Team #62880B: Alpha Robotics Electronics Online Challenge

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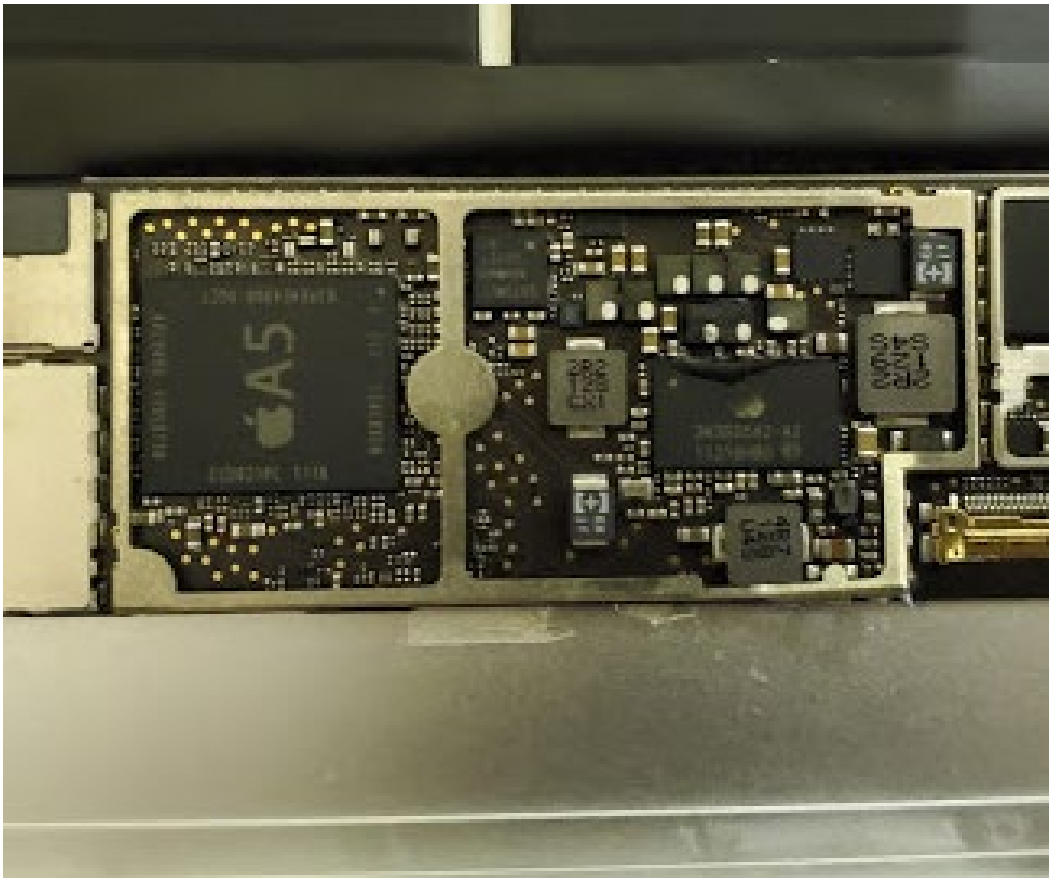
ROBOTICS

Device: Apple iPad 2

The Battery Pack + Touchscreen Line Driver and Capacitive Touchscreen Controller

For this challenge, our team decided to use an Apple iPad 2 to disassemble and evaluate. This is the first time we have ever taken apart a commercial electronic device, so it was a unique experience. Since the purpose of devices such as this iPad are to create an efficient, seamless experience for the user, our team thought this would be the best choice for this particular challenge. Furthermore, there are many different components in such a device, which all have to be working in tandem to create the best possible experience for the user. Another reason why we chose this particular device was because of its astonishing complexity, making disassembling it a challenge. Looking back, the iPad has a plethora of functions that it is able to carry out, meaning that there are so many interesting components to the device.

Chips and Components



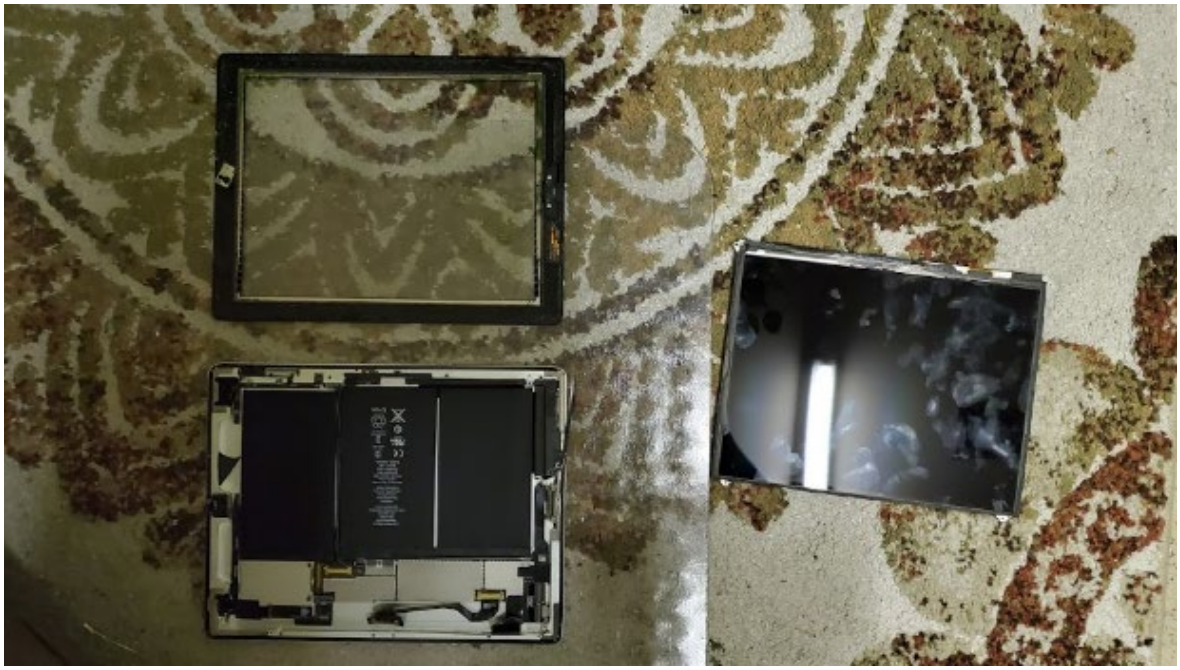
Logic Board of the Apple iPad 2

- Apple A5 Dual - Core 1GHz CPU
- 3438S0542-A2 – the Power Supply IC chip, which is used for power management
- DRAM - Samsung 512MB RAM
- Flash Memory - Toshiba 16GB NAND
- Touchscreen Line Driver: Texas Instruments CD3240B0
- Capacitive Touchscreen Controller - Broadcom BCM5974

The majority of the chips were in the logic board. Considering that an iPad is so similar to any standard computer, it requires some basic universal components such as a processor that has a RAM, which is a random access memory, more commonly known as storage. In addition, the iPad has a power supply, whose job is to to supply power to all the components within the device to keep it running seamlessly, and storage to manage anything that is a file such as applications or music. The iPad also has an A5 processor, which is something that is made specifically for the iPad itself. It is a part of the ARM archetype, which our standard computers don't have.

The TI component that was used was found in the touchscreen line driver. This is the main part that gives the touchscreen its functionality, which is integral to the composition of the iPad considering it is a tablet-style device. To conserve space, the RAM and the A5 chip are on the same chip within the logic board, which limited our ability to identify the chips. As of now, the storage capacities seem incredibly high when compared to those of nine years ago. However, 16 GB (gigabytes) of storage was an exceptional amount in 2011, and was considered more than enough at the time. The main component in charge of sensing any input in the form of movement or touches is the capacitive touchscreen controller. For its time, the battery was incredibly advanced, being able to withstand an impressive output of 8V (volt) and having the capability of holding 24 watt-hours. The iPad had the capability to last for a solid 8 to 10 hours on a single charge.

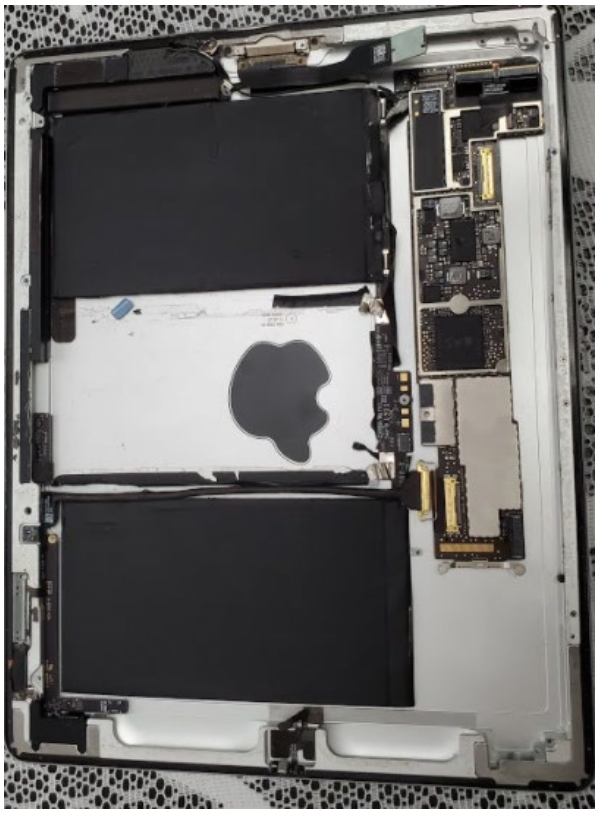
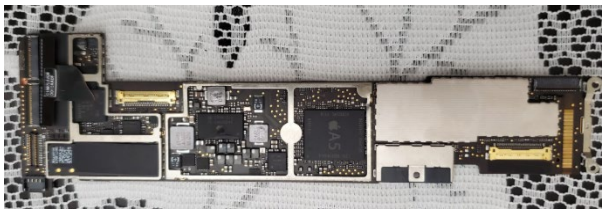
Conclusion



On the top left is the outer frame of the iPad. On the bottom left are the internal components as a collective whole. On the right is the screen itself.

Our biggest takeaway from this challenge would definitely be how astonishingly complex and incredibly intricate something as common as an iPad can be. Carrying out everything from our smallest requests to our biggest demands requires state-of-the-art technology and extreme precision. Texas Instruments, and other companies like it, have a huge impact on our lives because they are the ones who help develop these intricate internal components. Daily essentials in our day-to-day lives, such as GPS's (Global Positioning Systems), gyroscopes, and accelerometers are those that we take for granted, yet, they help us tremendously and we wouldn't have them if it weren't for companies such as these. Because of this challenge, we, as a team, are so much more aware of how the world works and how we are able to access all of these devices that are such an important part of our lives. This makes us so much more thankful for everything that makes our lives so much easier and the companies, such as Texas Instruments, that make this possible.

Parts

Picture	Caption
	The outer shell of our device – the Apple iPad 2
	The logic board – this contained the most chips, including the A5 chip and the RAM processor
	The screen of the Apple iPad 2 – this is without the outer frame.

	The outer frame of the screen of the Apple iPad 2.
	The battery from the iPad.