

Dell Inspiron reverse engineering challenge

10478D

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Credits

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The device

We chose to use a Dell Inspiron laptop for our project because this laptop has many of the usual components of a desktop computer but was smaller and more compact making it a more challenging project. It was also going to be thrown away so using it for this was good as we could fully deconstruct it and didn't have to consider the computers fragility.

For more descriptions see appendix.

Batteries



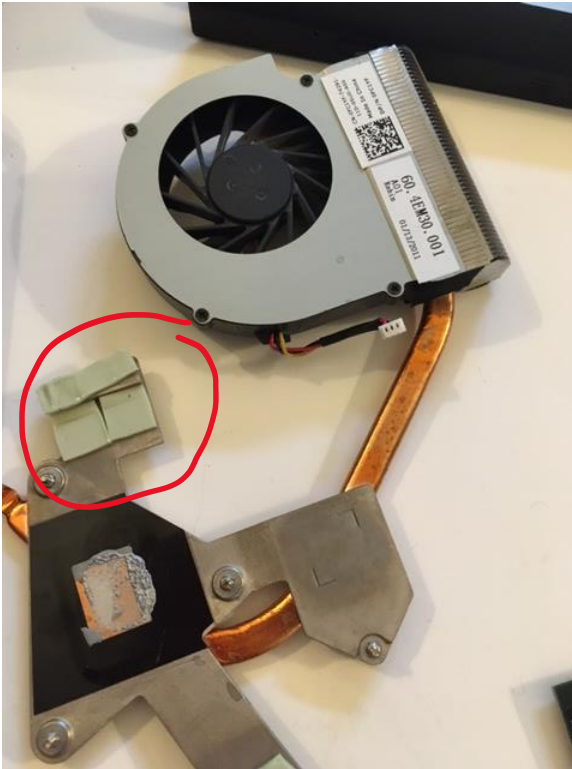
This laptop has a battery compartment, which was removed before we began de constructing it, the batteries allow the laptop to hold charge and run without a wired connection to a plug.

Hard disk drive (HDD)



The HDD is a form of secondary storage, it has a spinning platter and a head (a small pin) that moves over it. The HDD has programs stored on it in binary on the platter or magnetic disk. It is also non-volatile (it can remember without power)

Heat sink



The heat sink removes heat from the CPU and graphics boards by using the conductive metal to conduct the heat to the fan. There are some sponge pads (circled) between the metal and the components to prevent electricity being conducted.

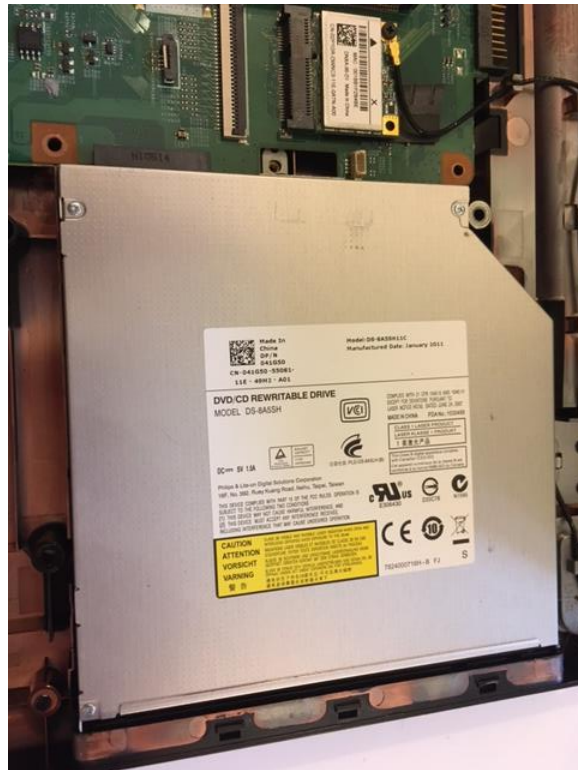
Random access memory (RAM)



RAM slots

The RAM is primary storage but cannot remember without power. Data and programs currently in use are stored in RAM and can be altered.

DVD/CD drive



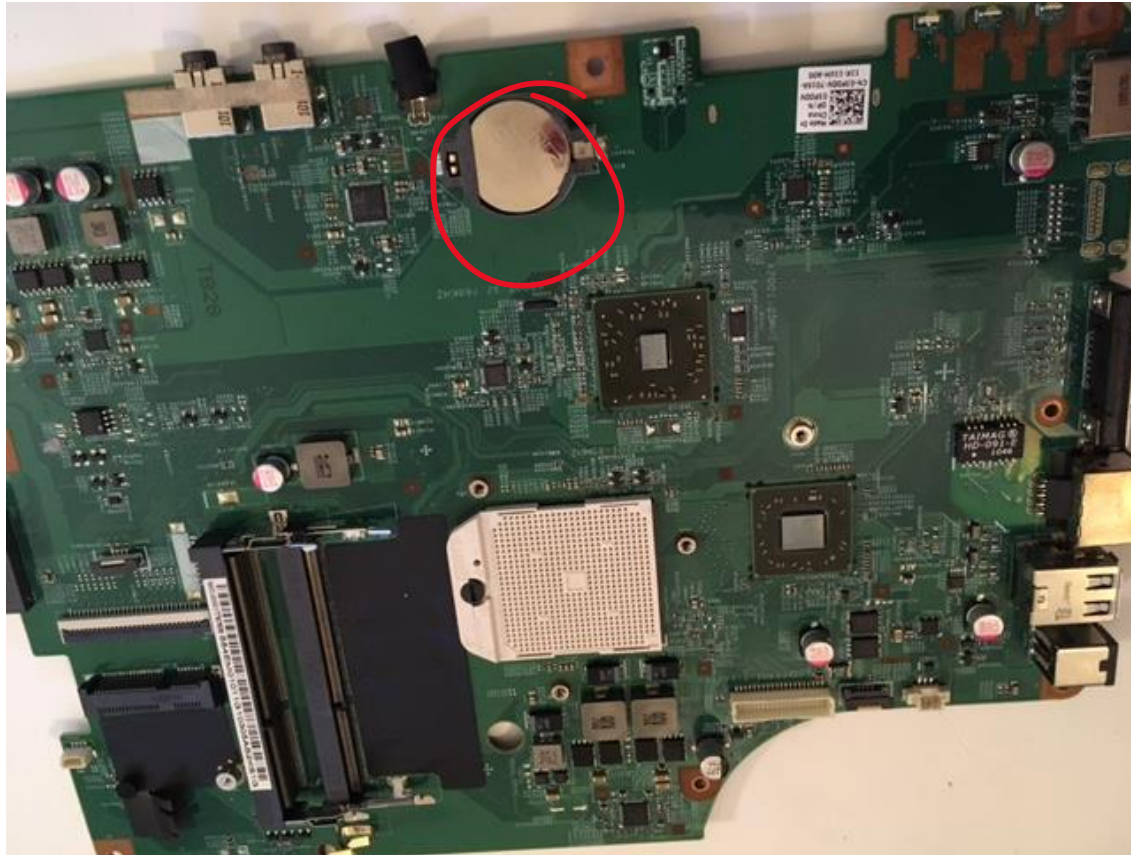
The CD/DVD drive is used to read CDs or DVDs and send the data to the screen.

Wi-fi chip



The wi-fi chip makes binary in a specialised frequency that a router can pick up and use to send wi-fi to the device.

Subsidiary battery



This subsidiary battery is used to ensure that when the device is not off, the time and date continue to maintain the correct time and date.

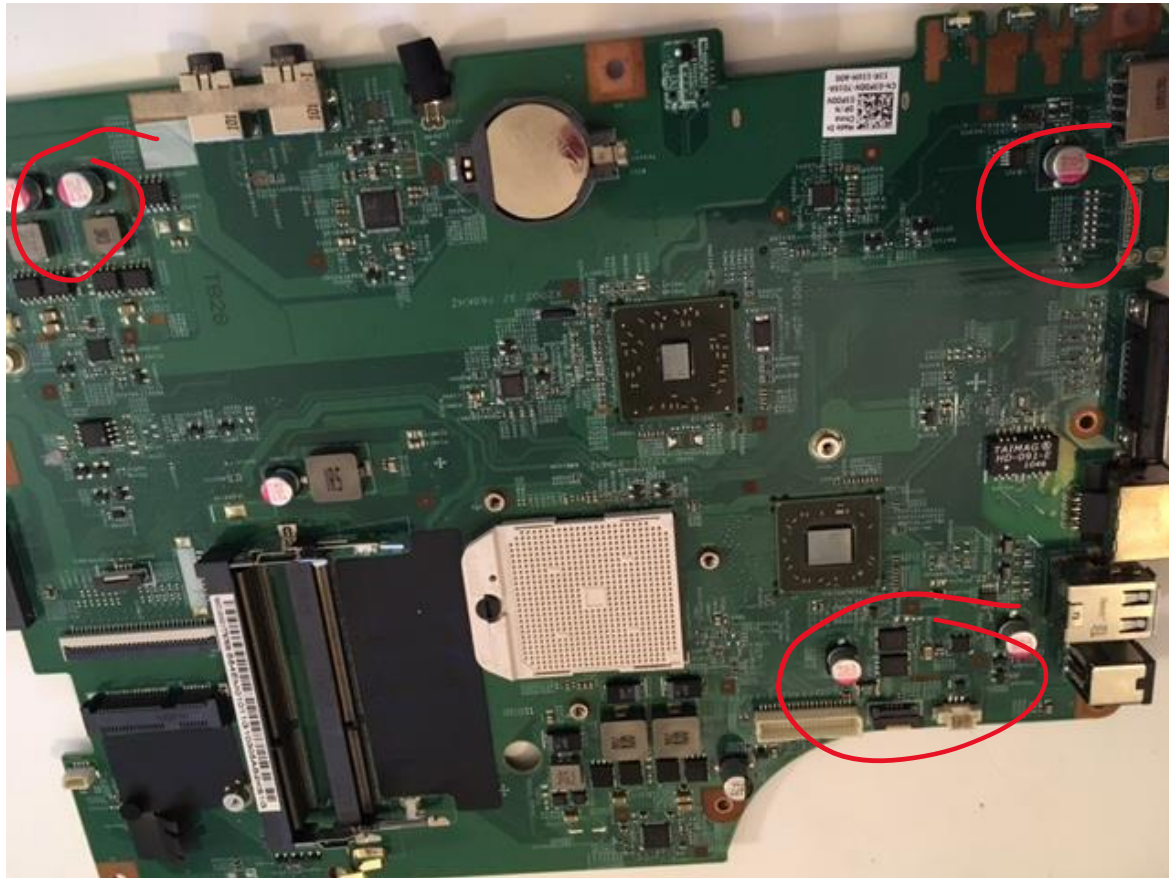
Central processing unit (CPU)



The CPU gives instructions to all the other components. This CPU has pins on it, is made by AMD and uses the Von Neumann architecture. This conducts the FDE cycle.

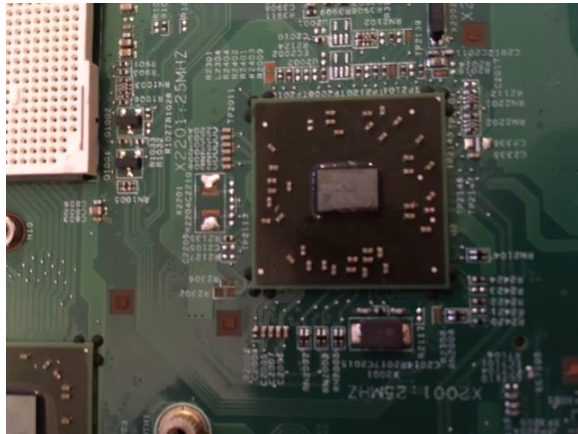
CPU and socket

Transistors



Transistors are used to make binary, they open and close like a gate. On=1, Off=0. This binary is then used to represent a number or letter.

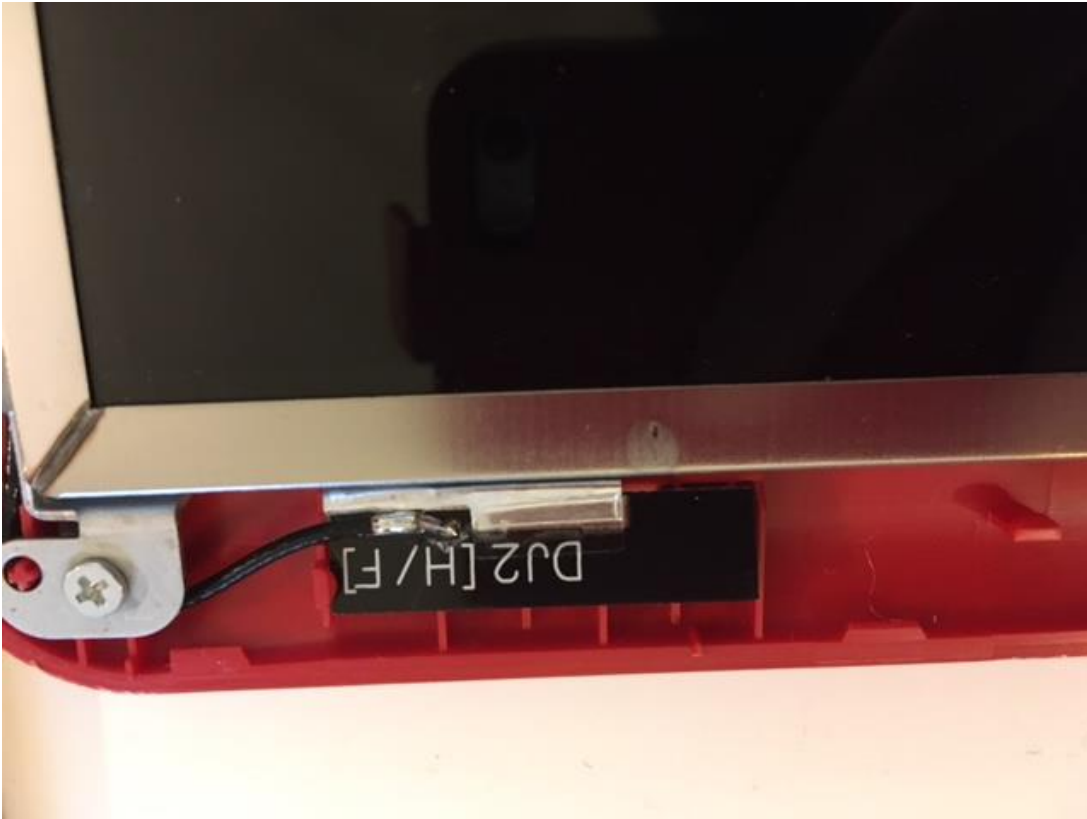
Graphics card



The graphics card enhances the video output onto a screen as it shares the job with the CPU preventing it overheating.

Wi-Fi areal

The wi-fi areal is used to find wi-fi coming from a nearby router.



camera



This laptop has a camera. It is connected to the graphics board and CPU. They translate the images and send them to the screen.

Printed circuit board (PCB)



PCBs hold many of the other components in place. They are plastic boards that have metal wires embedded in them to allow electrical connections between components.

Parts list

- Hard disk drive (HDD)
- Heat sink
- Central processing unit (CPU)
- Random access memory (RAM)
- DVD/CD drive
- Wi-fi chip
- Clock battery
- Transistors
- Graphics card
- Camera
- Wi-fi aerial
- Printed circuit board (PCB)
- Batteries

Appendix

Von Neumann architecture— In 1903 Von Neumann added registers to the CPU to improve its function. He added five registers, the program counter (PC), memory address register (MAR), memory data register (MDA), current instruction register (CIR) and accumulator (ACC).

Binary – a series of zeros and ones used by computers to communicate letters and numbers.

FDE cycle – The Fetch Decode Execute cycle takes place within the CPU. When the clock, inside the CPU, ticks a fetch, decode or execute can happen. When we input data through an input device (e.g. Mouse) the CPU waits for a tick to begin the fetch process. First the MAR tells the PC where the program is stored in the RAM, it then brings the programs data back to the CPU. After another tick the decode stage begins, the PC decides what the input meant (e.g. open the program). It waits for another tick then finally, it sends that data to the screen and the process repeats.

Conclusion

We feel that this project has shown us the complexity of electronic devices and the roles that microscopic components can play in a large system.