

LowSoRo

Low Tech and SoftRobotic workshop.

LowSoRo workshops can enable the acquisition of skills related to design, engineering and art.

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In this article, we present a workshop named LowSoRo (LowTech SoftRobotic), organised by art and design researchers Selma Lepart and Nathalie Guimbretière. The creation of this workshop aims firstly to increase the knowledge of the participants around an interdisciplinary project and secondly to allow the identification of the needs and the materials adapted to the creation of self-performing objects. We use the field of human-computer interaction in the particular context of artistic installation. We also wish to build, share and distribute a LowSoRo autonomous experimentation kit, both technical, methodological and conceptual. Though the workshop is fun, creative and educational, participants must be curious, creative, communicative and persistent. We ask for a strong engagement through a specific methodology that pushes them to be critical and self-analytical, which gradually allows us to advance our final goal. It is important for us to value them and their work, because beyond being participants, they are, for a short period of time, project partners.

CCS CONCEPTS • Soft Robotic • Low tech • Art

Additional Keywords and Phrases: low tech, soft robotics, art, design, workshop, experimentation

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1. INTRODUCTION

We have observed that human-machine interaction requires the acquisition of specific working methods, oriented both on precise techniques, but also on a thought of the context linked to this interaction. As artists and designers, we are interested in all forms of interaction with humans, whether it be for questions of behavior, emotion or agentivity (art) or for a thought of the social, political or environmental context (design). We also observe from our researcher's point of view, the necessity to set up a methodology of work and analysis substantially different from that used in the artistic professions in order to be able to make reproducible the experiments in contexts related to the exhibitions. It seems necessary to us to create a tool allowing the acquisition of skills related to design, engineering and art. For this, we have built the LowSoro workshops for creators of all horizons in order to see the emergence of self-performing objects that will be able to raise other questions in the human-machine dichotomy, but in fine, in the broadest sense of the relationship between humans and self-performing objects.

2. WORKSHOP LOWSORO

2.1. Principles and process

Our objective in creating this workshop is to bring participants through experimentations to evolve over a period of time in the universe of artistic and robotic creation. To do this, we propose to develop what we call a self-performing object, by giving them access to construction elements chosen by us beforehand (elastomeric polymers, shape memory springs, pneumatic elements, etc.). These elements are almost all used in the field of research called SoftRobotic from which we are largely inspired. But also from the field of tensegrity found in the Russian art of the 1920s [1] or in the architecture of the 1950s [2] and everything that could be from the lowtech and frugal design fields.

The self-performing object is certainly the goal to be expected, but it is above all the pretext for a methodological organisation that develops in several stages.

After a quick presentation of Softrobotic, trying to show them a wide range of projects already carried out by laboratories or artists, we give the participants the conditions of the workshop in terms of time, required results, etc. We reassure the participants from the beginning of the difficulty of arriving at a functional object in a few days. We invite them to take "risks", to be ambitious and in particular to archive their creation process.

We invite the participants to form groups and to define their project together according to their interests, their desires and according to the material that is proposed to them. There are no limits imposed on the themes or areas of activity. They can also propose a project related to robotics research, art, architecture or fiction. The only thing that is required is that the project be coherent.

Every day at 3p.m. each group is required to present in a few minutes the status of their project. This gives us the opportunity to help the participants identify the cause of their object's failures, thus allowing the necessary iterative design experience, and to guide the students without directing them too much to transform the ideas into practical principles. This has the primary effect of giving them confidence and reassurance that they will need to repeat their experiments by changing some parameters in order to move forward in their research. During this time, we also invited the participants to reappropriate the successes of each of the groups to feed their reflection.

2.2. Design for Inclusion and Diversity

Softrobotic is an emerging field that has great potential to serve as an educational tool, as by using assembly elements and basic concepts that are fairly simple to understand, participants of all levels are able to rapidly prototype, with little prerequisite material science and programming, performative objects that vary in function and performance. The building process allows participants to understand the impact of design choices on system performance. LowSoRo workshops are workshops where all participants are engaged (no matter where they come from) in discovery and experimentation.

2.3. The self-performing object: rebuilding bridges

The performative object has existed for centuries, if only in ancient Greece with the creations and automata of Heron of Alexandria. At that time, the creations concerned as much a form of innovation around engineering (agricultural, constructions, buildings, measures...) as in what we would call today the eventful (religious, theatrical, artistic...) The self-performative object was also widely developed in fiction (myths and legends, literature of all times...) and in another way, it will be presented particularly from the 1920's onwards by visual artists. We believe that softRobotic by its LowTech aspect, its study of unconventional materials and morphologies of autonomous systems, reconstitutes one of the lost links between disciplines.

With a series of experiments, we will be able to allow artists/creators to come and generate behavior in creations where the level of agentivity until now stays frozen. And by mirror effect, we could allow technicians to increase their production thanks to fiction and narration.

We do not forget that SoftRobotic bases a large part of its physical capabilities and specificities on the very composition of an object. The morphology of an object, the assembly of its elements is a decision-making process comparable to programming, which is very reminiscent of what artists and designers call negotiating with matter. "The man must speak, but the tool also and the material also. [...] Each material having its language, being a language, which admits no other and can serve none"[3]. The intrinsic properties of matter have long been identified by artists without having had their experiments validated as scientific knowledge. The SoftRobotic, through a programming by arrangements of forms and matter is in our opinion a godsend for artistic creation. This whole generation of work on the matter, responsive materials, softRobotics, 3D and 4D printing... seems to make the link between artistic statements and scientific validation.

3. TOOLS AND RESOURCES

3.1. Implementation of working methods

One of the working methods of S. Lepart and N. Guimbretière is to use custom-made tools to describe the experiments carried out. The goal is then to practice documenting research in progress where the various tools proposed will be both constraints and levers of exploration to be combined and shared.

This is what will mainly remain of our participants' work. This documentation is deployed in several stages:

- A "Researcher's Notebook" is filled out by all participants and also by the organizers. It is a timeline (real time) hosting images (photos, videos, stop motion...) that allow to see the evolution of the project. (<https://www.lowsoro.com/0122/>).

- A shared file (Notion) was set up to provide resources and references so that participants could find their inspiration, but also the students' work in text and PowerPoint form. To guide them, we suggested that they define the why and how of their project. To identify the successes and difficulties they encountered. To define what they learned through their experiments. And finally to name the possible perspectives.

4. RESULTS

4.1. Engagement

The implementation took about 18 hours over 5 days. We asked the participants to show curiosity, creativity, reactivity to unforeseen events and failures, but also communication, critical thinking and perseverance. Their commitment far exceeded our expectations.

It is certain that the participants of this first workshop, because of their background, naturally went towards subjects related to their center of interest, i.e. in this case the handicap (a project of articulated hand and a project of wrist) and the kinematic particularities in biology (a project of worm, an octopus and a frog). We can observe that the objects developed are either anthropomorphic or zoomorphic. We would like to propose a workshop to an Art School where the interests of the participants will be more abstract or fictional we think. This will also allow us to see what aspect the methodology will take with this type of public.

5. CONCLUSION

On our side, we learned a lot with this first workshop thanks to the perseverance of our participants. This will allow us to readjust certain parameters and include elements that we had not thought of. The solutions found by some participants allowed us to understand which manufacturing process to put in place to make the manufacturing process simpler and faster. We realised that it was necessary to create modular and reconfigurable molds. That the Lego type elements with the modification and the addition of certain parts could also be used as moulds. We also want to develop more varied tensile elements than what we already have.

We think that the LowSoRo workshops will allow us to identify the interesting elements to be placed in a Kit for the creators, whoever they are. It will allow us to better define which materials are best suited for which type of self-performing object. But also which materials are best suited to which the audience and their interests.

6. NEXT STEPS

- We will have to carry out a series of workshops with different audiences (artist designers, makers, teenagers, people with disabilities, etc.) in order to better understand the elements to focus on, but also in order to be able to draw inspiration from each person's interests.

- We would like to invite an artist or a scientist to each workshop, as far as possible, in order to enrich our methodology or sometimes to thematic issues.

- We wish to refine the state of the art directly related to this project (SoftRobotic workshops, SoftRobotic in relation to art, architecture and fiction. SoftRobotic in relation to design, individual, societal and environmental issues). This state of the art will allow us to refine the resources to provide to our participants.

- The workshop is conceived as a research-creation capsule that could lead to one or more extensions, creations, prototypes, research seminars.

- We will try, little by little, not to focus on a frontal man-machine interaction, but rather on its secondary aspects which are of the order of its human aspirations, utopias, non-vital, non-commercial needs...

Beyond these individual and group works, the third phase we would like to reach after a few workshops would be to animate an aggregation of flexible robots in the form of a global installation. Finally, in the longer term, we want to build, share and disseminate a LowSoRo autonomous experimentation kit, both technical, methodological and conceptual.

LINKS

<http://lowsoro.com>

<https://www.lowsoro.com/0122/>

RÉFÉRENCES

1. See the spring exhibition of the OBMOKhU in Moscow, 1921
2. See the work of Richard Buckminster Fuller
3. Jean Dubuffet, L'Homme du commun à l'ouvrage, Paris, Gallimard 1973 : 25

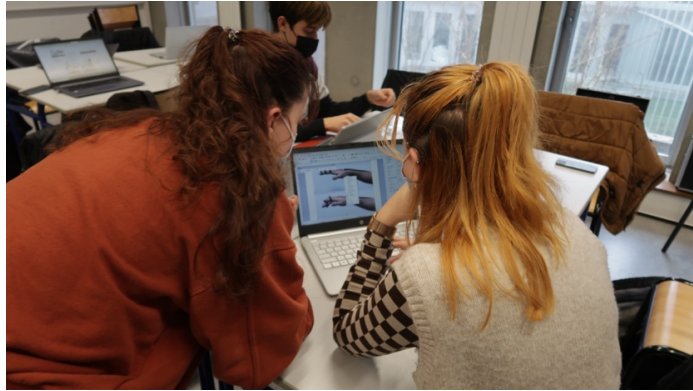


Figure 1: research time / first LowSoRo Workshop.

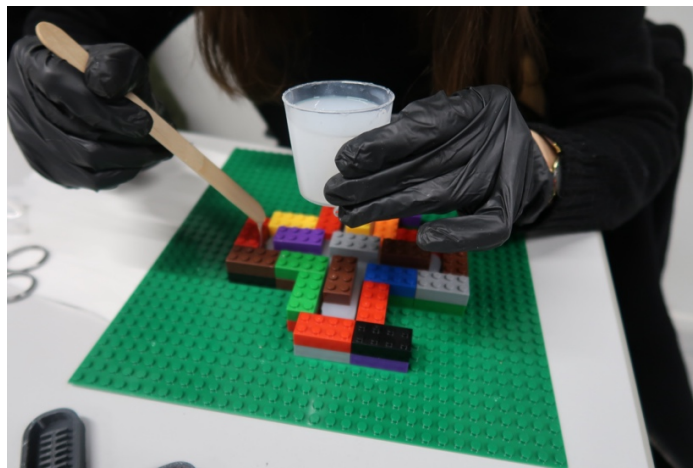


Figure 2: Experimentaion time / first LowSoRo Workshop.



Figure 3: Experimentaion time / first LowSoRo Workshop.

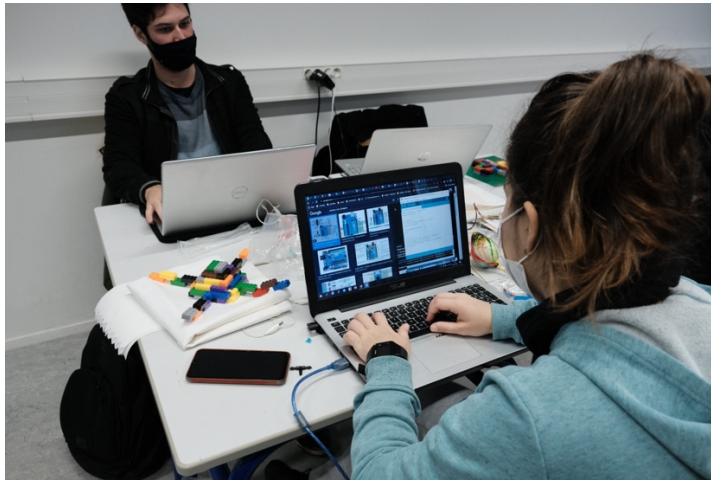


Figure 4: Coding to connect an arduino bracket to sensors / first LowSoRo Workshop.

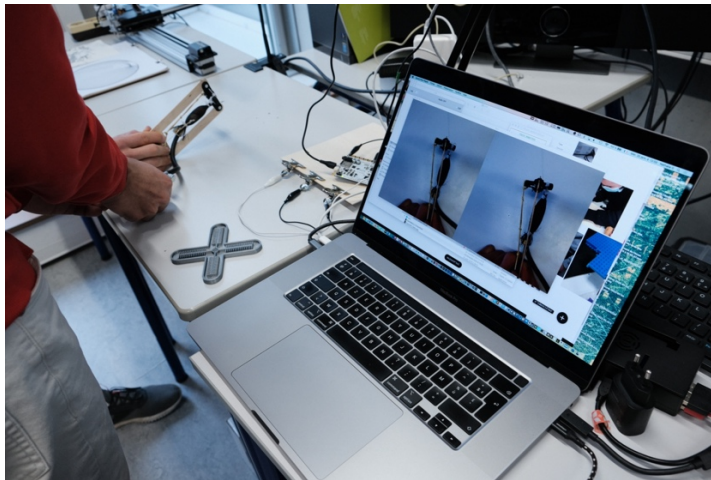


Figure 5: Real time stop-motion tool in order to document every process / first LowSoRo Workshop.

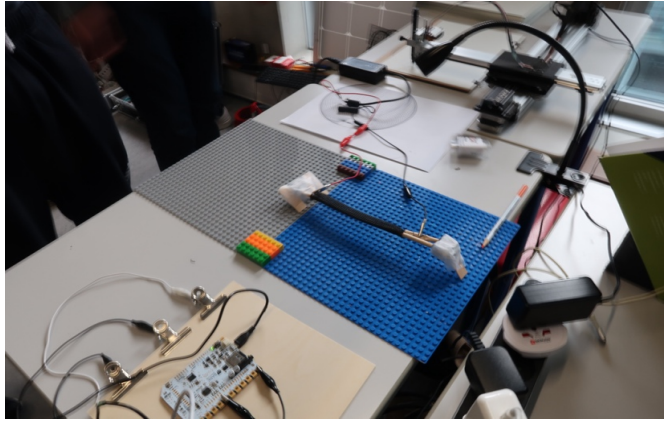


Figure 6: Example of experimentation of the first LowSoRo Workshop.

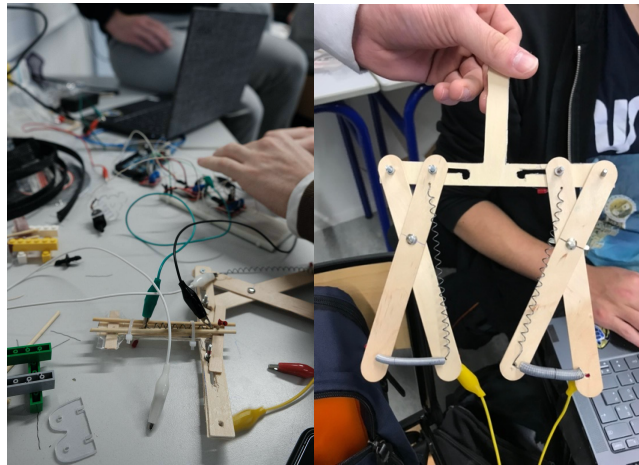


Figure 7: Example of experimentation of the first LowSoRo Workshop.



Figure 8: Presentation time / first LowSoRo Workshop.