

MorphIO

Entirely Soft Sensing and Actuation Modules for
Programming Shape Changes through Tangible Interaction

Prototyping is a very crucial step to achieving any project. When it comes to programming, starting from low fidelity prototypes, then moving on to mid fidelity and then to high fidelity prototypes, it is important to prototype with the intention of Human Centered Computing or in other words, Human Centered Interaction (HCI) where you work by keeping your users in mind. These prototypes can start with hand-drawn sketches, digital sketches, mini circuits/programs, mini models and move on to many different iterations.

Prototypes have many stages and it can be quite time consuming. MorphIO is an excellent tool to use for prototyping and programming physical projects due to its efficient framework. It is designed with the concept of programming by demonstration which “is a way of programming behaviors through physical demonstration” (Nakayama et al. 977). In order to use MorphIO, the user is given 8 seconds of recording time to record a particular action by tangibly programming the modules by physically manipulating them by making gestures such as pulling, twisting, turning, stretching etc. Once they are done, the users will be able to playback the recorded behaviour.

What is interesting about MorphIO is that the way to work with it allows the user to test their intentions themselves which enables them to actively keep in mind of the end user. The tangible and manipulative affordances allows our experience in creation to be more engaging, visual and efficient. In terms of engagement, the MorphIO takes the programmers away from the tiring environment of computer by reducing screen time and enables them to use their hands more actively and intentionally in order to create a behaviour. When it comes to the

visual aspect, the playback feature of the MorphIO allows us to see the consequences of our actions and reinforces the idea of how the actions we make has the power to affect our physical world. MorphIO is very efficient to work with as it eliminates the need to go back and forth much more. For instance, instead of coding first and then seeing the result, then going back to fix what is not right, MorphIO allows us to play with its modules beforehand and keeps track of our actions which allows playback and enables us to make quick and easy adjustments. Its modular structure also allows the users to construct many variations and shapes with no hassle. Lastly, since it is made with soft materials, it gives the users more freedom to shape and create formations.

In the reading, they discussed about several different ways in which MorphIO can be used for and in several different fields. MorphIO can be used on soft toys for storytelling, for rehabilitation, medical purposes as well as locomotion.

"The first step for successful user testing is to create a research plan that includes exactly what assumptions you want to test, the goal of the research, a few basic questions to establish who the test subject is, and the questions you need to ask or the tasks the user needs to accomplish to test the assumptions" (McElroy 41). A study has been done between MorphIO and Arduino in order to see which one is the most effective in terms of number of iterations, the amount of time it takes to complete the task and its expressiveness. Based on the results, the amount of time that it took to complete the task compared to Arduino was much lesser. The difference was drastic in terms of the number of iterations and proved that MorphIO was much more efficient, but the expressiveness does not show a great difference between the MorphIO and Arduino.

Personally, I found MorphIO to be a great tool that I would like to try and use. Based on the interactions that we have on mine and Zahra's final project, it would be interesting to see if we can expand the capabilities of the MorphIO and make it possible to interact with another set of

MorphIO modules. For example, when one user creates a movement with the modules on one device, the other user recieved live feedback of the recorded movement being played back.

Works Cited

- Ryosuke Nakayama*, Ryo Suzuki*, Satoshi Nakamaru, Ryuma Niiyama, Yoshihiro Kawahara, and Yasuaki Kakehi. 2018. MorphIO: Entirely Soft Sensing and Actuation Modules for Programming Shape Changes through Tangible Interaction. *In Proceedings of the 2019 on Designing Interactive Systems Conference (DIS '19)*. ACM, New York, NY, USA, 975-986. DOI: <https://doi.org/10.1145/3322276.3322337>
- McElroy, Kathryn. *Prototyping for Designers: Developing the Best Digital and Physical Products*. 1st ed., O'Reilly Media, 2016.