I thought my previous idea (visual art with something like music?) was too unorganized and difficult to present as real, so I've switched the topic from interactive media art to interactive well-being, maintaining music or sound as the vital element.

my new topic is about 'sampler'.   
A sampler, in the context of music production, is a device or software that captures and records audio snippets like drum breaks, instrument loops, which can then be manipulated, edited, and played back in various ways. Samplers have been integral to the evolution of electronic music, allowing producers to create entirely new sounds by manipulating existing recordings.   
One of the most famous and influential sampler products in music history is the Akai MPC (Music Production Center) series, and Maschine / Launchpad series nowadays. Let me show some of the usage of these kind of devices.

In this video, when the user press the pad button, the sound sample like kick, snare which is already assigned in each pad is played. You can play, edit, and even loop the sample or their certain patterns with the sampler.

I have searched about a lot of noticeable examples and one of the greatest influences is called “Ball Beats”. It doesn't seem to be sold these days since the website domain is changed to other topic, but I think this is a really creative one. Let me show this simple Youtube video.

In this video, the user takes 'Amen Break', which is one of the most famous and widely sampled drum breaks in the history of music. The Amen Break sample is chopped into several pieces with the same time interval, and user can set up which chopped one should be played in each time section. The default state is that the balls are placed right-top diagonal direction, which nth chopped sample is played in nth time section so that the original sample is played without any modification. But as you can see, if the user place the ball off the diagonal direction the other part will be played at that time. This cut-and-paste method is the most fundamental part in electronic music production and sequencing.

Another one is, this is not a hardware one but anyway, the virtual plugin Illformed Glitch 2, is such a great motivation in developing idea. As the name directly says it is a plugin adding some “glitches” to sound which is able to use in Digital Audio Workstation (DAW) program. Glitch on sounds can be categorized into several methods, like time stretching the sample, retriggering tiny section of sample part, downsampling, or reversing the play direction like rewinding of turntables. Let me show actual examples using Glitch 2 on FL Studio 21 (or Ableton Live 11?).

I would like to combine these two ideas to edit the sample more efficiently. In my research, I haven't seen any hardware device we can control the sound with glitch effects I have mentioned (stretch, retrigger, downsampling, reverse), they are all made with software aspects with signal processing. My actual idea is that controlling the time position of sample as adopting the idea of Ball Beats, and adding any (or no) glitch effect into each “ball” section which is the played part of sample. In this aspect, I want to make it possible to create a glitched and rearranged loop of sample and even can save it into audio file.

But this has some problems of implementing in real world: how can we indicate the type of glitch effect (or no effect) in each ball section? I can prepare some buttons which swaps the integer value indicating the type of glitch in each ball area, but it would require too many budgets to get all of them (since the layout is about 8x8). So my alternative is, replace the 2d(8x8) ball grids with 8 discrete sliders with the value of zero to 8, of which the position of each slider indicates “which chopped part should be played at this time” and extra 8 buttons which indicate the type of glitch, like 0 for no effect, 1 for stretch, 2 for retrigger,... and so on.

I also considered how can I add some spices to the sample loop we created. The most interesting idea I think is using random variables on glitch type, or the value of slider knob. For example, assume that the slider has a value of 4. If we apply the random position change with the amplitude 2, the corresponding value of the slider would be between 2 and 6. Similarly it will between 3 and 5 when amplitude 1. In this aspect, we could add some differentiation to repeated patterns.

Here is my desired model made with blender(since notion doesn't support mesh files viewer). I somehow rushed because I was busy dealing with my other courses and personal works so the model seem to be a bit simple, but it contains most of the underlying elements of my idea. Let's take a look about it.

First, user can load the audio file via the software from the pc, or I can make the standalone mode which loads by itself without any external connection but that requires extra display and internal storage so I would think about it. The USB cable at the right side is for that connection purpose.

User can play the file by pushing the play button at the left top. The sampler consists of two play buttons - one with forward direction and one with reverse. User can simply switch the playing direction with pushing the button with opposite direction. Also, user can record the sample pattern he or she made via the record button, which is red circled one. The red color means that the pattern is currently playing and recorded, if user press the record button again, the recording and playing immidiately stops and the recorded audio of the pattern is saved as wav or mp3 format in computer or internal storage.

The sampler basically consists of 8 sliders which represents the time position. As I explained, switching the slider value represents changing the sample position at that time like the Ball Beats reference. And you can see the small display of numbers down the sliders, which indicates the value (integer) of corresponding slider for user-friendly experience. At this time every display shows value 1 because this is just a sketch but should show the actual value in the real product. For the randomizer I mentioned, the meter bar with 3 displays is attached to each slider, which shows the amplitude of the randomizer from zero to 3. But I hasn't considered how to modify each amplitude so would provide some additional stuffs about it later.

~~In order to express the glitch effect, I added 8 pads at which located down the slider display, which user can activate switch the type of glitch by pressing them once or again. The pad can have several colors that each of them represents different type of glitch - for example, white is normal state, green is retrigger, yellow is stretch, blue is reverse, grey is randomized one among all effects (not shown in this model tho). There would be some inconvinience that user should press them once by once switching the type when there are too many kinds of effect, but I think this is currently most efficient way to utilize.~~

~~At present, my current goal is divided into 3 sections:~~

~~First one is understanding the basic embedded coding materials and implementing basic functions of sampler. I'm currently really new to the embedded because my last experience with arduino or lazpberry pie is several years ago. I would acquire some parts which can play the audio output by itself or through the computer, and Build a simple circuit board operating as a simple sound player first. Also, I was looking for the actual library about playing audio and found the Arduino Teensy, which is widely used by many homemade audio craftmans for building sampler or drum machines. So I will learn about the basic functions about how teensy works and use it for the first objective.~~

~~Second one is improving or adding more distinctive features to the product. Compared to others, my current plan seems to be a bit too similar with some sampler products on the market. Even though I added the time position controlling mechanisms and glitches, It seems to lack some diversities or versatilities as editting sounds a bit. In fact, my discord acquintance pointed out that the famous audio company Roland released a sampler with similar roles just a few hours ago! It's called MC-707 and contains enormous amount of functions about editing and even sequencing samples. But considering my scale and budget, it is actually impossible to build that kind of comprehensive product. So I want to add some strongly unique one, related to the time position change in my current plan. I'm also considering about using multiple audio samples to chop so that it's like a sound collage. Sound collage means chopping various audios to a small pieces and sticking them like a collage, which many glitch and experimental musicians utilized.~~

Last one is about how can I develop and link software to control this sampler. Since standalone device seems to be extremely difficult to build, I thought that some software that can help dealing with audio input, digital signal processing, and more is inevitably needed. Fortunately I have some experience about GUI programming with PyQt5, a famous UI / UX library, so I will try to use it mainly for the software section.

Thank you for listening my idea.