3D-design and printing of the 2FA cookie jar

To house all the electronics of the 2FA cookie jar, a case had to be modelled. This was done using the 3D-modelling software Autodesk Fusion. The case had to fulfill a set of requirements as listed in the following:

- Be big enough to store cookies.
- Mount the breadboard in a way that ensures short cable runs and accessibility.
- House the used servo motor in a way minimal force is needed to open the lid of the jar.
- Make the shapes as simple as possible to allow errorless printing and therefore rapid prototyping.
- Parts of the jar should be modular to allow partial printing to minimize reprinting in case of failure.

After implementing a first mockup to get an idea where the design was going and to discuss possible properties with the group, a first 3D-model was created. This first model was then scrapped because some of the previously named requirements arose through discussion of the model. Therefore, a V2 was created that fulfilled all the requirements and was ready to be printed. The printing took place using the facilities of DTU Skylab and the Ultimaker and Prusa printers that are offered there for project use. After some successful printing only the lid was left and turned out to be a miss design. It needed 5 attempts to print, involving two redesigns. When it was time to put everything together, the issue of inaccuracy of the print settings used arose. Therefore, the breadboard holder had to be redesigned and reprinted too. Finally, every piece fitted with each other, fulfilling almost all the requirements of the modelling process. But the initial force needed to open the cookie jar lid was too high. Hence, a longer arm got attached to the servo heightening the efficiency of force translation. Following the approach of rapid prototyping the parts were joined using Loctite and Duct tape, allowing adjustments further on. The final step included putting all the electronics in their designated place following the pin out created during the circuit design process.

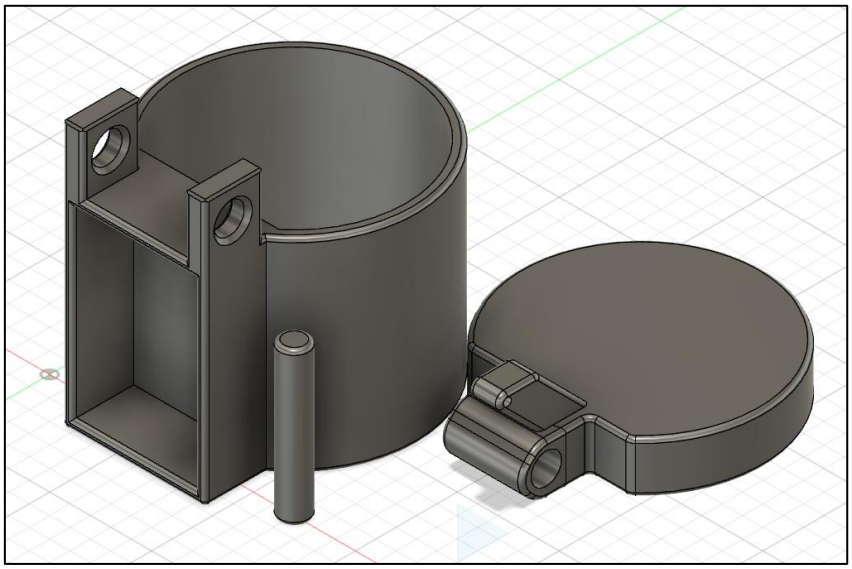

Figure 1: V1 of the 3D-model of the 2FA cookie jar

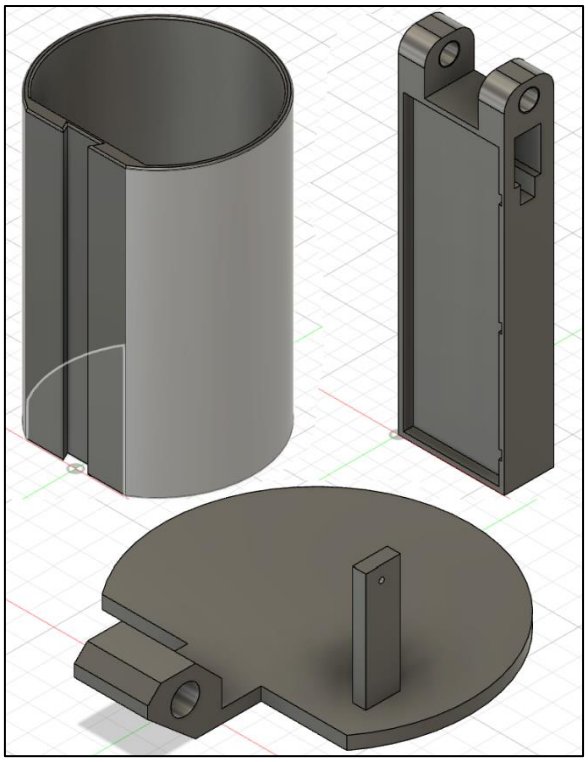

Figure 2: V2 of the 3D-model of the 2FA cookie jar

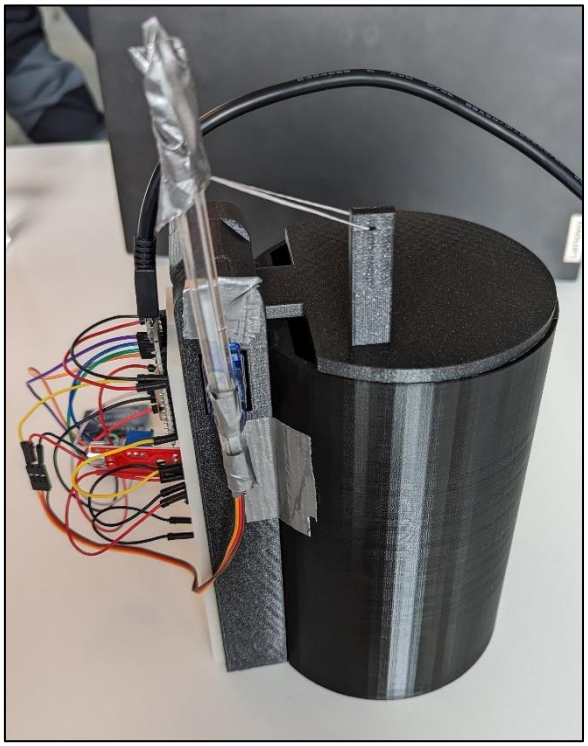

Figure 3: 3D-print of the final model of the 2FA cookie jar including electronics