

UC2 BOX: Modular toolbox for Optics Education and adventurous biologists

Barbora Maršíková, Benedict Diederich, René Richter, Eda Bingöl, Rainer Heintzmann
Leibniz-Institute of Photonic Technology
Albert-Einstein-Str. 9
07745 Jena
Germany
E-mail: marsikova.b@gmail.com

Key words: multimodal imaging, low-budget microscopy, photonic education, 3D-printing, open-source, UC2

The open-source optical toolbox UC2 [YouSeeToo] [1] simplifies the process of building optical setups, by combining 3D-printed cubes, each holding a specific component (e.g. lens, mirror) on a magnetic square-grid baseplate. The use of widely available consumables and 3D printing, together with documentation and software, offers an extremely low-cost and accessible alternative for both education and research areas. In order to reduce the entry barrier, we provide a fully comprehensive toolbox, TheBOX, that serves as an educative tool and comes in two versions. The Simple version, equipped with passive components only, covers the basic experiments of ray optics. The Full version, extended by motorized stages and programmable illumination modes, is completely remote-controllable and can therefore create more advanced setups, like a compound or light sheet microscope, ready to use anywhere by anyone. By continually incorporating user feedback we improve the documentation [2] consisting of detailed instructions, video tutorials and step-by-step guides which is one major key of the usability of TheBOX. By simply exchanging some components, the user can go from a brightfield to a light sheet microscope within a few minutes. This is highly beneficial in the field, where one wants to try several imaging modalities on the same sample and in educational environments where optical concepts can be explained easily. The project is in a work-in-progress state and aims to grow along with an active community of interested researchers, biologists, teachers but also other enthusiastic users and makes microscopy affordable, portable, understandable and generally accessible.

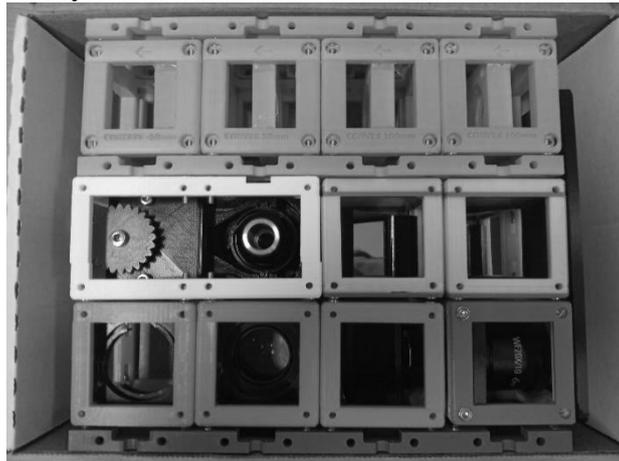


Figure 1: The small UC2 BOX allows for realizing the following experiments: converging and diverging lenses, magnifying glass, telescopes, projector, smartphone microscope.

References:

- [1] UC2 website [Online], 2019 [2019-12-11] Available on: <https://useetoo.org>.
- [2] UC2 GitHub repository [Online], 2019 [2019-12-11] Available on: <https://github.com/bionanoimaging/UC2-GIT>.