

Cassandra Rousseau, Zi Di Zhu, Hummam Houara

Proposal —

Everywhere = Nowhere = Now

Vibe Check Music Controller

CART 360: Tangible Media & Physical Computing

Elio Bidinost

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Project Description

In our proposal titled *Vibe Check Music Controller* (i.e., *VCMC*) we aim to discuss the concept of a music controller that has unconventional inputs which are related to the bodily functions, such as heart beats, body temperature and motion. We aim to create a fun, human-oriented toy that mixes premade tracks into a unique composition. Some features includes:

- Changing the song's tempo according to the heart rate of the user;
- Changing the waves of the oscillator with the user's hand motion;
- Changing the sound's *EQ* depending on the user's body temperature.

We will be using *Ableton* in this project for the music part, and *Arduino* for the sensors and functionality part.

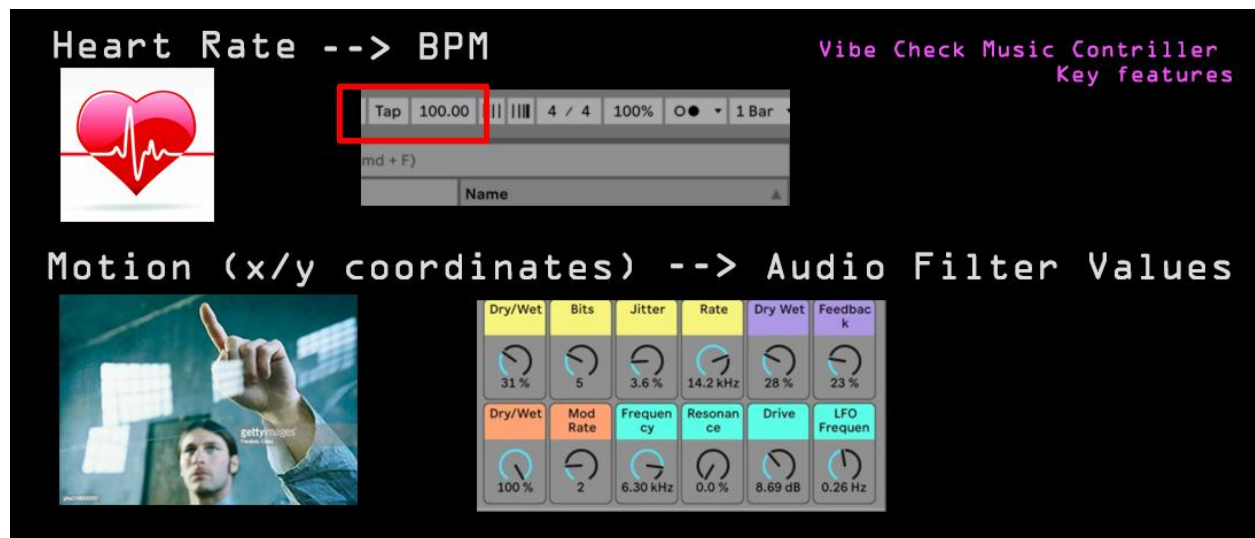
The ideal context to present this project would be anywhere, either portable or stationary, indoor or outdoor. We don't need a specific space to present this installation because most inputs are simple, some even passive(i.e., like heartbeat). It is only required for a human user to be present to interact with this device. Our goal is to make this device accessible to everyone and anyone. The procedure of having the sensors detect the user's passive physical states does not require any professional nor educational background in music. Instead of adjusting sliders on a screen, our interface is more primitive in a sense that it involves simpler inputs and it is more relevant to the physical body. The artifact is automated to adjust the sound texture and musical compositions.

Our extensive goal is to make this device portable, so that people can experience music that changes with their body on a workout session, as originally, we wanted the project to be

beneficial to active persons and athletes. It allows them to track their cardiovascular activity during their physical performance. So that the experience of listening to music during workout would be enhanced, as the music becomes speedier and changes the sound texture as the user's heart rate gets faster and body temperature rises. Furthermore, this project could also help people having trouble detecting their physical sensations. For example, sometimes we are nervous but unaware that our body is changing, the artifact will help through the change of the tempo of music according to their heartbeats. This could be a mindfulness practice aid and allow people to reconnect with their body.

Sensors and Interactive Design

Active/passive	Sensor Type	Input	Process	Output
Passive	Heartbeat Monitor	Heartbeats	Determines the heartbeat rate and proportionally change the bpm	Bpm of the track
Passive	Temperature sensor	Body Temperature	Adjust the frequency of a particular instrument according to the body temperature value	A sine sound wave
Active	Motion sensor	x/y coordinate of the player's hand	Link the x/y value to the values on audio filters	Amplifier / Audio filter
Active	Buttons	click	Toggle on/off each channel of instruments	Track on/off



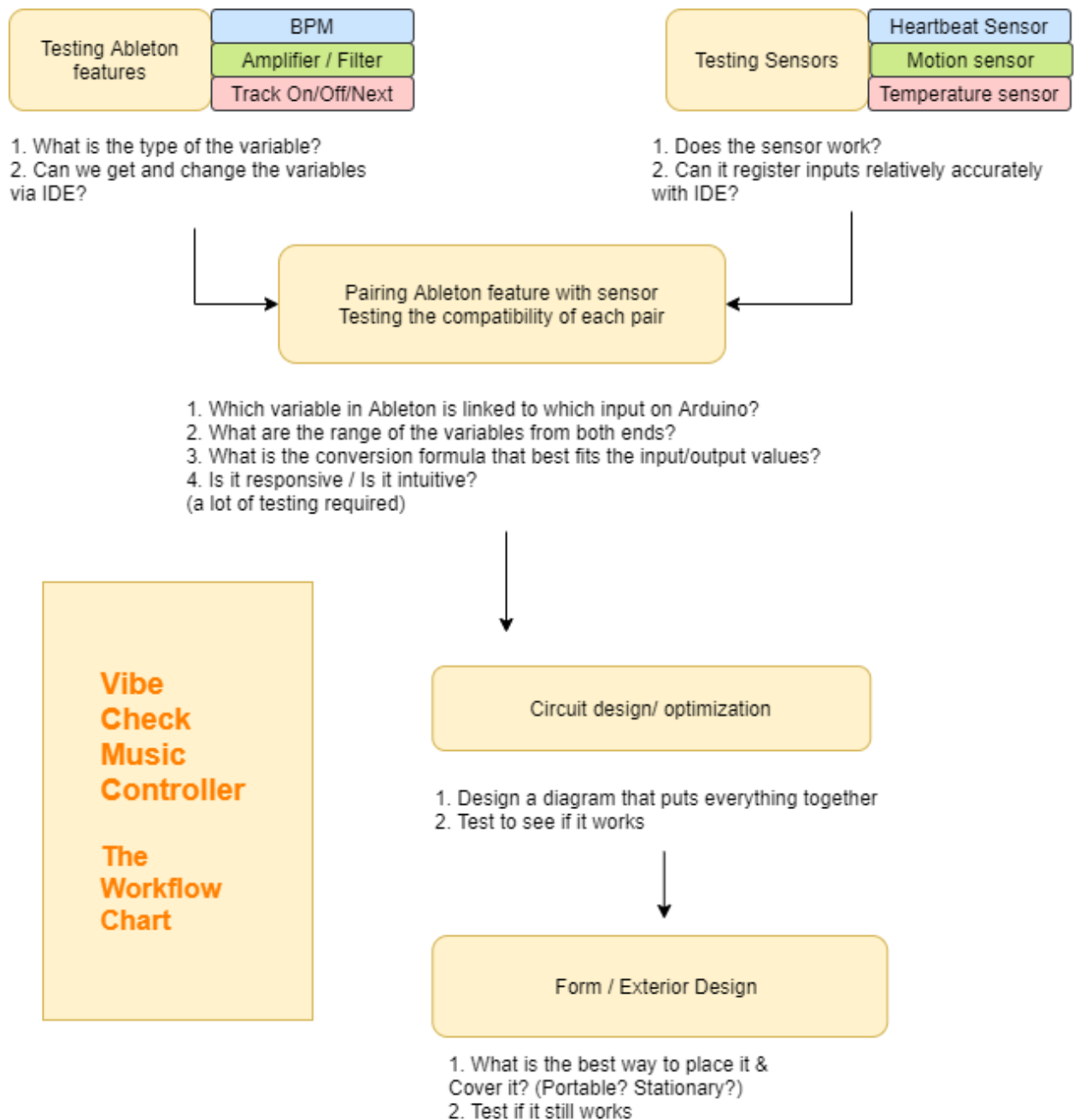
Ableton Live is a DAW (i.e., *Digital Audio Workstation*) for music production and live performances. We will be using the connection kit package of *Ableton*, which provides support for *Arduino*.

We will be using *Ableton*'s pre-existing features, but with a more intuitive, tangible and fun way for controlling them, such as using the motion of the hand to change a sound wave.

There are also some passive controls, such as the user's body temperature and heart rate being an input.

Music mixing is fun, but the interface of *DAWs* can be threatening to anyone inexperienced with sound production. We aim to eliminate the prerequisite of learning the technical terms and understanding the maths behind sine waves and just start vibing.

Strategy Journey Map



Relevant Projects

1. [Banana Piano](#)

The first project similar to the *Vibe Check Music Controller* is an *Arduino* project called *Banana Piano*. The *Banana Piano* is made of eight bananas that are interactive for the user. It plays eight different piano notes through a speaker connected to the *Arduino* board.

The components needed to build this project is an *Arduino* (i.e., only six analog inputs required), a small breadboard, a 30cm flat ribbon cable jumper wire, eight ¼ watt resistor 2.2 M Ohms, a resistor 220 Ohms, a speaker, eleven alligator clips (i.e., one for each banana) and additional leads to connect the speaker and to ground the user. As well as the main objects of the project: some bananas. Any other object can work as a substitute to the bananas. The method of making the bananas work is by placing three resistors where one leg has its row, and the other leg shares a row with two other resistors—then doing the same for three more resistors. After, the creator connects the two shared rows with the jumper wire. After that, one shared row is connected to the *Arduino* five volts with a jumper. It connects one jumper wire from each resistor to an analog input, attaching a wire from the speaker to pin eight and connecting the other wire to the ground. Lastly, the creator adds another jumper wire to the ground, which connects with an alligator. This connection leads to each resistor's leg and then joins the main object: the bananas. The code starts with defining the variables (e.g., the number of keys equalling eight, etc.) The creator imported the notes from another *Arduino* project. The main code consists of a void loop and an if statement.

2. [Heart Beat Indicator](#)

The second project is a heartbeat indicator using an electrocardiogram. It is initially an *LED* ring that blinks in time with your heartbeats and displays your current heart rate through the quantity

and colour of illuminated *LEDs*. The components of this artifact are a *uECG* device, an *Arduino nano R3* (i.e., for smaller size), *Adafruit NeoPixel Ring* (i.e., *RGB LED* lights), and a *Li-Ion Battery* 1000mAh. The diagrammatic of the project starts with the *DI* pin of the *LED* ring that goes to pin *D11*, the *DRV* pin of the *uECG* device goes to pin *D3*, *Battery's +* goes to *Arduino 5V* and *LED* ring *5V* inputs. Lastly, *Battery's* goes to *Arduino GND*, ring *GND* and *uECG's GND*. The artifact used a *LiPo* battery because it starts at 4.2 volts when fully charged and gets to 3.4 volts only when less than 15% charge is left. As long as the input voltage does not fall below 3.4 volts, *Arduino* remains steady.

The program's code is pretty simple: it continuously checks the *D3* pin and stores the time of change in a 20-element when detected in the array. The average time per beat is calculated by dividing the difference between the first and last elements by 20 (in milliseconds). So we get the *BPM* value by dividing 1 minute (60000 milliseconds) by that number.

Assembling the project on the body is easy, hence fitting the *Arduino* within the ring when the size is nearly the same. The *uECG* is worn on the chest. The user needs a wire with connections, which they will need to position first, then put on a shirt with other components, and last plug the connector. The battery can also be found nearby. Otherwise, putting it on would be pretty inconvenient.

3. [Ableton Max For Live Demo](#)

The third and last similar project to our *Vibe Check Music Controller* is *Max for Live Connection Kit*. *Max for Live Pack* makes it easier to create new and innovative ways to expand and interact with *Live*. With various new technologies and communication protocols, gadgets such as *Arduino* enable users to connect, control, and monitor *Live*.

The undertaking *Max* begins with a playhead *Drumstick*, which triggers an *LFO*, which controls a servo through the *Arduino* device. In contrast, another servo with a pen connected is controlled by a parameter that changes in a clip. The golf ball is then mapped to the *Camera* device's *XY* pad, which controls the frequency of a filter. Following that, the pendulum swings between a light sensor and a light source, modulating an *EQ8*. *LFOs* in *Live* control visuals in *Processing* through *OSC*. *Leap Motion* input controls *Live* via *OSC*. Following that, the golf ball generates a *MIDI* note, causing the speaker to vibrate and distribute the rice. The *JSON* Video device creates a new rhythm by looping a video sample using *Vine's API*. The motors of the *LEGO® MINDSTORMS® EV3* device, designed like a robot, are controlled by automation in *Live*. The robot comes into contact with a banana that has been converted into a sensor using the *Bare Conductive Touch Board*, exactly like in the banana piano project. Finally, a hammer triggers a pressure-sensitive pad from *littleBits*, forcing the music to end. The *Pack* contains 11 *Max for Live* devices, which may be used as a toolbox for research or to open up in *Max* and adapt to your own purposes.

Greater Goals: Mind-body connection through music

The primary purpose behind this artifact is to allow people to connect with their bodies. This is a good practice for one's wellbeing and health. A meaningful connection with yourself is something precious that is hard to achieve. The importance of mindfulness is a crucial point in this project. We would like to make people realize how the designs of modern technology deprive us of mind-body connection. Knowing, and understanding ourselves through this project. This project will give a medium that helps people to know themselves better. The relationship we would like to create between the user and the artifact is companionship. This project will allow

an intimate space that makes a more profound connection to our inner world. That way, the user will feel the presence of music in their surroundings, and their sense of loneliness will completely disappear. Furthermore, it will serve the user to detect their health state abstractly and figure out their needs. The user will directly know their intense emotions through the relationship of frequent heartbeats and loud sounds. The reflection in this project comes from the relationship between oneself and its surrounding environment. The fact that the sounds are isolated and based on an individual's heartbeats challenges the perception of oneself. The external and internal sounds change their relationship with the world, and they perceive their body differently. They gain conscience of their organs and inner mechanisms; they realize the power of their bodies. The intimacy involved in the experience and the relationship between oneself and the artifact make this project's concept stand out.

The proposed project will help people get in symbiosis with the body that carries them each day and gain conscience about the importance of their physical body. The individuals who have a hard time caring about themselves and understanding the use of their physical body will realize their inner mechanisms through their unique composition made only by the pulses of their hearts. For example, relating emotions through sounds can help people with the autism spectrum to understand their feelings. We want to immerse users within their souls and be conscious of the other utilities of your body beyond the metaphysical world. It challenges users to accept a more profound connection with their bodies throughout the experience. Users have to be in a state of consciousness of their physical presence in the outside world. This connection helps to find the unique utilities of our bodies. Also, we would like to inquire indirectly about how we used to compose music during the experience. Allowing participants to let their bodies create a melody only by the pulses of their hearts gives a new dimension to creative practices and

questions the traditional methods used to produce music. It helps develop creativity among citizens interested in this type of creation but do not have enough skills to compose a melody according to traditional methods and practices. The project gives the space to users to discover new sides of themselves, both in creativity and sensitivity and to challenge the conventional perceptions of human senses approaches and provides a notion of empowerment to the users.

Our main Interaction Design Strategy will rely on the physical design of the object. To communicate our intentions, we will create a wearable computing artifact. We intend to install this artifact around an area where we can detect heart pulses easily. Using wearable computing will directly connect the human body and the artifact, which their relationship is an essential concept in this project. The user will instantly associate the closeness of the object and the connection to their body. The procedure will detect vibrations from the heart through sensors and transmit these frequencies into the *Arduino* microcontroller connected to an audition software called *Ableton*. Once the *Arduino* receives these unique frequencies, the microcontroller will activate the specific sounds required for this result in the software. The computer will start playing the edited track through its speakers. This intuitive and instant feedback from these inputs eliminates any technical terms, which is more intuitive than adjusting computer slides with a mouse. This whole process means the importance of the connection between the artifact and the user. The participant will automatically recognize the involvement of detection and feedback from the computer while wearing the artifact linked to the computer. The meaning behind these design strategies is to reinforce the central theme of connection into this project. An artifact worn on the body, connected to a microcontroller connected to a computer, causes a

chain of thoughts about contact for the user. There will be a constant theme of connection within the project. These design strategies are essential to our concept.

What makes *Vibe Check Music Controller* Unique?

The *Vibe Check Music Controller* is a fun, simple music toy, but it is also a helping tool for mindfulness practice.

The *Vibe Check Music Controller* uses a blend of passive and active inputs to control sounds - instead of something that only has active input (i.e., like the *Banana piano*) or something that is only passive (i.e., *Heart Beat Indicator*). The aim is to make the experience of modifying sounds feel less technical and more intuitive. With this project, our goal is to create something that is both fun and capable of helping us to develop a sense of connectedness with our bodies.

Some people find mindfulness very helpful in reconnecting the body and mind. Still, mindfulness can require a tremendous amount of patience and focus for people who are not used to the practice. It can be challenging for neurodivergent people such as those who have *ADHD* - paying attention to subtle physical sensations without a source of stimulation is a daunting task. In this case, audio feedback for these passive physical sensations can be a helpful guide to identifying and recognizing these sensations.

It could also help one's ability to pay greater attention to sound. The user can manipulate the soundwave with their motion, allowing them to "observe" the sound through this synesthetic

motion-sound interaction. The user may notice the subtle details of the change in the texture of the sound.