As a team, we decided to take apart a pair of wireless Beats Solo 2 headphones. We chose this item because the pair we took apart was already in not working condition and we thought it would be a cool idea to look inside of them. We didn't plan on really fixing them, but more of checking to see if we would be able to take them apart and be able to inspect all of the little components.

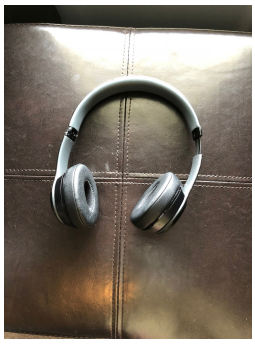
When taking apart the headphones, we were able to get the cap protecting the circuit board completely off and were able to clearly see all of the components. The largest part in there was the battery for the headphones. It took up most of the space in the left headphone with little room for the circuit board around it. In the same headphone we also found the Li-ion Battery Charger and Power Path management IC, a 4-bit I/O expander I2C chip, a System-Side Impendance Track™ Fuel Gauge, a Low-Voltage 7-Bit I2C and SMBus LED Driver, ,and a Matched Pair NPN Small Signal Transistor. All of those just listed other than the Small Signal Transistor were TI components. It was a Digi-Key electronics Product. In the other headphone, there was a more complete circuit board but less actual components to find. There was an Audio System-On-Chip and a Class-H Stereo Headphone Amplifier. Neither of those two components were produced by TI. Looking back at the components, we noticed that the ones in the left earpiece had more to do with the power and actual functioning of the headphones while the other earpiece had components that dealt with the sound and microphone aspects of the headphones.

These components are all very complex micro components. The I/O expander is a bidirectional bus as an input and output port in 4-bit configuration. The Power-Path Management IC controls the power flow of devices that are operated by an AC adapter such as these headphones. The Battery Fuel Gauge is a simple gauging device to measure the power of single-cell Li-ion batteries. The 7-bit I 2C is used to dim the lights of LED's throughout the device to create a more efficient processing time. The Small Signal Transistor is a device that measures a small range of linear data values. The Audio System-On-Chip is a wireless connectivity audio port that plays sound without a direct connection. Finally the Class-H stereo Headphone Amplifier is a device that has an adjustable volume by an I2C chip.

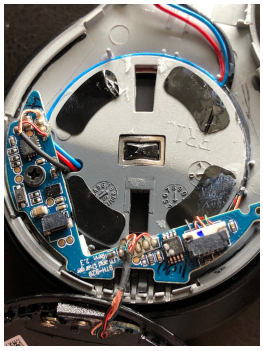
In conclusion, we learned a valuable lesson about the manufacturing of some more common products. We had seen wire maps and digital representations of these circuit boards before but never had been able to have something such as this actually in front of us. The actual design was amazing in how small and compact it was. It is no wonder how things like that are so fragile and how any of those tiny parts could break and mess up the product.

Parts List:

- PCA9536 I/O Expander
- BQ2407: y Li-ion Battery Charger and Power-Path Management IC
- BQ27425: Battery Fuel Gauge
- TCA6507: 7-Bit I 2C and SMBus LED Driver
- TPS782: Ultra-Low Quiescent Current Low-Dropout Linear Regulator
- DMMT3904W: Matched Pair NPN Small Signal Transistor (Not TI)
- CSR8670: Audio System-On-Chip (SoC) (Not TI)
- AMS AS3561 Class-H Stereo Headphone Amplifier (Not TI)

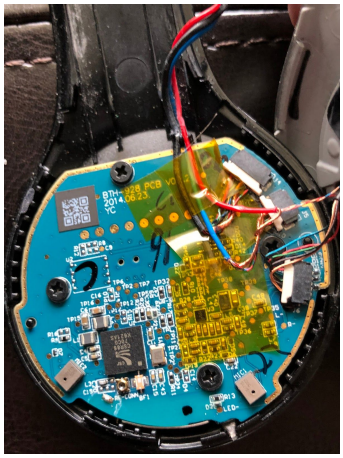


This was a picture of the headphones before we began to take it apart.

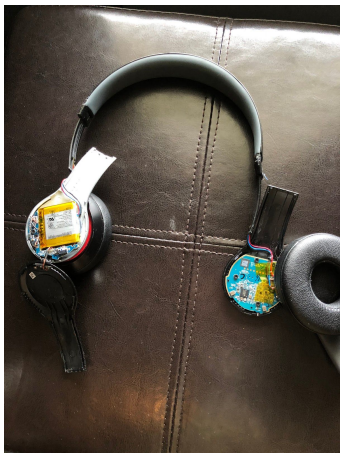


This was as we opened the right side of the headphones by prying off the plastic cap. We had already removed the battery.

The battery that was in the right headphone.

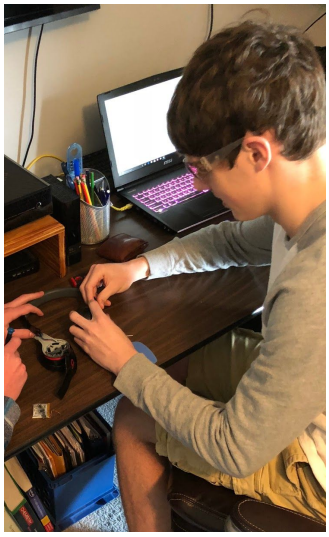


The left headphone had a bigger circuit board in it as it didn't have to store a battery. This side dealt more the wireless components.



An overhead view of the headphones with circuit board on both sides exposed.

Tanner and Braden using safety first while disassembling the headphones.



Gavin is about to take off one of the caps to the end of the headphones.