

Reverse Engineering Project

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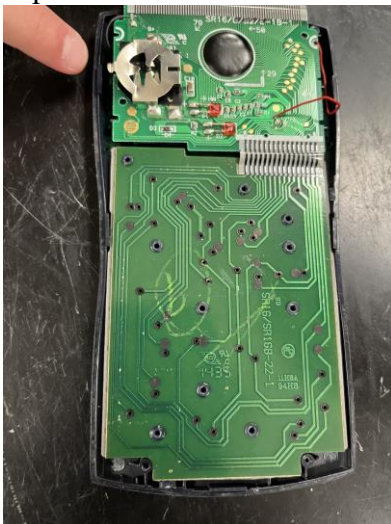
Vex IQ Robotics

Have you ever wondered if you could find out how a device works by just taking it apart? This process is called reverse engineering. And yes, this process does work. My team and I used this process on a solar powered calculator, and we learned many interesting facts about something we thought was simple but was actually very complex. In this expository text, I will be explaining the different parts and pieces and how we figured out how the calculator works by using reverse engineering.

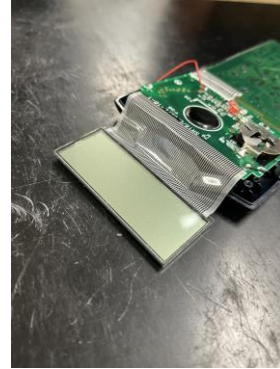
After unscrewing the shell of the calculator, we instantly found a large, thin lithium battery, because lithium is an efficient conductor material, and is easily rechargeable. We also found a solar panel on the top which is connected to a red wire which provides positive charges from the solar energy to the lithium battery, before escorting negative charges through the black wire. The lithium battery powers the motherboard, therefore making the calculator function.



On the bottom portion of the motherboard, there seems to be tiny black splotches all over it. But these tiny black splotches serve a very important role in the calculator. You see, these tiny black splotches are connected to the buttons. And when a button is pressed, it sends electrical charges through the ridges of the bottom portion and a tape connects it to the motherboard. From the motherboard, it connects to the screen. When many buttons are pressed, the electrical signal travels in perfect unison to the motherboard, and eventually, to the screen.



When you look at a motherboard, you usually see golden patches on it. Those patches are made from thin slices of gold, and their purpose is to act as a super conductor and to boost the electrical signal towards the screen of the calculator. You also see a big black splotch in the center, that is a silicone cover for a semiconductor, which manages the electrical current on the motherboard. What about the screen, how is it connected? It is connected with white and black tape that transmits electrical signals to the screen, lighting it up. It is lit up by LEDs. Protecting the screen is a glass screen.



How does the calculator get power in order to function? It uses solar cells that collect solar energy. If you look at the front of the calculator, you will see a tiny rectangle above the screen. This rectangle gathers solar energy (positive charges) and delivers it through our red wire so that it can recharge the lithium battery and cycle through the process that I explained earlier.

In conclusion, what our team thought was a simple device is actually very complex when you take the time to see what it is composed of. Reverse engineering is a great way to learn new things about electronics, and our team learned a lot from it. We learned how a calculator works, how solar powered objects work, and how motherboards in general work. Our team had a great time working on this project, and we will definitely remember what we learned today.