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Electronics Online Challenge: Deconstructing a Remote Control

The Sony RM-ADP034 remote control functions like other infrared remotes: it sends out flashes of light that represent the binary code corresponding to commands that turn control a device. We chose to deconstruct the remote control because it fascinated us with its role as a universal remote and the complex structure hidden within the smooth case. After dismantling the remote, four main components were identified: the light-emitting diode (LED), the integrated circuit, the capacitor, and the transistor.

Light-emitting diodes (LEDs) are an important component in infrared remotes. The LED transmits infrared light waves to systems such as televisions, fans, and other devices that contain binary code; the device that receives the signals processes them and carries out an action (ex: turning on/off, switching channels, raising the volume, etc). In the Sony RM-ADP034 remote control, the LED was placed near the top and was connected by two wires. Because of the position of the LED, the angle of an infrared remote could determine whether the device received the message. LEDs are TI components and can be used for scanners, security cameras, and even lighting for certain venues and events.

An integrated circuit is a single chip embedded into a thin sheet of silicon that contains multiple microscopic components. Jack Kilby from Texas Instruments, Inc., and Robert Noyce from the Fairchild Semiconductor Corporation successfully developed this minute circuit in 1958 and paved the way for a variety of useful innovations in the Information Age. In the Sony RM-ADP034 remote control, it appears as a small black rectangle (approximately 1 cm x 0.5 cm x 0.1 cm) connected to the sheet of silicon. In the remote, the circuit processes the information

gathered through the button contacts and sends a signal to the light-emitting diodes. Integrated circuits can also be found in TI calculators; they process the information from the button contacts and send the information to be computed before an answer is revealed.

A SAMXON capacitor lies at the bottom of the remote and appears as a blue cylinder connected with two wires on one side. The first capacitor was created in November 1745 by Ewod Georg von Kleist and was similar to the Leyden jar; now, modern capacitors can store electrical energy that is released on demand in one-centimeter-long cylinders. In the remote, the 47-microfarad capacitor works along with batteries to power the device, but it cannot create energy on its own. TI produces capacitors for industrial use.

The transistor is another key part of an infrared remote. It amplifies the signals sent to the LED that reads the signal and generates the infrared light. The transistor is found inside the remote next to the chip. Transistors are TI components and can be found in multiple devices which send signals from one end to another.

After completing this experiment, we learned that the commonplace remote control we used every day hid a multitude of electrical components. This experience has opened our eyes to the complexity electronic devices.

Pictures



Figure 1: The remote before being disassembled



Figure 2: The components of the remote after being disassembled



Figure 3: The integrated circuit on the front of the remote

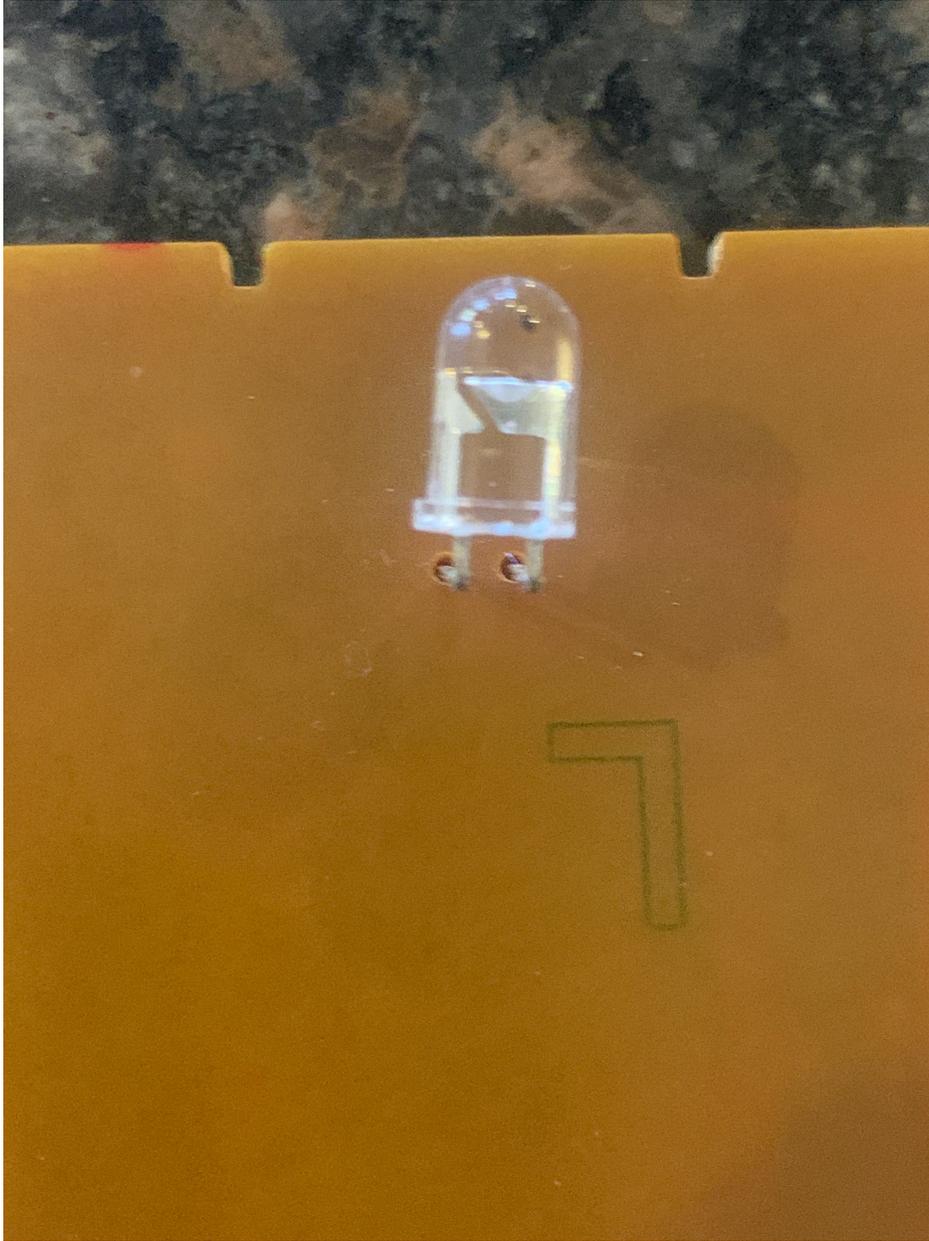


Figure 4: The LED on the back of the remote

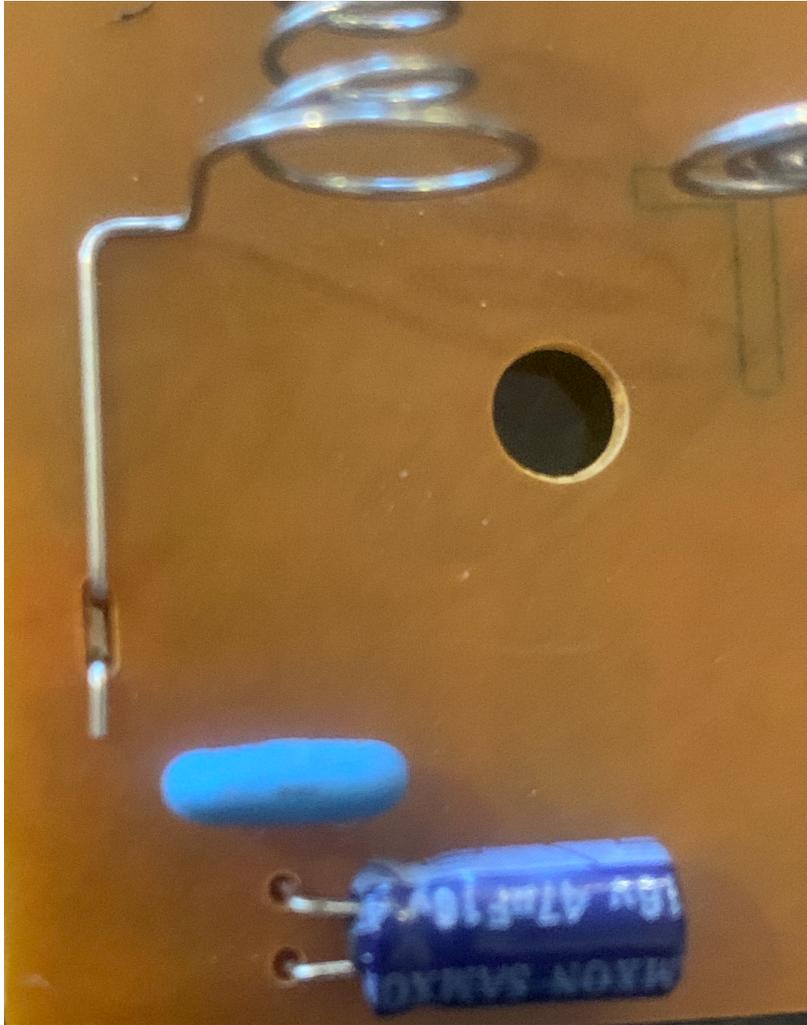


Figure 5: The transistor (light blue) and capacitor (dark blue) on the back of the remote

Works Cited

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