Kindle Deconstruction By Team 63857E
Katrina Mayen, Jamie Hughes

The electronic device we selected to deconstruct is the Kindle Fire HD 7" Generation 2. We wanted to deconstruct this device because it stopped working, and we suspected the battery was dead. We were interested to see if the battery had any physical signs of decay.

Inside the device, we found many different parts, all of which are listed on the parts list. The main systems we found were the motherboard, battery, audio system, and touchscreen display.

There are 4 types of components in every device, input, output, CPU, and memory. When there is the desired output, there is an action performed to trigger an input component to send binary data to the CPU and memory. CPU and memory would then go back and forth with different instructions until the desired output is found, and then the binary data are sent to the output components, which provide the desired response.

The input components on this device are the GPS and AGPS, Bluetooth, FM Receiver/Transmitter, Ambient light sensor, touchscreen controller, gyroscope/accelerometer, and Camera. The GPS and AGPS track the position of the device by satellites, and the FM Receiver/Transmitter receives radio waves to provide radio access. The ambient light sensor senses light levels and adjusts the brightness of the screen to optimize readability. Bluetooth components provide compatibility with other Bluetooth connections. The touchscreen controller receives data to process what part of the screen was touched, and the gyroscope/accelerometer determines the orientation of the tablet.

There are two types of memory on the kindle, RAM, and Flash. There is no hard drive, which is common in most tablets to save space and weight. Flash memory in the device is the long-term memory which saves data when there is no power, contrary to RAM, which provides faster access to certain highly-used data but does not retain data.

The output components in this device are the stereo, display, and headphone jack. The stereo and headphone jack use binary sent to them to produce audio. The display uses binary to produce graphics on the screen of the device.

Many essential functions of the device are also handled by integrated circuits, circuits that are shrunk to be more efficient. A Power Management IC and a Multifunction IC are on this device. The Power Management IC dictates the distribution of power, both in the destination and quantity of power. A multifunction IC combines many functions into one chip, and this device's multifunction IC includes a GPS, Bluetooth, and radio transmission.

Deconstructing this device has shown us how much goes into a device. We were amazed by the number and size of the components. None of the chips were over 1 in.^{2}, so many components fit on the multifunction IC! We learned about circuit boards, different types of memory, and the general structure of electronic devices. As for the battery of the device, we didn't see any physical indications of damage, but we are still interested in why the kindle died.

Parts List
Samsung KLMAG2GE4A eMMC 16 GB Flash Memory and Flash Memory Controller
Hynix H9 TK N8KD PQR-NGM RAM

| |
|---|
| Texas Instruments TWL6032 Fully Integrated Power Management IC |
| Broadcom BCM2076 Multifunction Monolithic IC with GPS and GLONASS AGPS, Bluetooth 4.0, and FM Receiver/Transmitter |
| Wolfson WM8962E Ultra-Low Power Stereo CODEC |
| Texas Instruments OMAP 4460 dual-core processor |
| InvenSense MPU-6050 gyroscope / accelerometer. |
| 3.7 V, 4400 mAh, 16.43 Wh Li-Polymer Battery Pack |
| Atmel maXTouch™ mXT768E mutual capacitance touchscreen controller |
| MD v1.2 Microphone |
| I1233 Camera |
| Ambient light sensor |
| LG Display LD070WX3-SL01 |
| Amazon Headphone Jack |
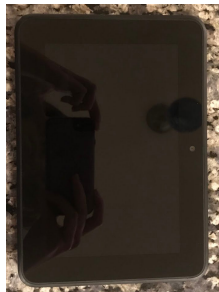
This is the top view of the Kindle before I started to deconstruct it.

These are the 2 parts of the kindle once the backplate had been removed. The battery, motherboard, and speaker system can be seen clearly here.

This is the Kindle once the battery was removed. The () and () can be seen clearly here, which connect the camera and headphone jack to the motherboard.
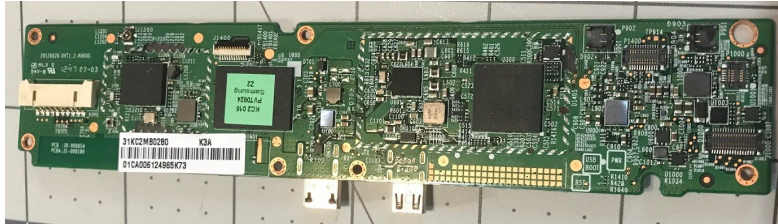
This is the motherboard of the Kindle. The Flash Memory, RAM, CPU, Power Management IC, and GPS are some of the components on the motherboard.