We are the makers – Directional indicator system for bicyclists

Activity elaborated by WeMakers Romania team

Scenario

Alex is an 11 years old child. He loves to ride his bike and he prefers to go to school and come back home by bike. Alex is in 5th grade and he has afternoon classes. During winter, when he finishes the classes and returns home from school it is already dark outside. Not always the drivers notice his arms pointing in the direction he needs to go.

Let's help Alex by creating a wearable device for him which displays a lighting flashing arrow which points the direction!

1. Title of the Scenario	**Directional indicator system for bicyclists**
2. Target group	Depending on the students experience with physical devices coding and 3d printing - 10 - 18 years
3. Duration	About 3-4 lessons (of 50 min each)
4. Learning needs which are covered through the exercise	- Understanding the importance of respecting the traffic rules - Understanding how two devices may communicate one with each other - Understanding basic aspects of 3D printing (for beginners) - Designing 3D parts to be used with programable devices
5. Expected learning outcomes	- Building a system of interconnected devices - Printing 3D objects - Combine programable devices with 3D printed objects in order to create a useful interactive object
6. Methodologies	- Project based learning - Inquiry based learning - Cooperative learning - Heuristic conversation
7. Place / Environment	Room with computers and 3D printers
8. Tools / Materials / Resources	- computers with 3D modelling software and MakeCode for micro:bit (variant - online versions – https://www.tinkercad.com/ and https://makecode.microbit.org/) - micro:bit chips (one for each student) with accessories (batteries and USB cable) - tutorial 1 from O3 - other materials presented in tutorial
9. Step by step description of the activity / content	If the teacher aims also to learn students the traffic rules, one lesson may be dedicated to this aspect. **Lesson 1** During the first lesson the students should create the code for the Micro:bit. The students work in pairs. One student will create the code for the micro:bit H and the other for the micro:bit B (see the tutorial). If the students are beginners with MakeCode, they may use the code from tutorial, otherwise, they may try to create their own code. They will try the system and at the end of the lesson they should have a system that work as expected. If the students have previous experience in working with programable devices and IoT, they may try to replace

	one micro:bit with a smartphone and use Bluetooth connection instead of radio connection. **Lesson 2** The second lesson is dedicated to designing/ downloading and 3D printing different cases for micro:bit chips. Depending on their knowledge on 3D modelling, the students will search on Internet for suitable models for micro:bit cases or they will design their own models. They may also download and use the stl files from http://www.wemakers.eu/ website (from here). They will start the printing during the lesson, and they will check the printed objects next day. **Lesson 3** When they have the 3D printed objects, they will try to create the final system, by combining the micro:bit microcontrollers (or micro:bit microcontroller and smartphone) and 3D printed cases. They will make adjustments, if needed, and test the system. In case the students create different systems then the one proposed in the tutorial, they will present it to the class.
10. Feedback	At the end of the activity the teacher will collect students' feedback and discuss about students work and results.
11. Assessment & Evaluation	The teacher will observe the students work during the whole activity, and their collaboration with their pair. Final results evaluation: functionality and creativity