VIQC Middle School - Reverse Engineering Online Challenge

# Dell Monitor

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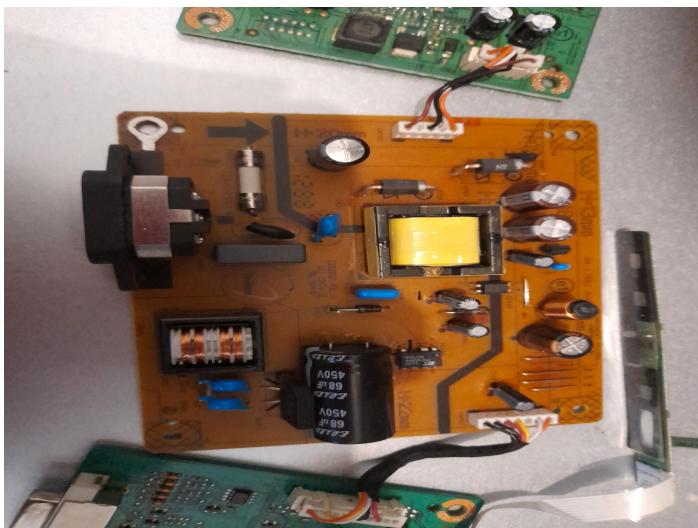Palmerston North
New Zealand

Introduction

I chose to take apart a Dell monitor. I picked this electronic device because it was broken and I thought I might be able to find what was wrong with it when I took it apart.

The main components I found when I took apart the monitor were a 24" LCD screen, power delivery, and a monitor controller.
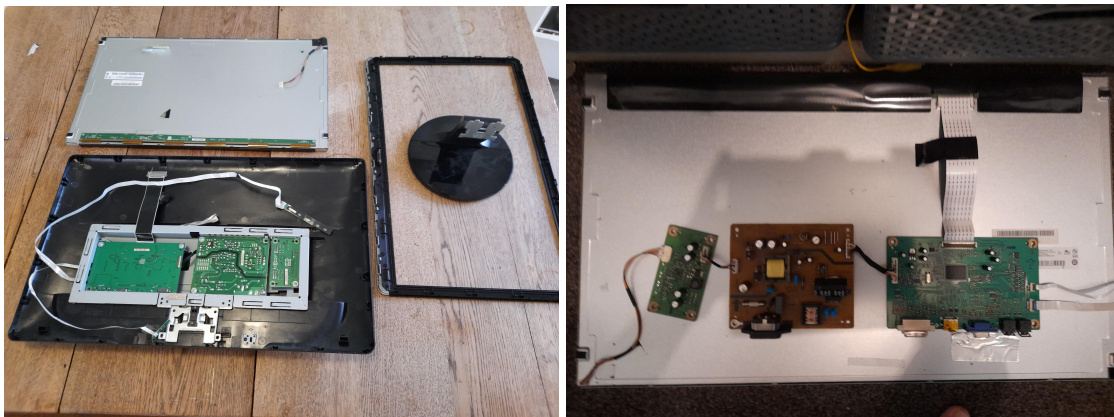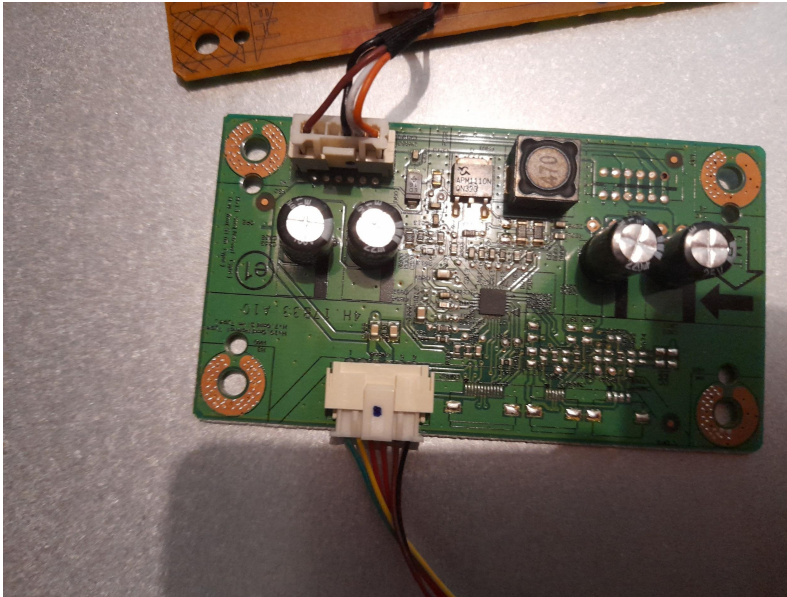

Components

Power Delivery

The power delivery board takes electricity from the power outlet via the external cord and distributes it to all the other components. The power input can be seen at the top left of the picture above. It is connected to the other components by the plugs seen at the top and bottom of the board.
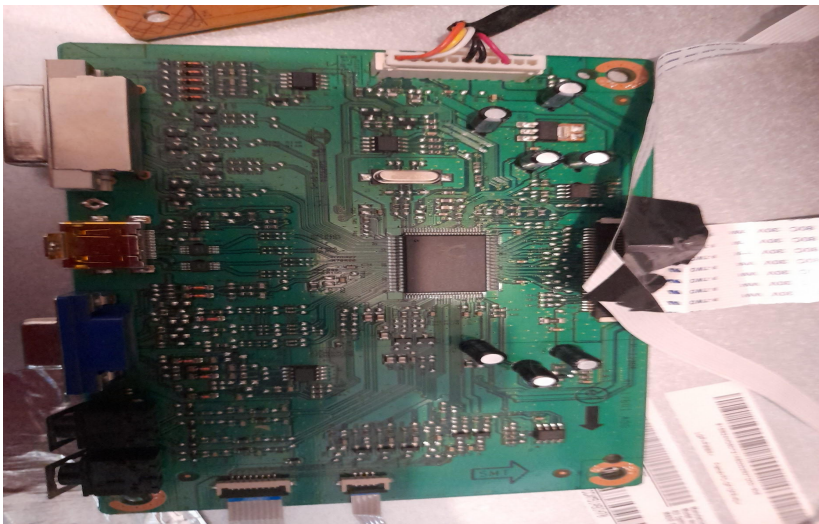
Power Delivery Cont.

This component takes the power from the power delivery board and sends it to the screen.

Both boards have a lot of different sized capacitors which hold different charges for the various components on the boards.

Monitor Controller

This is the monitor controller, this is the heart of the monitor, it takes the signal from the HDMI or VGA cable and translates it to a signal that the monitor can read. It controls the brightness, colour and contrast of the screen. The controller also has an output and input for audio because HDMI also sends audio through the cable.

Some specific capacitors on this board hold a charge to keep the component that holds the information for the contrast, colour and brightness settings powered.

LCD screen

This is the 24" LCD screen, it stands for Liquid-Crystal Display. It works by using a polarizing filter, some nematic liquid crystal, a backlight and a sheet of RGB (red, green and blue) subpixels. The polarizing filter blocks horizontal light waves. Nematic liquid crystal works like the polarizing filter but it can move the angle of the light waves it lets through by changing the amount of energy the nematic liquid crystal receives. Effectively it changes the brightness of all the light it lets through. After that process all it needs to do to make it show colour is to shine the light into a filter of lots of RGB subpixels so it can make a full colour image.

Conclusion

As part of this project I learnt these things:

- It is quite difficult to pull apart a device without breaking it as the manufacturers probably don't expect you to try to repair it.
- There are a lot of different kinds of capacitors that hold different charges for various applications
- How an LCD screen can manipulate liquid crystal to change the brightness of light and colour displayed on screen