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Spinal

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GENERAL REQUIREMENTS

I. What is your idea? 250 words
II. Illustration: visualization of project (collage, hand or digital drawing)
III. Schematics: technical drawing of the proposed design & system (include circuit layout)
IV. Materials: List of materials and tools needed to execute project

PROPOSAL 0.1

In the context of the Computation Arts program held in the Concordia University, I want to create an artistic project critically engaged with the human technological wearables. The realization of this project is supervised by my teacher Valerie Lamontagne for the Project Studio II (CART 412) class. By the means of this project, I want to stress the importance of the human spine using the wearable technology medium called Spinal.

Spinal helps you to “hear” your spine condition. This wearable technology serves as an amplifying interface for the spine. Your spine allows you to move and feel due to its major role in the nervous system. This project aims to raise awareness about your spine by creating a shape-shifting interface of communication which can adapt to any spine. The latter will help your spine to manifest its condition in order to prevent an ongoing deterioration. Once this deterioration reaches a certain level such as a spinal disc herniation condition, there are only few possible treatments involving severe operations which may cause an uncomfort and reduce mobility for the rest of your life.

Spinal uses the arts to explore a fashion of smart wearable with a bio-technological interface.

The system will interpret the data and directly interact with its user through a meaningful output. Each spine is unique. Therefore, the starting point would be to position your spine into a proper posture (with a help of chiropractician if needed) and hit memorise using a haptic switch. From this point, the interaction will use vibration actuators. The user will be able to use built-in modes

of interactions supporting various timeframes, intensities and positions. For instance, there will be a reminder and calibration modes.

The reminder mode will remind every n time units using a vibration intensity from 1 to 5 set by the user about its spine incorrect positions. Whereas the calibration mode will vibrate on incorrect spine alignment points using a user-defined intensity until the user takes a proper position. The spine modes will be extendable and programmable to suit each user's specific needs.

The core advantage will be in its shape-shifting nature which will allow it to adapt to various human spine dynamics. The latter will help the user to be aware about its life-essential living friend, your spine.

The interpretation of the data is processed directly in the built-in "Spinal" compressible t-shirt. Why connecting something to the Internet if there is no necessity? By keeping everything embedded not only we mitigate the possible privacy issues related to data personal data leakage but we are enabling a transparent interface closely merged to the human body.

It will feel natural and pleasant for an everyday healthy sitting life.

TECHNICAL

ILLUSTRATIONS

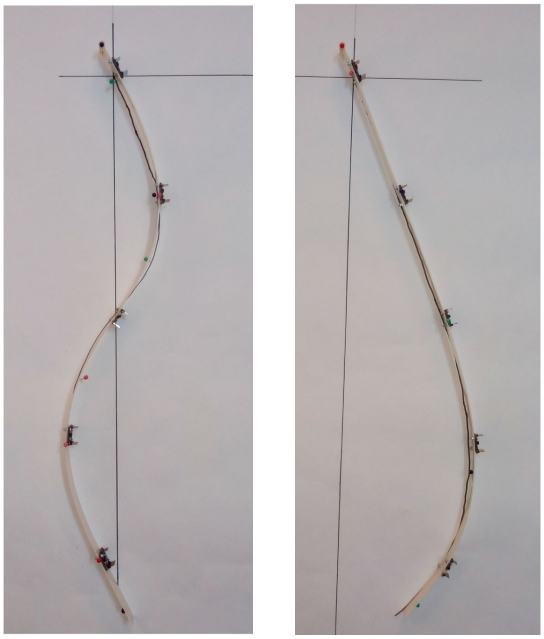
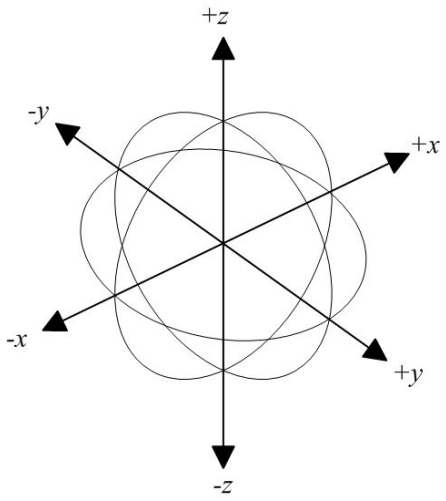


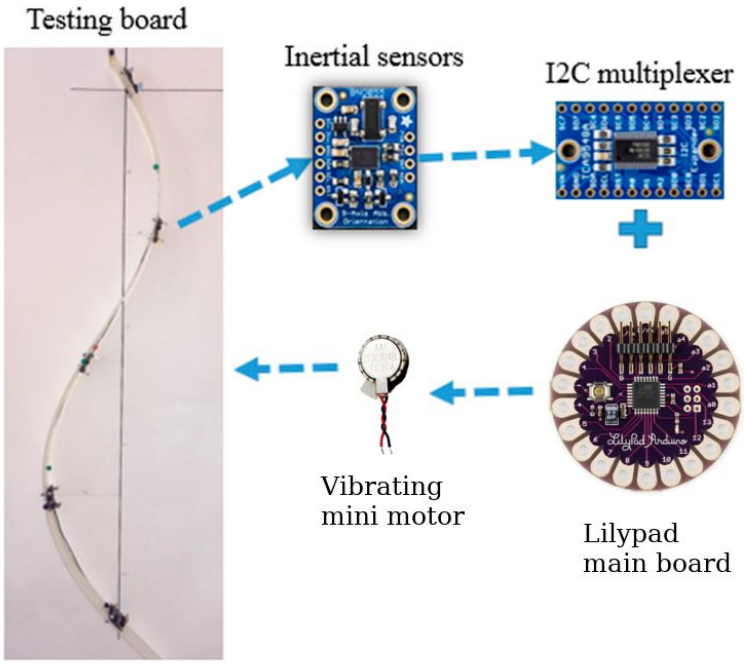
Image source[1]

1 Voinea, G.-D.; Butnariu, S.; Mogan, G. Measurement and Geometric Modelling of Human Spine Posture for Medical Rehabilitation Purposes Using a Wearable Monitoring System Based on Inertial Sensors. Sensors 2017, 17, 0003

SCHEMATICS

Note: Doe to a complex circuit nature, an exact schematic will be produced once I understand exactly how to bind the I2C multiplexer with the 5 IMU sensors. However, here is a visualisation of the communication logic:





MATERIALS

HARDWARE / MATERIAL	PRICE
Compressed (adjustable) t-shirt	To be determined
Isolating tissue	To be determined
Stainless Medium Conductive Thread - 3 ply - 18 meter/60 ft	$9.37
LilyPad Arduino 328 Main Board	$27.93
2472-ADA Adafruit 9-DOF Absolute Orientation IMU Fusion Breakout – BNO055	$244.65 ($48.93 * 5)
Vibrating Mini Motor Disc	$13.65 ($2.73 * 5)
TOTAL	$400~

Note: the budget will be updated as the project evolves.

CONCLUSION

This is very interesting project that may evolve in a variety of directions. For the moment, I'm primarily thinking about an everyday device to enhance people's health. However, there is a captivating tangent to the Spinal project in the gaming industry. The latter will depend on the resources and the available timeframe.

REFERENCES

[1] Voinea, G.-D.; Butnariu, S.; Mogan, G. Measurement and Geometric Modelling of Human Spine Posture for Medical Rehabilitation Purposes Using a Wearable Monitoring System Based on Inertial Sensors. Sensors 2017, 17, 0003, online, http://www.mdpi.com/1424-8220/17/1/0003