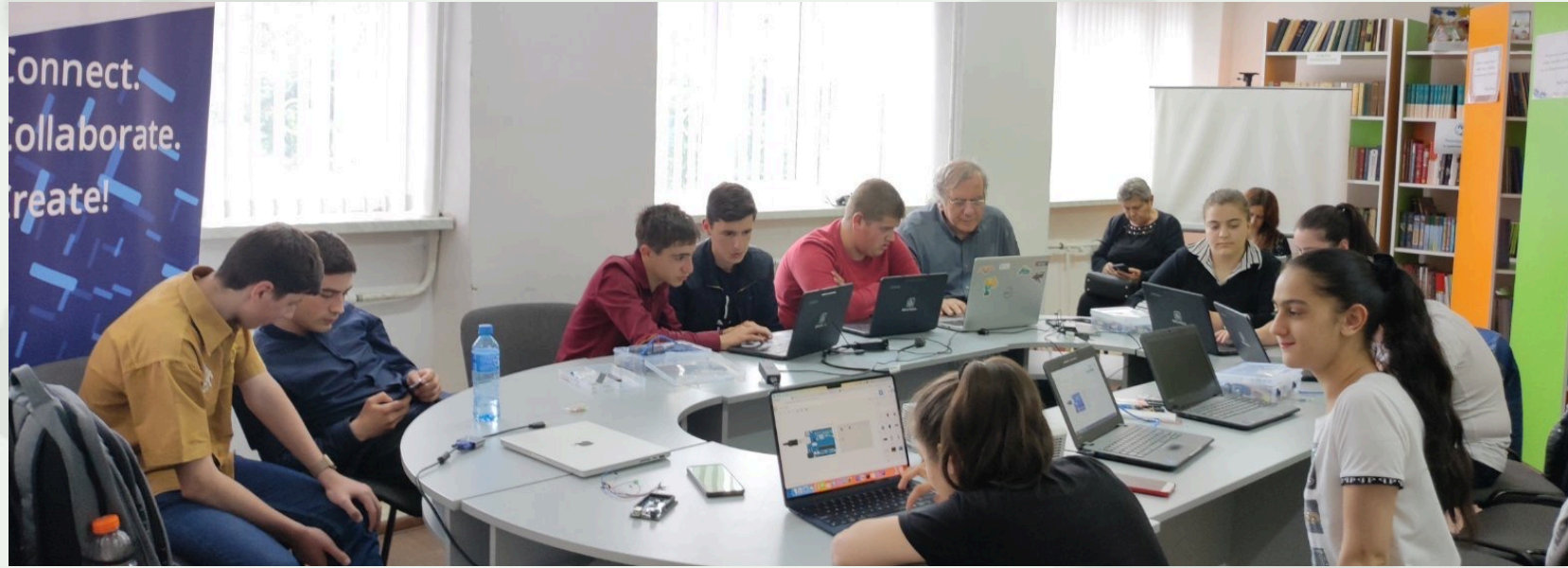
Power supply

Healthcare

During practical courses, participants worked directly on physical boards such as Arduino Uno, ESP8266 and ESP32, sensors and actuators. In addition, online tool (Tinkercad) was widely used. Tinkercad is a web app for 3D design, electronics, and coding, which is the ideal introduction to the circuit technology that permits to emulate the circuit design. It made the study easier and more comprehensible.



Through the platform, participants were also given individual homework, and each participant's work is further discussed in detail in online classes. This methodology allowed strengthening participants' knowledge. Students' tasks completed with the Thinkercad emulator were presented to trainers for approval.





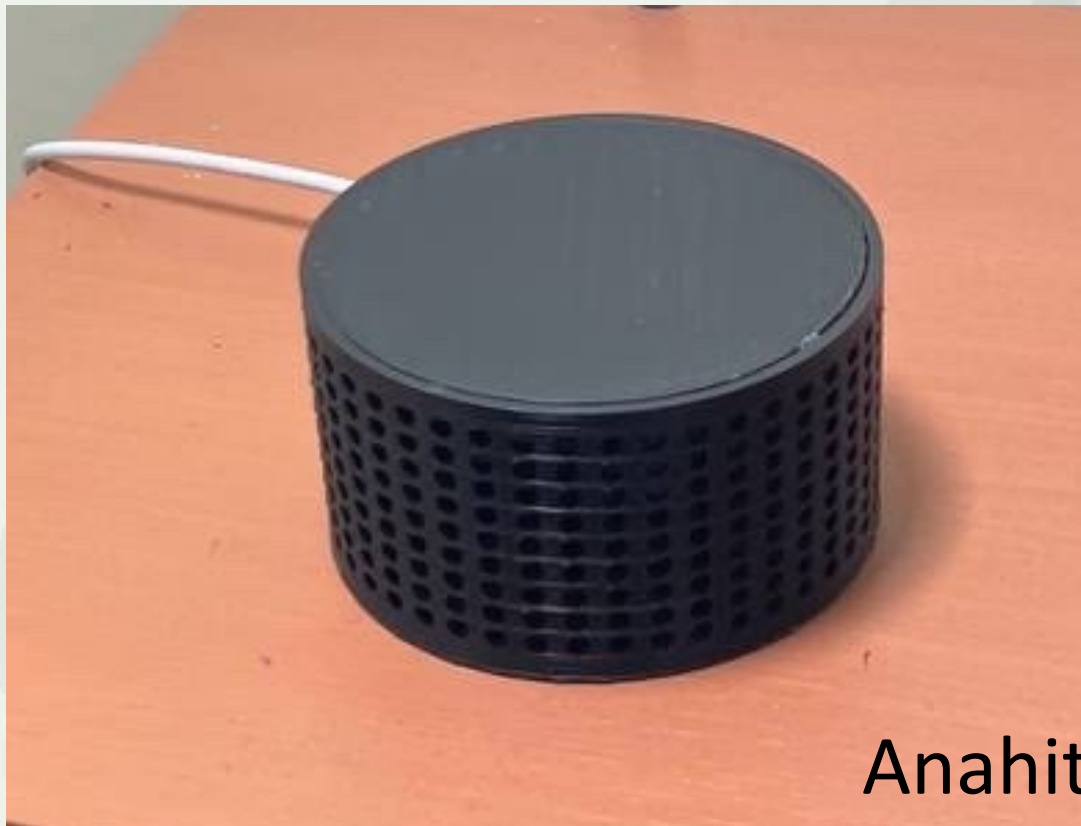
We conducted a study of IoT solutions that can be offered for people with disabilities. As a result of the study, we concluded that IoT solutions with voice control can be most applicable and useful for blind and visually impaired people, as well as people with limited mobility.



Today, that kind of solution is widely used in the world and many companies have developed solutions allowing to control smart home or office equipment by voice. Nowadays, voice recognition technologies have been developed only for the most popular languages of the world. However, there were no such solutions in Armenian yet. We oriented the groups to work on the development of a voice assistant in Armenian based on Raspberry PI4 microcomputers.



Commands in Armenian were developed and offered a solution to the problem with limited words or phrases, which will help people with vision or mobility problems to control their home and office equipment (lighting, heating, doors, shutters, water, etc.). The work was done in collaboration with the House of Culture of Blinds and Visually Impaired People (HCBVIP). The list of voice commands sufficient to control the smart equipment was defined and developed.



The first prototype of the Armenian-language voice assistant was developed with the involvement of the participants of the project. It was developed using the latest technologies and solutions in voice recognition and machine learning. The voice assistant "Anahit" is built based on a Raspberry 4PI microcomputer, to which a microphone hub, a speaker and a sound amplifier are attached. A 3D model was developed to give all devices a complete equipment look. With the 3D printer an equipment case was prepared, where the above-mentioned devices was placed.

Currently, "Anahit" can control various smart devices. A web application has been developed that allows these operations to be carried out through user-friendly and understandable tools. Now the improvement works of "Anahit" are being carried out aimed at better recognition of voice at a distance and more accurate understanding of voice commands.

The improvement works of "Anahit" will be continuous. In addition to the web application, a mobile application will also be created that will allow to add smart equipment controlled by a voice assistant.

Electricity and water shut-off valves, controlled by the Anahit voice assistant, were installed in the HCBVIP







Thank you!