Generating a visual representation of an athlete's movements

Maddie Zug
Mobile and Web Application Development Lab
Thomas Jefferson High School for Science and Technology

Background

Wearable electronics and motion capture have become popular with the rise of smartwatches and other fitness hardware. Many of these wearables incorporate bluetooth and motion sensing capabilities. One wearable that served as an inspiration for this research was Lesia Trubat's pressure sensing pointe shoes.

Figure 1. Lesia Trubat's Etraces for ballet

Development

In order to generate art from a figure skater's movement, a combination of hardware and software systems was designed (Figure 2). The hardware includes the sparkfun 9 degrees of freedom razor IMU and the RN-41 Bluesmirf gold bluetooth module. The razor IMU senses acceleration, velocity, and heading in the x, y, and z directions and sends the data to the computer through the Bluesmirf module.

The software for this project was written using Processing 2, a language designed for use with graphics. Classes were defined for strokes and spirals. Spirals have properties that include radius, speed, and color. Strokes have a direction and are comprised of multiple connected spirals. New strokes are instantiated in the code when the average of the acceleration values for each axis spikes above a specified threshold. The x, y, and z acceleration values are then mapped to red, green, and blue values respectively for a new stroke.

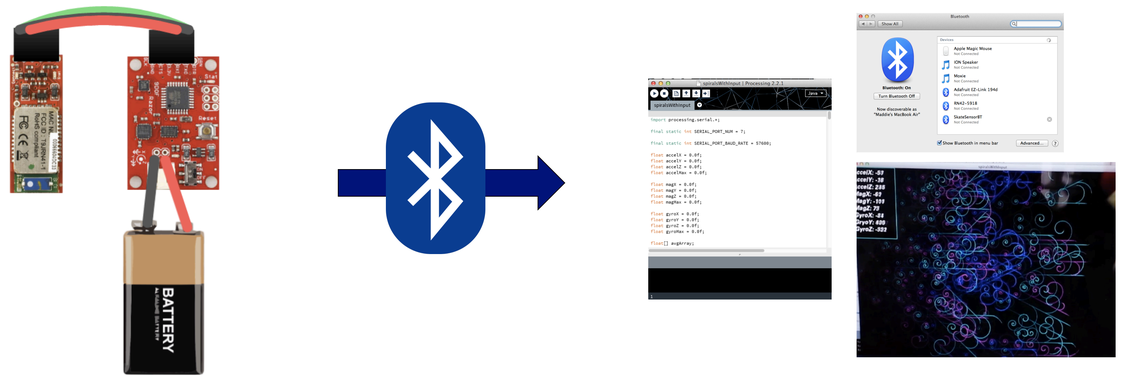

Figure 2. The final system

Results

The final product was functional for a range of less than 100 feet. It successfully represented a figure skater's movements as a collection of spirals varying in color based on the direction and type of the movement.

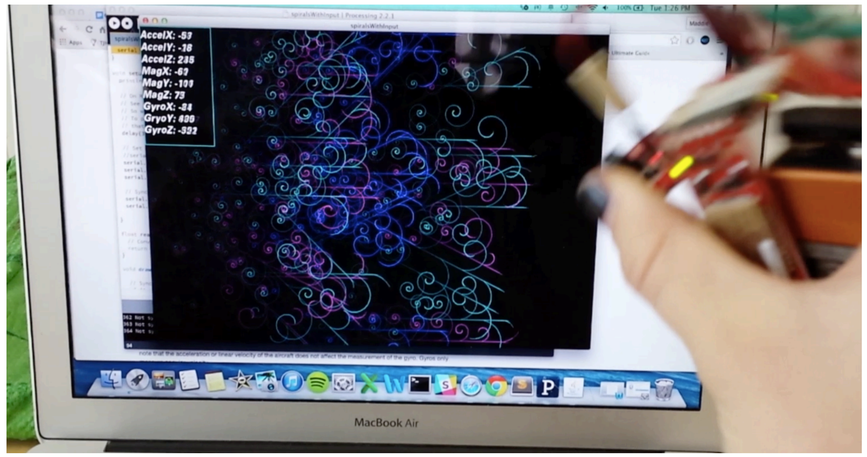

Figure 3. Testing the output of the final product

Conclusion

The project was successful in producing a visual representation of an athlete's movements. This has applications in the fields of wearable electronics and sports coaching.

Further improvements include increasing the range, decreasing the size of the hardware, and refining the visuals to be a more direct representation of movements.

Acknowledgments

I would like to thank my lab director Paul Kosek for his time, advice, and help. I would also like to thank Charles Dela Cuesta for letting me borrow his components and equipment.

References

Fitbit. (2015). Retrieved June 9, 2015, from Fitbit website: http://www.fitbit.com/

Trubat, L. (2014, June). E-Traces. Retrieved June 5, 2015, from http://cargocollective.com/lesiatrubat/E-TRACES-memories-of-dance