

Reverse Engineering of Google Home

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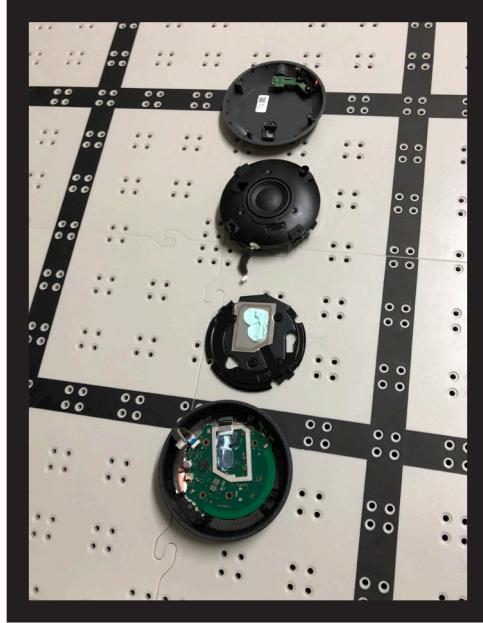
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The Reverse Engineering project seeks to disassemble a piece of technology of their choice, understand its functionalities, and reassemble it with the knowledge gained. The team then enhances the device, increasing its capabilities. This year's device was a Google Nest Mini, 2nd Generation (GNM). We chose the GNM for reverse engineering for its unique features and complexity. The GNM has a specialized ability to interact with the user, performing tasks based on the command given. To maximize the device's potential, we could add a battery source to it, making the device portable. With easy access to the device, its resourcefulness could be used anywhere. To take apart the device, caution is necessary, including parental supervision. A T6 screwdriver and a metal spudger is needed to take apart the GNM. We first unscrew the screw on the device's bottom, loosening the rubber case. Then we removed the rubber case and unhinged the two halves by turning the bottom half counterclockwise and the top half clockwise, separating the two pieces.



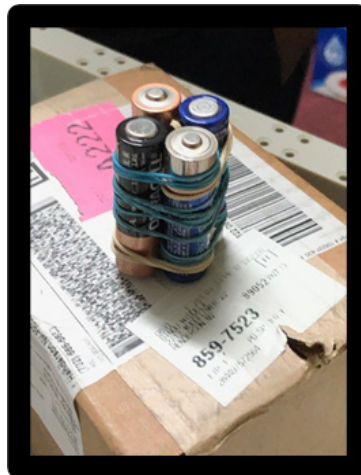
Our team taking apart the Google Nest Mini device.

We lifted the lock for the connector wire to separate the two halves and then unscrewed the screws that held the speaker connected to the bottom of the half. After that, we took off the plastic cover slowly to keep the adhesive, revealing the main circuit.



Disassembled Google Nest Mini

Once we looked at the circuit, the 3 microphones on the side, the motherboard in the middle, and the speaker above the motherboard were there as we expected. Other than these 3 crucial components, there are several other components, one of which is the surge protector, as it keeps the device safe from any sudden bolts of electricity produced from the power source. The next step is enhancement. We created a battery source for the GNM, to make it portable and more convenient due to the fact that it usually is plugged into a wall, not making it accessible from many places.



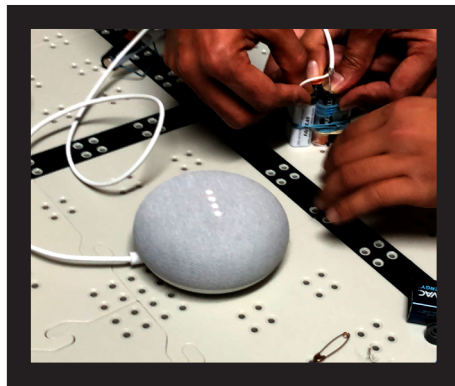
Finished battery source

We created this battery source by connecting multiple wires to generate the amount of electricity needed to power the device, which is 15 volts. To direct the power from these batteries, we took off the brick part of the general wire and separated the positive and negative wires. This creates a path for the power to move in a circular motion, powering the device. In conclusion, this dynamic project gave us team members a deeper understanding of how a GNM functions.



Our team reassembling the Google Nest Mini

However, it is still a complex system that requires prior knowledge in order to navigate properly. Due to this, we encountered difficulties, one of which being that when reassembling the GNM, we failed to recall how to assemble it, causing mishaps that took time.



The Google Home device showing "Powered On" lights using the battery device we created as a power source.

To prevent these mistakes from happening, we will go more thoroughly into the research and clearly convey our findings and what we have to do in order to ensure that everyone in our team is on the same page. Also, to make our GNM look more appealing, we will add a cover to the added battery.

Parts List:

1. T6 Screwdriver
2. Metal Spudger
3. Google Nest Mini
4. 4 volt batteries, qty. 4
5. Wire Cutters
6. Rubberband
7. Electrical Tape

Citations:

Google Home Mini teardown. iFixit. (2021, February 2). Retrieved December 31, 2021, from <https://www.ifixit.com/Teardown/Google+Home+Mini+Teardown/102264>

YouTube. (2021). *Google Nest Mini teardown (2nd Gen)*. *YouTube*. Retrieved December 31, 2021, from <https://www.youtube.com/watch?v=AyeGW0otFs8>.

Credits:

Dr. Sandip Thanki - Mentor for Reverse Engineering Project

Dr. Rekha Subremanian - Coach