

Physical Computing for Novices: Using the TinkerKit with Snap4Arduino

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Abstract: Physical computing is the development of interactive objects or installations that communicate with their environment through sensors and actuators. With the Arduino TinkerKit and Snap4Arduino this can easily be integrated in schools. Preassembled sensors and actuators and a modification of the Snap visual programming language reduce the complexity of using and programming Arduino. In our workshop, participants will get to know these tools and different approaches to using them in the classroom.

Contents and practical implementation:

Physical computing blends the virtual and the physical world and makes artifacts of learning visible, tangible and shareable. It promotes learning in a creative and practical fashion and perfectly matches with the ideas of constructionism, which has the creation of personally relevant artifacts in its core.

With the Arduino TinkerKit and Snap4Arduino those benefits can easily be integrated in schools. The Arduino TinkerKit is an educational physical computing construction kit with preassembled sensors and actuators that reduces the complexity of using Arduino (Figure 1). It allows for immediate tinkering and trial without the need of elaborated skills in physics or principles of electrical engineering, such as soldering.

Snap4Arduino is a modification of the Snap visual programming language that lets you seamlessly interact with almost all versions of the Arduino electronic prototyping



Figure 1: TinkerKit Sensor Shield and modules

board. With Snap4Arduino in connection with Arduino already at a low age level immediate tinkering and the construction of interactive objects is possible even for novices (Figure 2).



Figure 2: Using the TinkerKit with Snap4Arduino

In this workshop, participants will get to know these tools and different approaches to using them in the classroom. With the example of *My Interactive Garden* [1] they are introduced to an award-winning physical computing teaching concept that was tested and evaluated in different contexts (schools, university, professional development). The aim of a *My Interactive Garden* project is to collaboratively work on an exhibition of a futuristic interactive garden. This way, learners are encouraged to not just copy or rebuild systems, which they already know, but to use their imagination and creativity in order to develop personally relevant interactive objects. Hands-on activities and examples will show the participants, how the provided tools can be used in class in order to inspire students to create meaningful interactive objects.

Resources:

All materials that will be used in the workshop are available online at www.tangible-cs.de and are currently being translated from German to English. Additional material explaining the tools as well as discussion forums can be found at www.arduino.org/tinkerkit and www.snap4arduino.org respectively.

References:

[1] M. Przybylla, R. Romeike: *My Interactive Garden – A Constructionist Approach to Creative Learning with Interactive Installations in Computing Education*. In: Kynigos, C.; Clayson, J. E.; Yiannoutsou, N.: *Constructionism: Theory, Practice and Impact*. Proceedings of Constructionism 2012, Athens, Greece, 395-404.

Short Biography:

Mareen Przybylla is research assistant and PhD candidate at the professorship for Didactics of Computer Science at the University of Potsdam, Germany. Her main research interest is on physical computing in CS education, especially concerning the design of concrete lessons and courses in terms of contents, learning material and methodology and the analysis and evaluation of such. In 2016 she started working at Arduino SRL where she is project manager of the TinkerKit and education.