



8301B Texas Instrument Vex Online Challenge 2018 entry

Epson PowerLite 5000 projector



COUGARBOTS

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Introduction

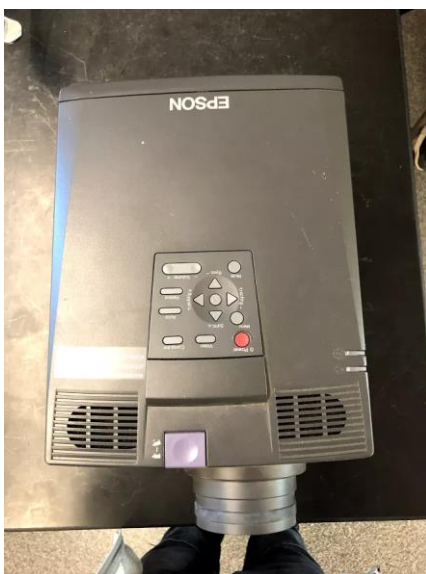
When we came upon the Electronics Online Challenge Sponsored by Texas Instruments, we had the choice of taking apart an Xbox 360, a PS3, an iPhone, or an old EPSON home projector. Our minds were first captivated at the thought of dismantling our long beloved devices - Xbox, PS3 and iPhone. However, since those 3 are beloved devices by many people, videos of their inside mechanisms on YouTube were abundant. Taking apart an old EPSON home projector, on the other hand, is more of a rarity. So, out of the curiosity to figure out how an old projector makes it possible to display images from a far distance, we chose to disassemble an EPSON PowerLite 5000 projector from the year 1996.



Front face of the projector



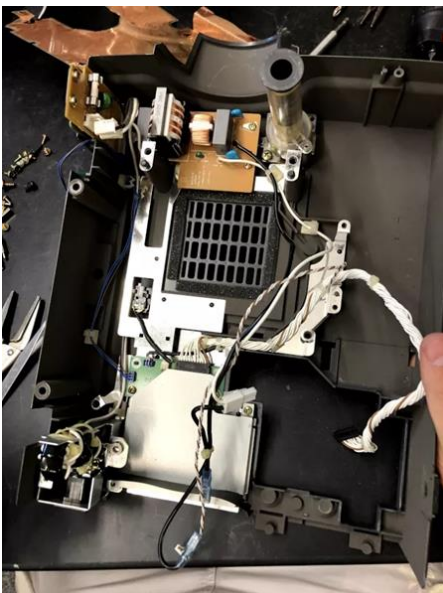
Back side of the projector



Top side of the projector

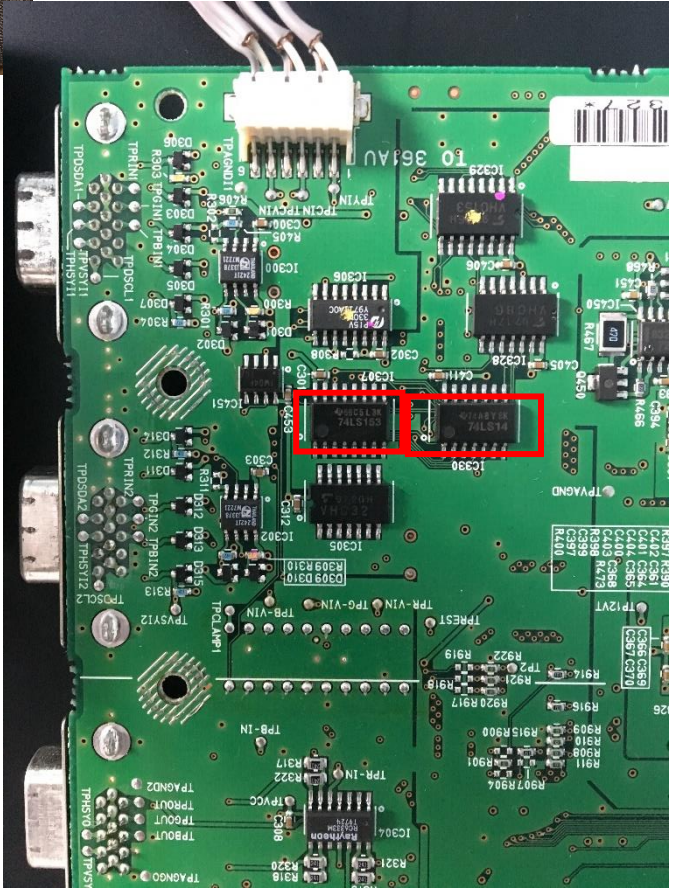
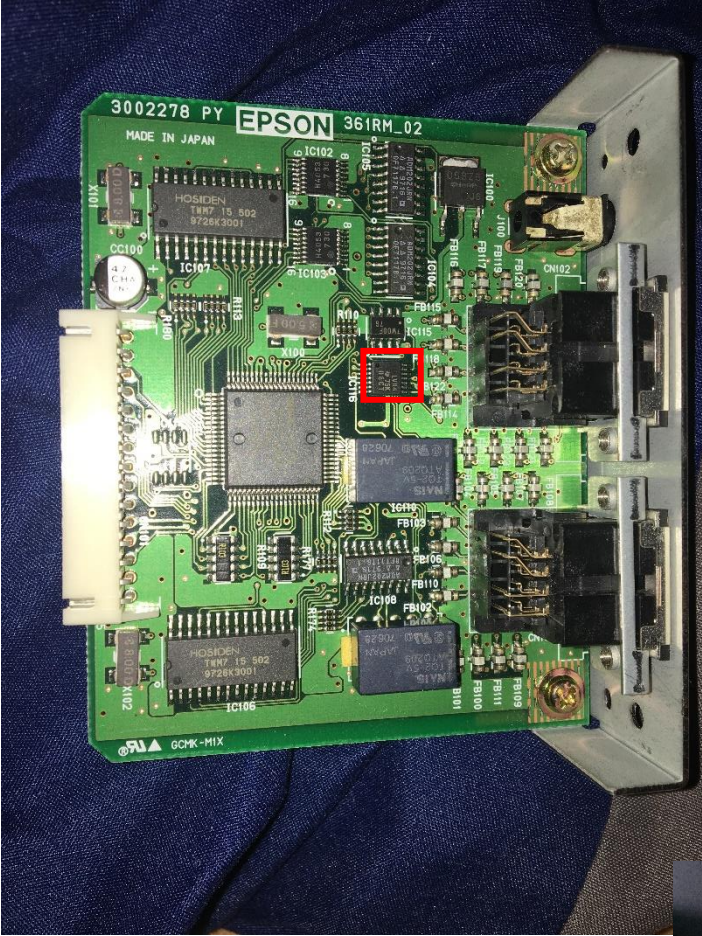
Disassembly/ Analysis

At the very beginning of the tear down, we quickly realized how daunting this task was going to be. Once we took off a lot of small screws from the covers and took apart the top from the bottom cover, we were quick in realizing the incredible engineering that took into designing something so complicated into the small volume that the projector has, despite being very old and heavy. While we were taking it apart, we came across a variety of many different parts and PCBs. We found 5 PCB, all with very distinct purposes and many other components like the speakers, lens, light guiding unit through which the light moves through. Taking this apart was not very complicated once we were able to get the main board off the, exposing the light guiding unit, lens, and driver board. Taking this projector was definitely very fun and interesting because as we removed another component, we realized how complex a projector is and how many things were necessary in order to project the light image. While taking this projector apart, we were also very surprised to find as many TI chips that we did. During this tear down, we were able to find up to 6 distinct TI chips throughout all the PCBs.



List of figures

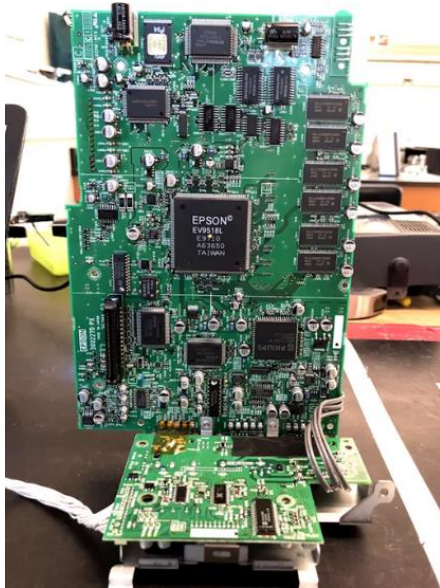
1. Main Board
2. Main Board connected to the AU Board
3. FR Board
4. Driver Board
5. RI Board
6. Filter Unit
7. Power Supply Unit
8. Driver board heat protector
9. Cooling Fan
10. Fan Filter
11. Lamp Inner housing
12. Individual speaker module
13. Optical Lens
14. Power supply
15. Top view of the Optical Vision Engine
16. Light Guide Unit
17. Power supply AC connection
18. Bottom access panel





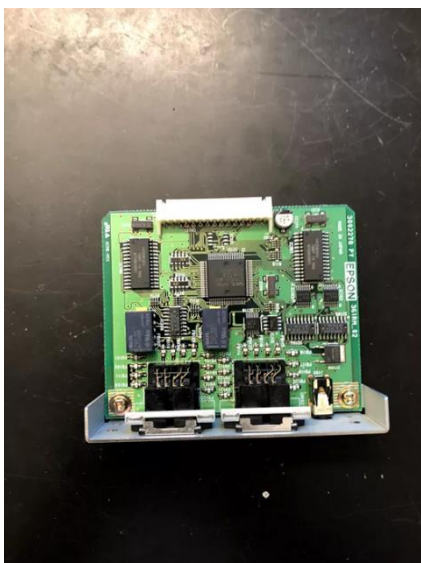
Main Board

Figure 1:



Main Board with AU Board

Figure 2:



FR Board

Figure 3:

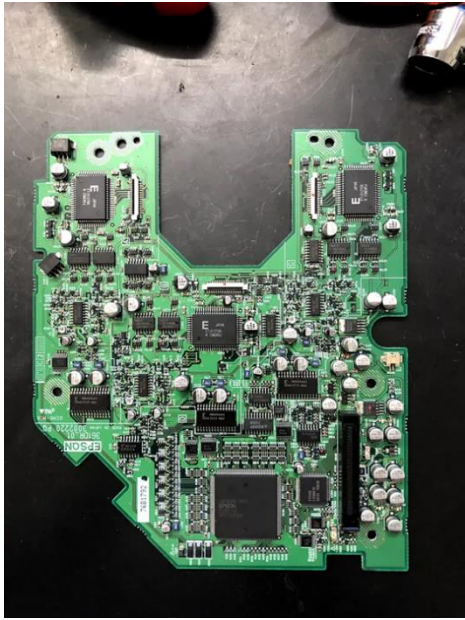


Figure 4:

Driver Board



Figure 5:

RI board



Figure 6:

Filter Unit

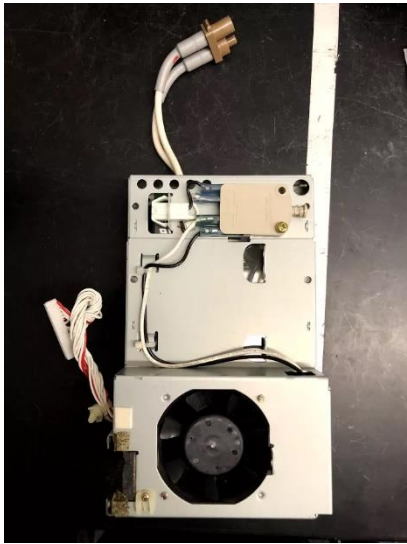


Figure 7:

Power Supply Unit

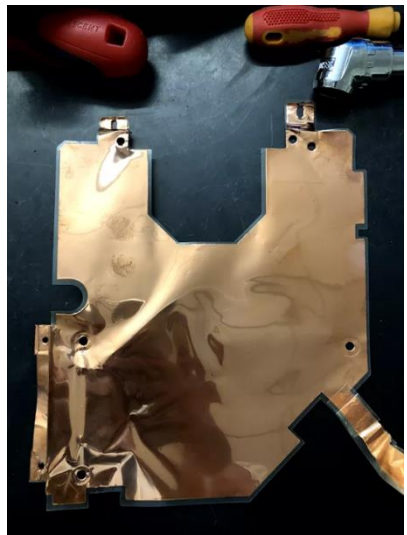


Figure 8:

Driver Board Heat Protector



Figure 9:

Cooling fan



Figure 10:

Fan Filter



Figure 11:

Lamp Inner Housing



Figure 12:

Individual Speaker Module



Figure 13:

Optical lens

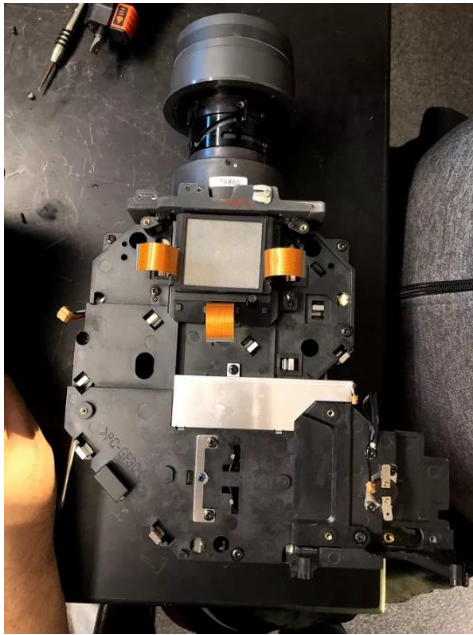


Figure 14:

Power supply

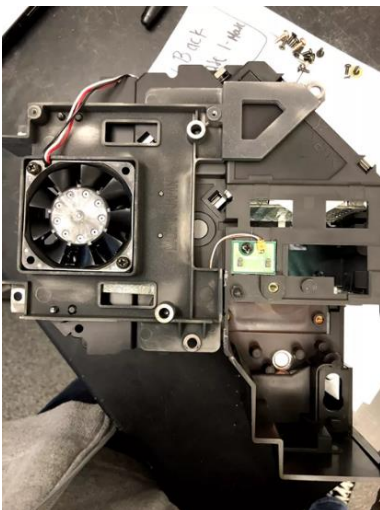


Figure 15:

Top View of the Optical
Visual Engine

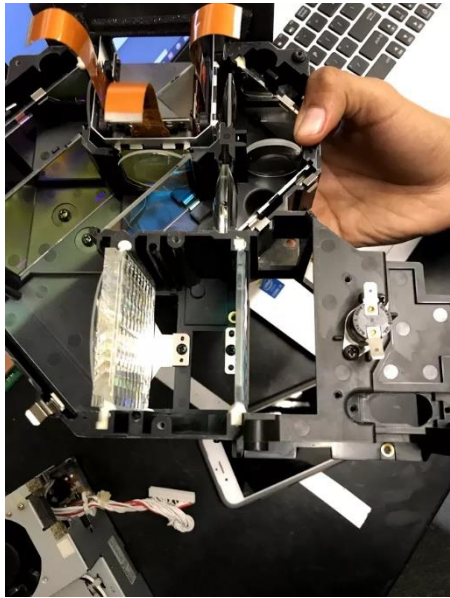


Figure 16:

Light Guide Unit

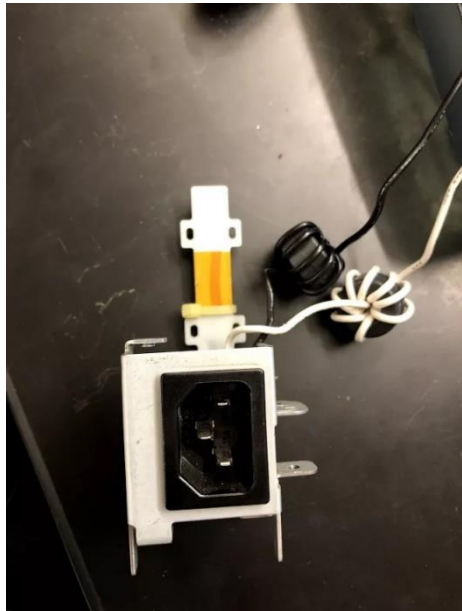


Figure 17:

Power Supply AC Connection



Figure 18:

Bottom Access Panel

Conclusion

After completing our disassembly, conducting research on how a projector works and also researching the purpose of the projector's components made us learn that it takes many different types of CBs, processors, filters, ventilation and power supply to make a projector display images. We also learned how capacitors store the energy that flows through the transistors in the CBs. We were also surprised to see 5 chips manufactured by TI; we didn't know that TI made many parts for Epson. Overall, this experience allowed us to expand our knowledge on the complexity of electrical components.