

Annandale High School

Atoms STEM

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Texas Instruments (TI) is one of the largest semiconductor design and manufacturing companies in the world. Technology has changed our lives in many ways. The most evolved piece of technology is the cellphone.The evolution of cellular devices is caused by the development of smaller electrical components.TI components are used inside devices ranging from calculators to the newest cars.Team members had to research and find the purpose of each component. Using the intuition of an engineer, we explored the inner workings of the Apple Iphone 4 and Samsung Galaxy S4.

Inside the IPhone 4 We found numerous components after removing all the EMI shielding which protects the integrated circuits from electromagnetic interference. The Iphone has an A4 Processor from Apple The A4 was a Cortex-A8 from ARM and a PowerVR GPU. This chip does all the data processing for the device. Next we have the Muratas 1830010 Wi-Fi chip. As the name implies this is the chip that enables Wi-Fi connectivity. The Baseband Processor made by Qualcomm, the MDM6600. It is a cellular module utilizing CDMA technology. There are two memory chips the Qualcomm PM8025, acting as as RAM, and the Toshiba THGVX1G6D2HLA01, A sixteen gigabyte NAND flash chip used for storage. Next we have the Cirrus Logic 338S0589 an HD audio codec with built in headphone amp. Unexpectedly, we managed to find a TI component. The TI 343S0499 touch screen controller, which converts signals from the digitizer to a language that the logic board can understand.

Moreover, we discovered that the Galaxy S4 is more complex than the Iphone. The processor is an Exynos 5410 manufactured by Samsung. It’s an 8 core processor based on the Cortex-A15. It has two gigabytes of Samsung K3QF2F200C-XGCE DRAM memory, acting as short term memory for the processor. Next we have the Power Management ICs a Samsung S2MPS11 and a Maxim MAX77803. These are like the mitochondria of the device. They control and filter power for each of the components and the ICs in the phone. Continuing with numerous communication modules; we have a PMB9820 baseband processor by Intel for 4G cellular data connection, A BCM4335 Wifi chip by Broadcom, a Broadcom BCM20794 NFC controller, and an Intel PMB5745 RF transmitter for near field communication, and an SWC-GKF48 Antenna Switch Module by Maxim. The audio is processed by a Wolfson Micro WM5102E. The touch screen is powered by a S5000B Touch IC from Synaptics. Finally the last component a SIL8240 image transmitter by Silicon Image, which allows the device to support HDMI video.

In both of the devices we listed above we also found a variety of SMD components such as capacitors, resistors, thyristors, and fuses which run the power rails and connect signal lines for all the components on the board.

Through the research of these devices, it is possible to innovate and create something new. Finally, we would like to thank VEX for allowing students like us, with the passion towards Science, Technology, Engineering and Mathematics for the opportunity.