

TINKERING AROUND WITH REVERSE ENGINEERING

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INTRODUCTION

We are team 5312E- The Tinker Belles. Tinkering is what we do...

We enjoy taking things apart, figuring out how they work and putting them back together, so we were excited for this challenge.



VIZIO XRT122

You have probably watched T.V. before, but have you ever wondered how the remote actually works?

We decided to take apart a Vizio XRT122 remote to see what we could learn. We chose this device because we had one handy and we thought it would be easy to take apart.



Vizio XRT122
Remote Control

MATERIALS NEEDED

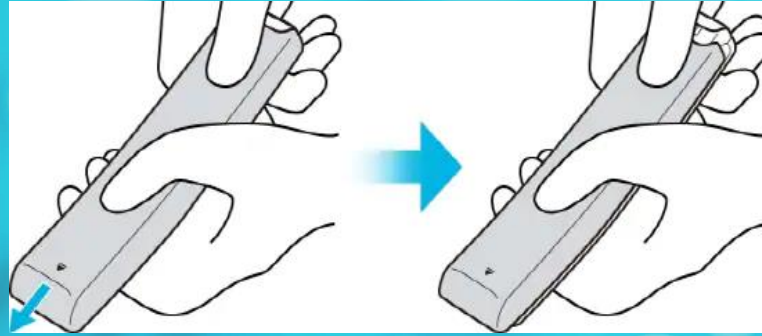
- Safety goggles (for protection)
- Vizio XRT122 T.V. remote
- Flathead screwdriver
- Pen
- Blank paper
- Computer with internet connection (for research)
- Camera (for photos)



Materials
(Camera, computer and goggles not pictured)

STEP 1

Our first step in deconstructing was to remove the plastic cover on the back. It just slides off and does not require any tools.



Back side of remote with cover removed

STEP 2

After removing the back cover, we could see that there were two 1.5V AAA batteries. They give the remote its power by providing an electrical current. They needed to be removed to continue taking apart the remote. We used our fingernails to pry the batteries out of the battery holder. Once they were removed, we could see inside the battery compartment. The picture inside of the compartment shows which direction to place the batteries.



Remote with batteries removed

STEP 3

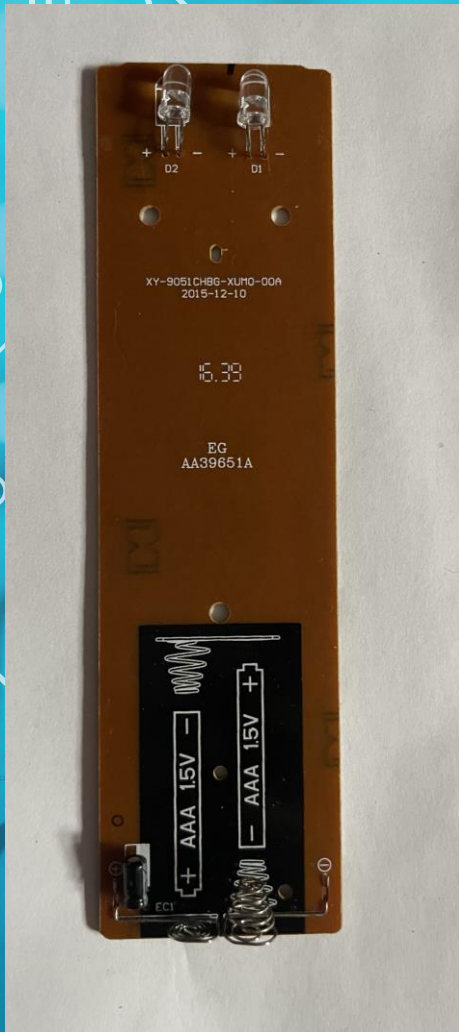
Next, we removed the back casing. We put the flathead inside of the hole in the center of the remote, this popped open one side. Then we put the flathead in the side to loosen it and used our fingers to pry it apart.



Steps to remove back casing

STEP 4

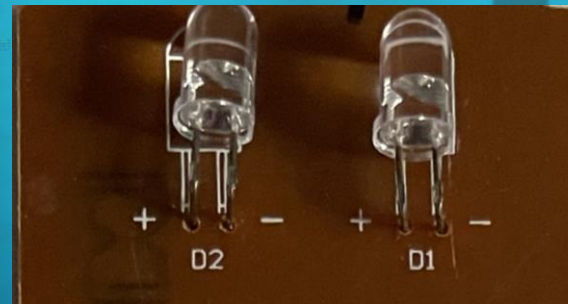
After removing the back casing, we could see the back side of the circuit board. It has two lights on the top. These are called infrared (IR) lights. This light carries a signal between the remote control and the T.V. The IR sends out pulses of light that represent specific binary codes. These binary codes tell the T.V. to follow commands such as on/off, channel and volume. The IR receiver in the T.V. decodes so that it understands and follows the command given. We also noticed a black cylinder object. We learned that it is called a capacitor. It stores energy and releases it into the rest of the circuit.



Back of circuit board



capacitor



Infrared Lights

STEP 5

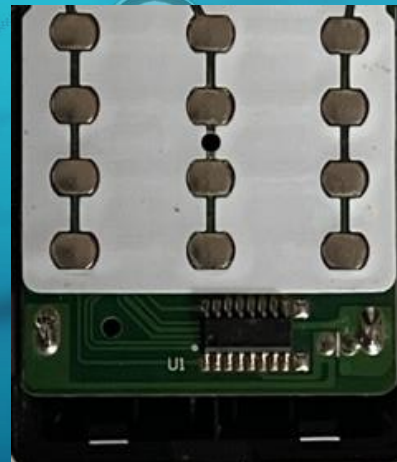
The front side of the circuit board acts as the base for the buttons. There are several flat metal push buttons that branch out. The rubber keypad lays on top of the buttons and presses the buttons on the circuit board then sends a signal to the integrated circuit on the bottom of the circuit board that generates an infrared signal.



Front of circuit board



Contact side of keypad



Integrated circuit

STEP 6

The remaining piece of the remote is the front casing. It has holes that allow the buttons on the rubber keypad to be shown. The front casing and the back casing fit together to hold all the pieces inside of the remote.



Front casing and rubber button pad

SUMMARY

After disassembling the remote and examining the pieces, we put the remote back together. One interesting fact that we learned was that the IR light cannot be seen with the human eye. We learned so many things from this experience. We never knew so many parts would be inside of this little remote!



Just like Humpty Dumpty it's
all put back together again

CREDITS

<https://electronics.howstuffworks.com/capacitor.htm>

<https://electronics.howstuffworks.com/remote-control1.htm>