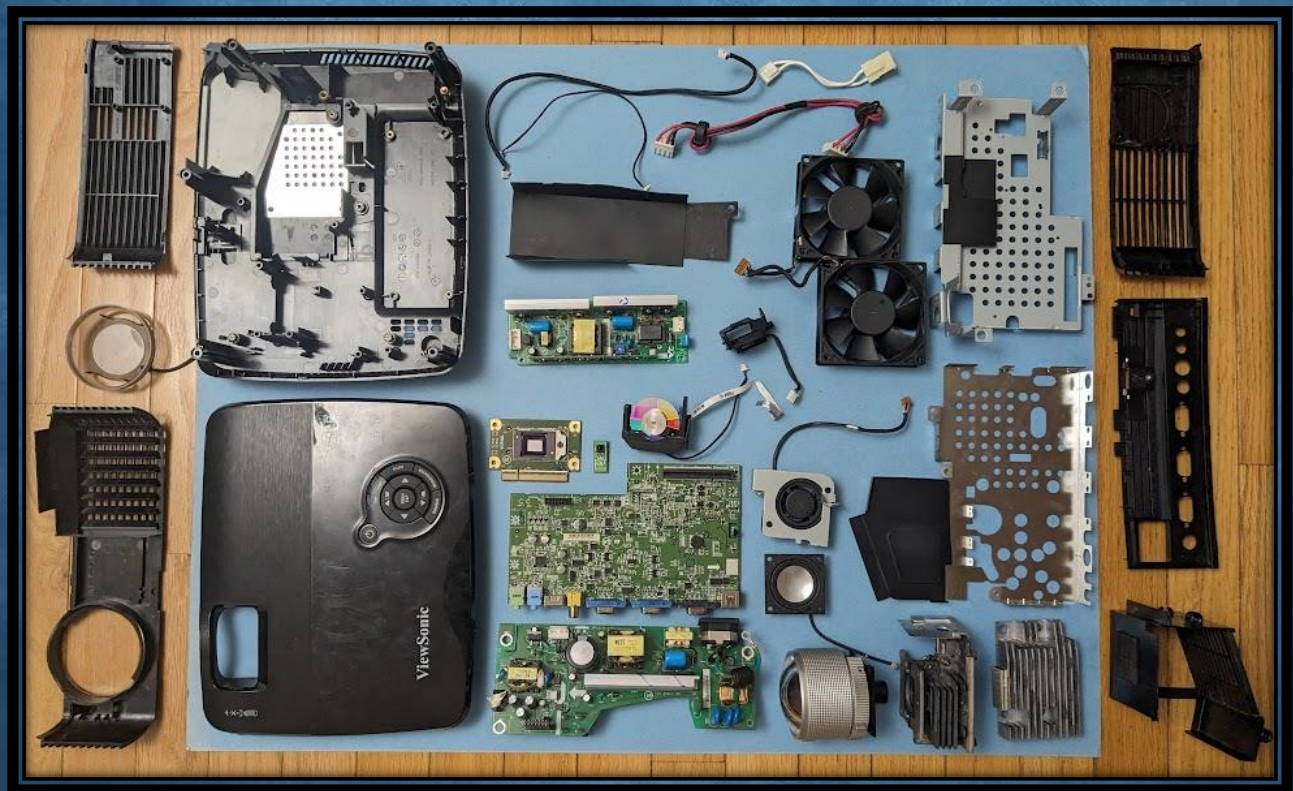




The Anatomy of the ViewSonic PJD5352 Short-Throw Projector



Grafton Gears 23692A

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1. INTRODUCTION: OUR TEAM

We are three juniors who joined Grafton High School's Robotics club ever since last year. We were introduced to the REC Foundation Online Challenges this year and have spent our time outside of school to work on this project.

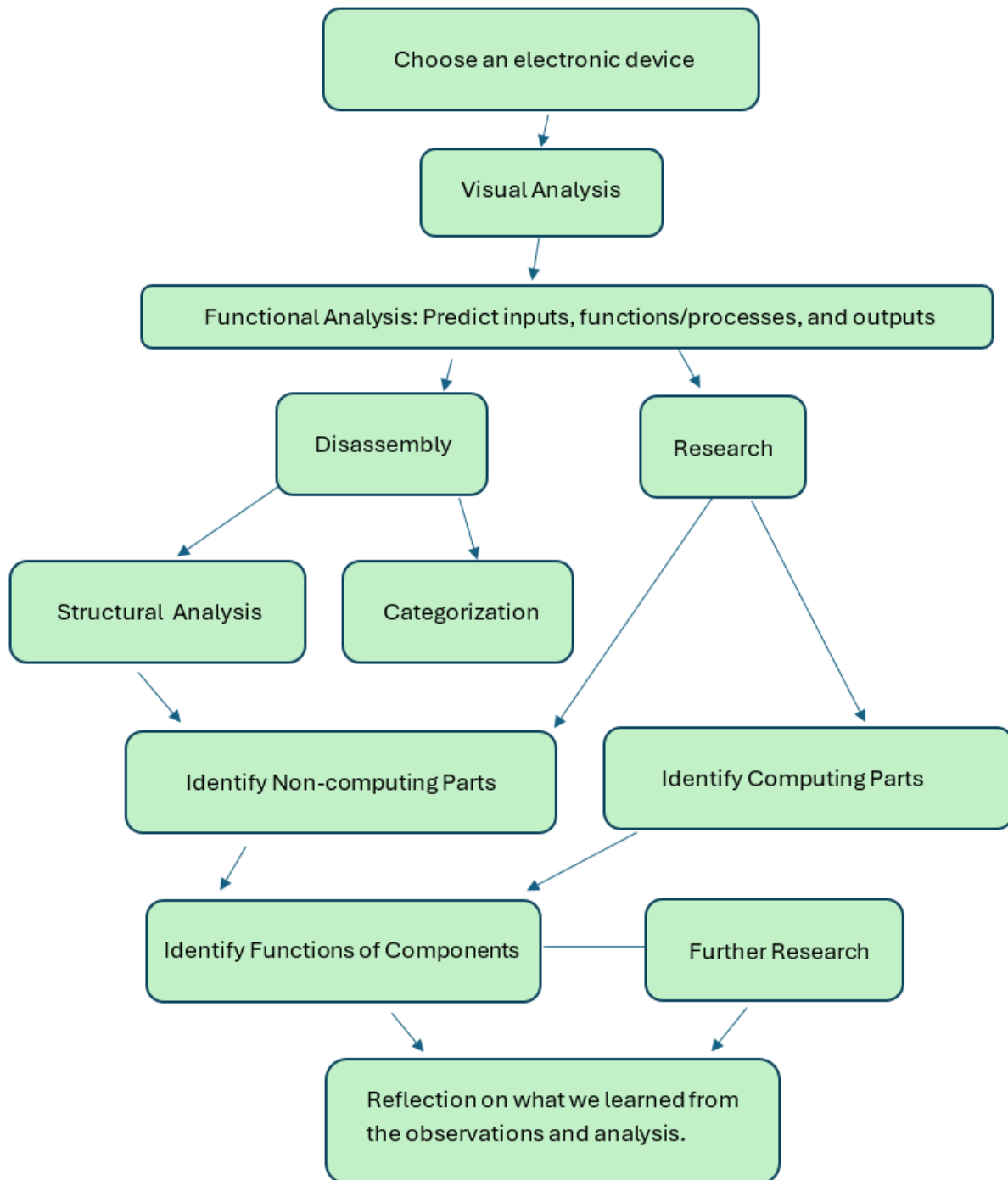


2. WHAT IS A VIEW SONIC PROJECTOR?

A ViewSonic projector allows us to display digital content to a large screen as light projects through lenses/mirrors to magnify/focus the projections onto the desired surface. ViewSonic incorporates cutting-edge technologies to enhance color accuracy to display improved graphics. **We were intrigued and chose to deconstruct this device because not only it is regularly used at schools, but also in many other settings like businesses/corporations, entertainment, and medical settings.**



3. PLAN OF ACTION

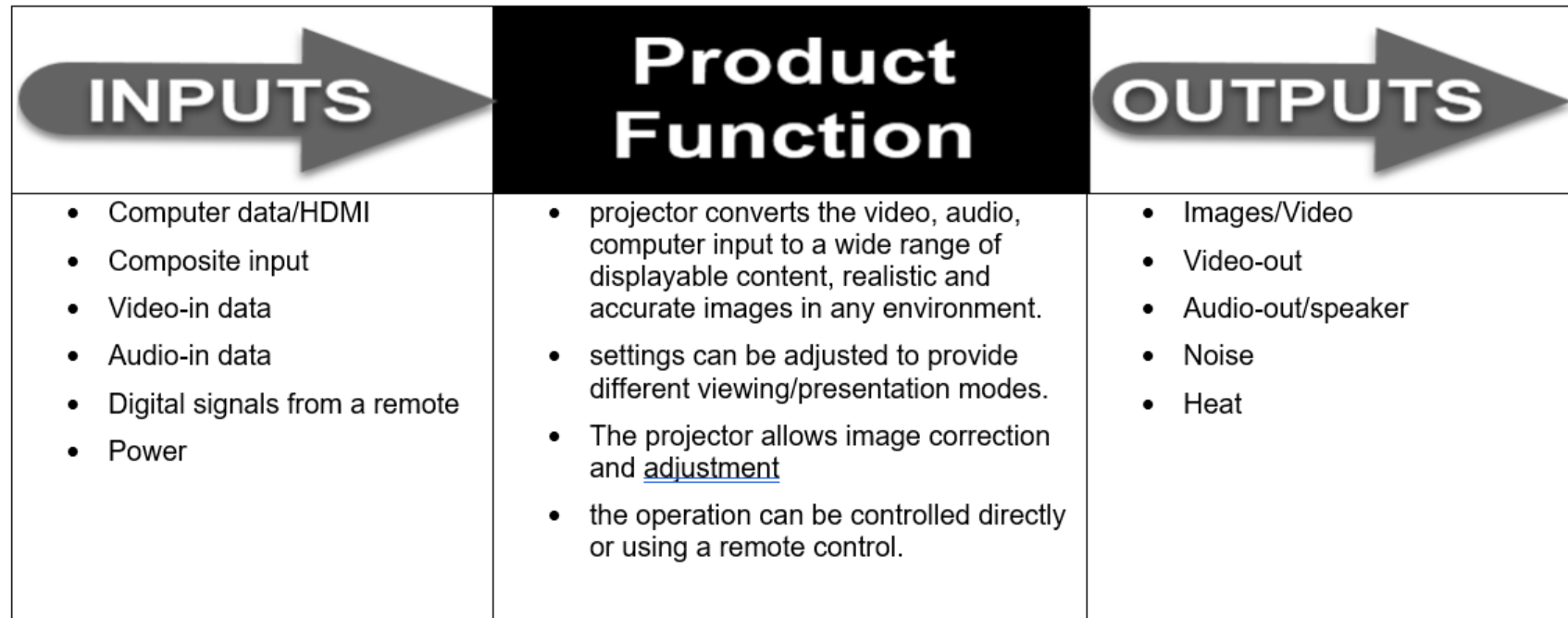


4. VIEWSONIC FUNCTIONAL ANALYSIS

ViewSonic PJD5352 Short-Throw Projector

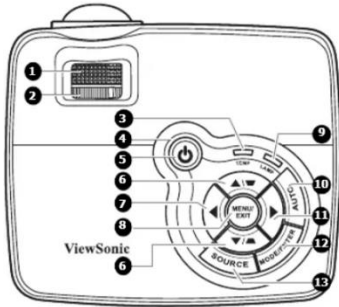
Purpose of the Product:

display digital content to a large screen as light projects through lenses/mirrors to magnify/focus the projections onto the desired surface.



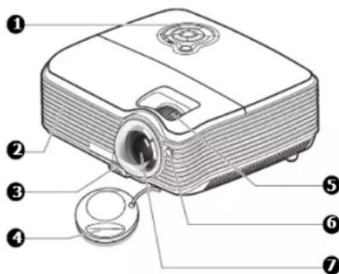
5. RESEARCH ON VIEWSONIC

External Components Defined in User Manual:



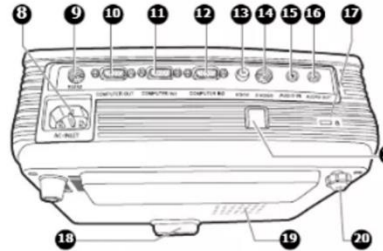
1. **Focus ring**
Adjusts the focus of the projected image. See "Fine-tuning the image size and clarity" on page 26 for details.
2. **Zoom ring**
Adjusts the size of the image. See "Fine-tuning the image size and clarity" on page 26 for details.
3. **TEMPERature indicator light**
Lights up red if the projector's temperature becomes too high. See "Indicators" on page 49 for details.
4. **POWER indicator light**
Lights up or flashes when the projector is under operation. See "Indicators" on page 49 for details.
5. **POWER**
Toggles the projector between standby mode and on. See "Starting up the projector" on page 19 and "Shutting down the projector" on page 35 for details.
6. **Keystone/Arrow keys (▲/▲Up, ▼/▼ Down)**
Manually corrects distorted images resulting from an angled projection. See "Correcting keystone" on page 26 for details.
7. **◀Left/Blank**
Hides the screen picture. See "Hiding the image" on page 33 for details.
8. **MENU/EXIT**
Turns on the On-Screen Display (OSD) menu. Goes back to previous OSD menu, exits and saves menu settings. See "Using the menus" on page 21 for details.
9. **LAMP indicator light**
Indicates the status of the lamp. Lights up or flashes when the lamp has developed a problem. See "Indicators" on page 49 for details.
10. **AUTO**
Automatically determines the best picture timings for the displayed image. See
11. **▶ Right**
Activates panel key lock. See "Locking control keys" on page 33 for details. When the On-Screen Display (OSD) menu is activated, the #6, #7, and #11 keys are used as directional arrows to select the desired menu items and to make adjustments. See "Using the menus" on
12. **MODE/ENTER**
Selects an available picture setup mode. See "Selecting a picture mode" on page 29 for details. Enacts the selected On-Screen Display (OSD) menu item.
13. **SOURCE**
Displays the source selection bar. See

Front/upper side



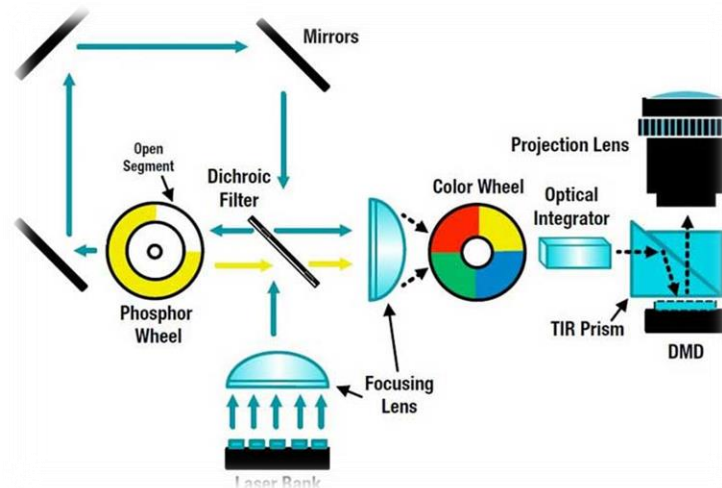
1. External control panel
2. Vent (heated air exhaust)
3. Quick-release button
4. Lens cover
5. Focus ring and Zoom ring
6. Front IR remote sensor
7. Projection lens
8. AC power cord inlet
9. RS-232 control port
10. RGB signal output socket
11. RGB (PC)/Component video (YPbPr/YCbCr) signal input socket-1

Rear/lower side



12. RGB (PC)/Component video (YPbPr/YCbCr) signal input socket-2
13. Video input socket
14. S-Video input socket
15. Audio signal input socket
16. Audio signal output socket
17. Kensington anti-theft lock slot
18. Quick-release foot
19. Lamp cover
20. Rear adjuster foot
21. Security bar
Connects a commercially available theft prevention cable.

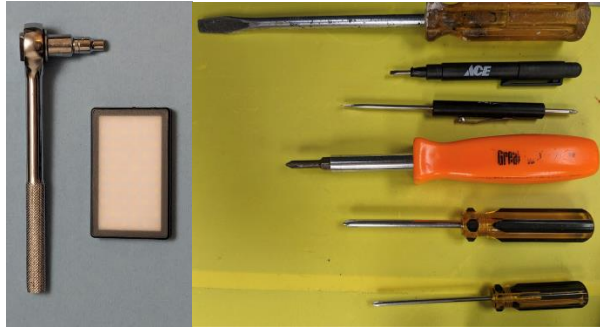
Optical Lens Assembly Projection:



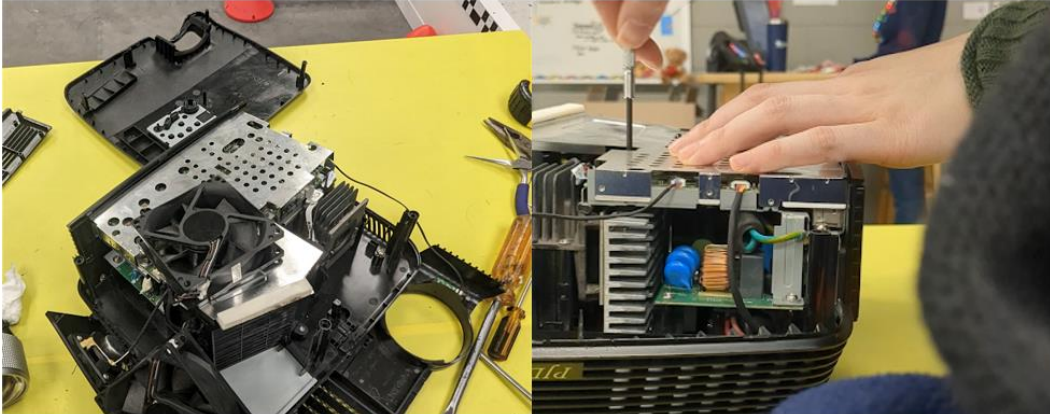
6. DISASSEMBLY

Tools:

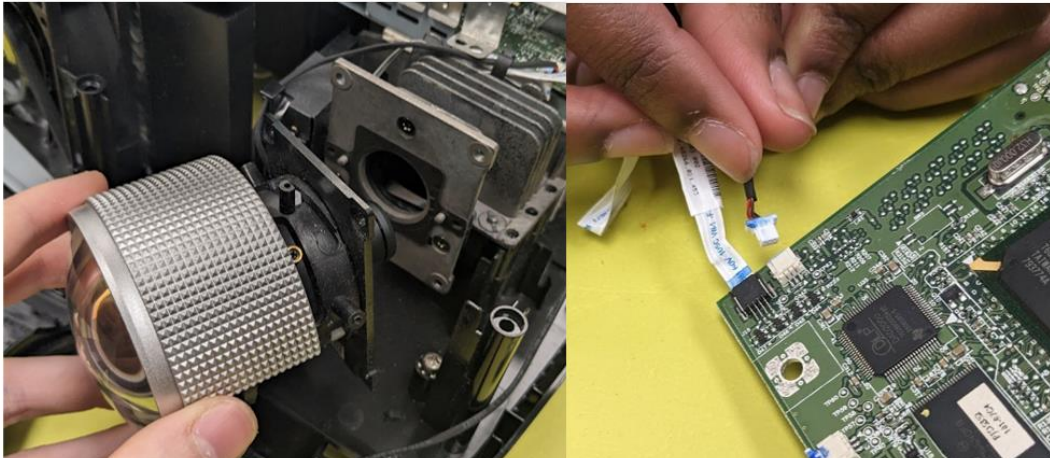
- Hex Socket
- Flashlight
- Philips and slotted screwdrivers (varied sizes)



Unscrewed battery lid and the outside screw; removed sides until top cover removed.



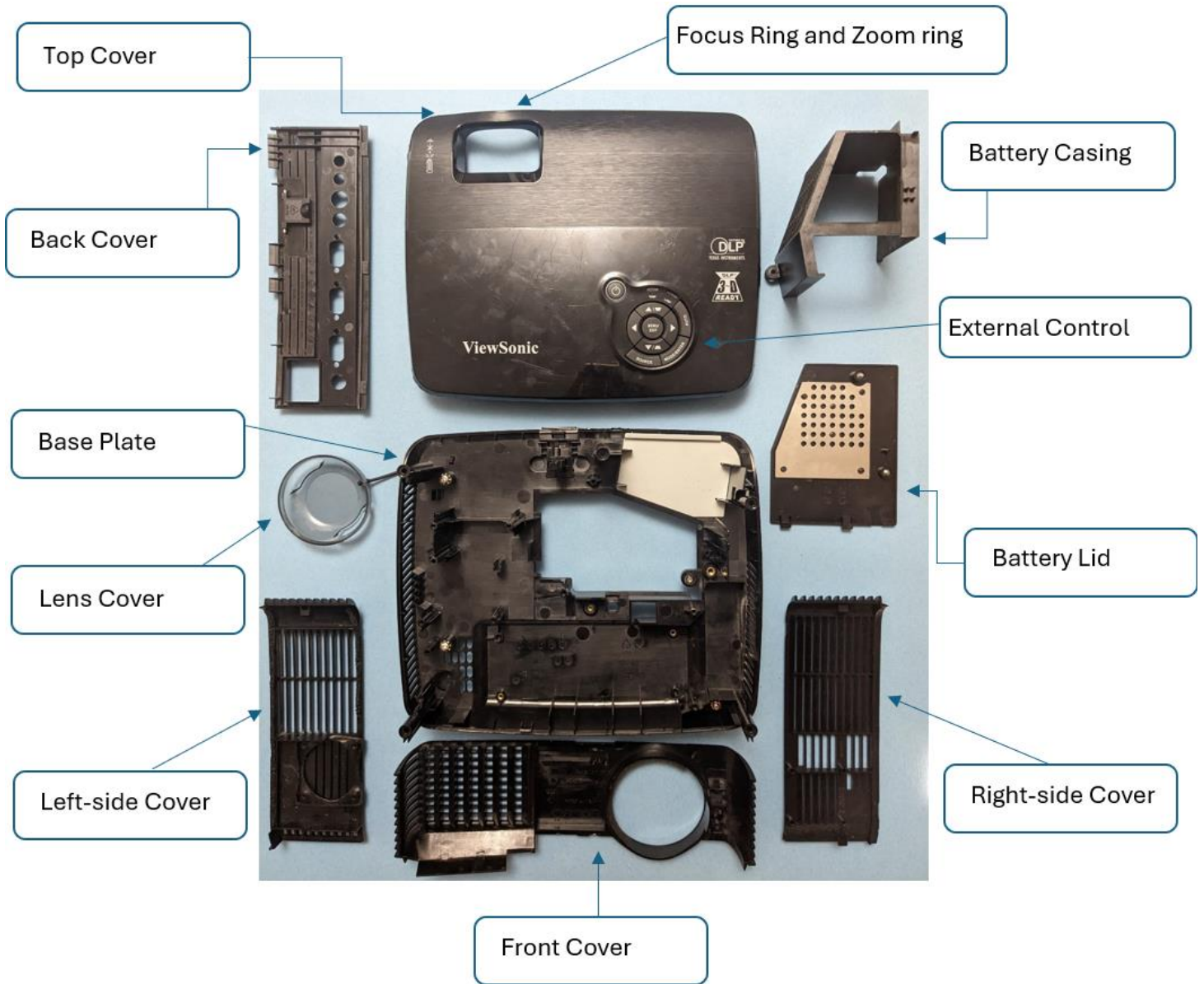
Unscrewed and withdrew projector lens, motherboards, and miscellaneous parts.



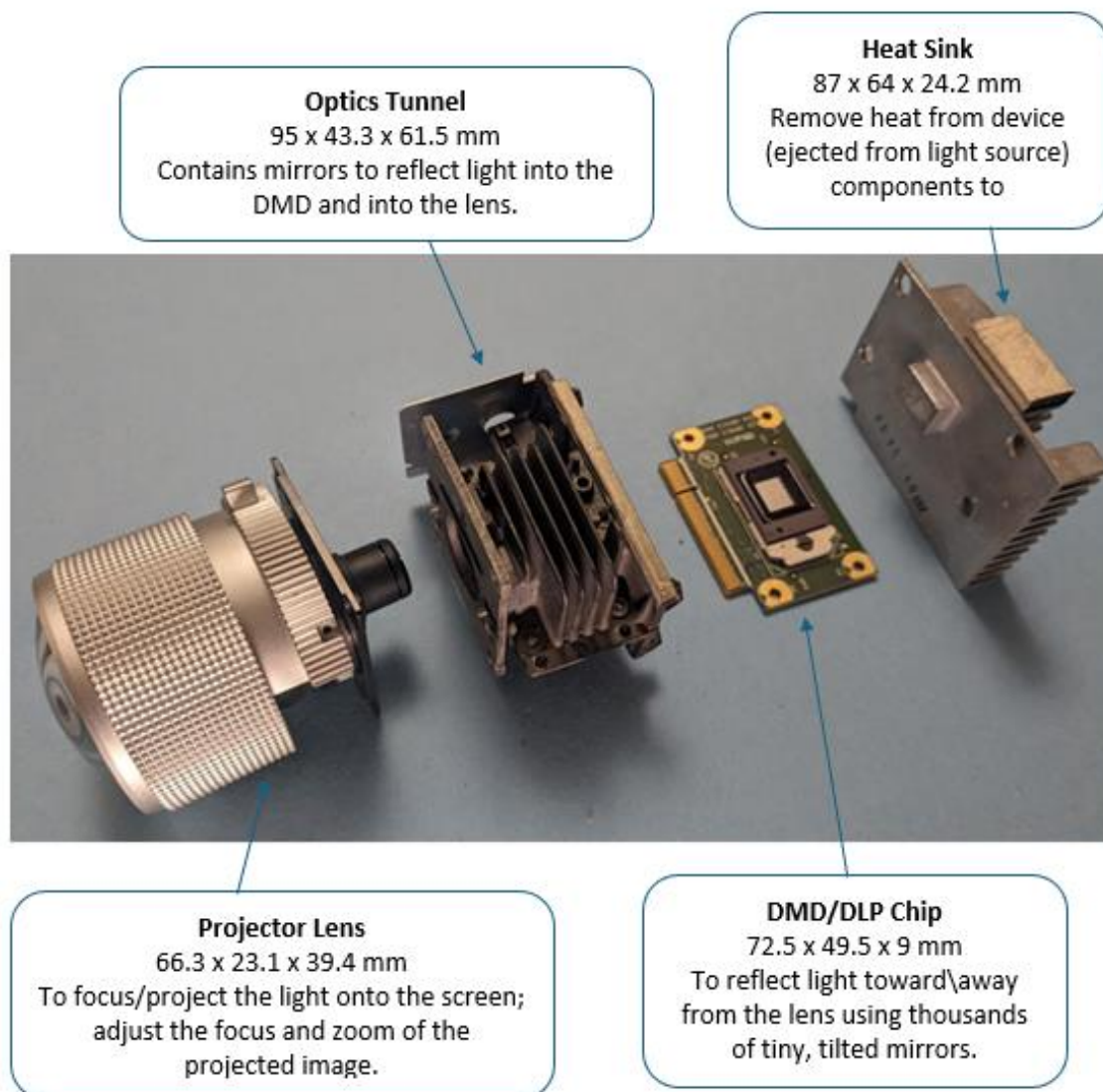
Slid out non-screwed parts, withdrew motherboard covers, and disconnected connectors.

7. PARTS LIST

7.1 Projector's External Casing

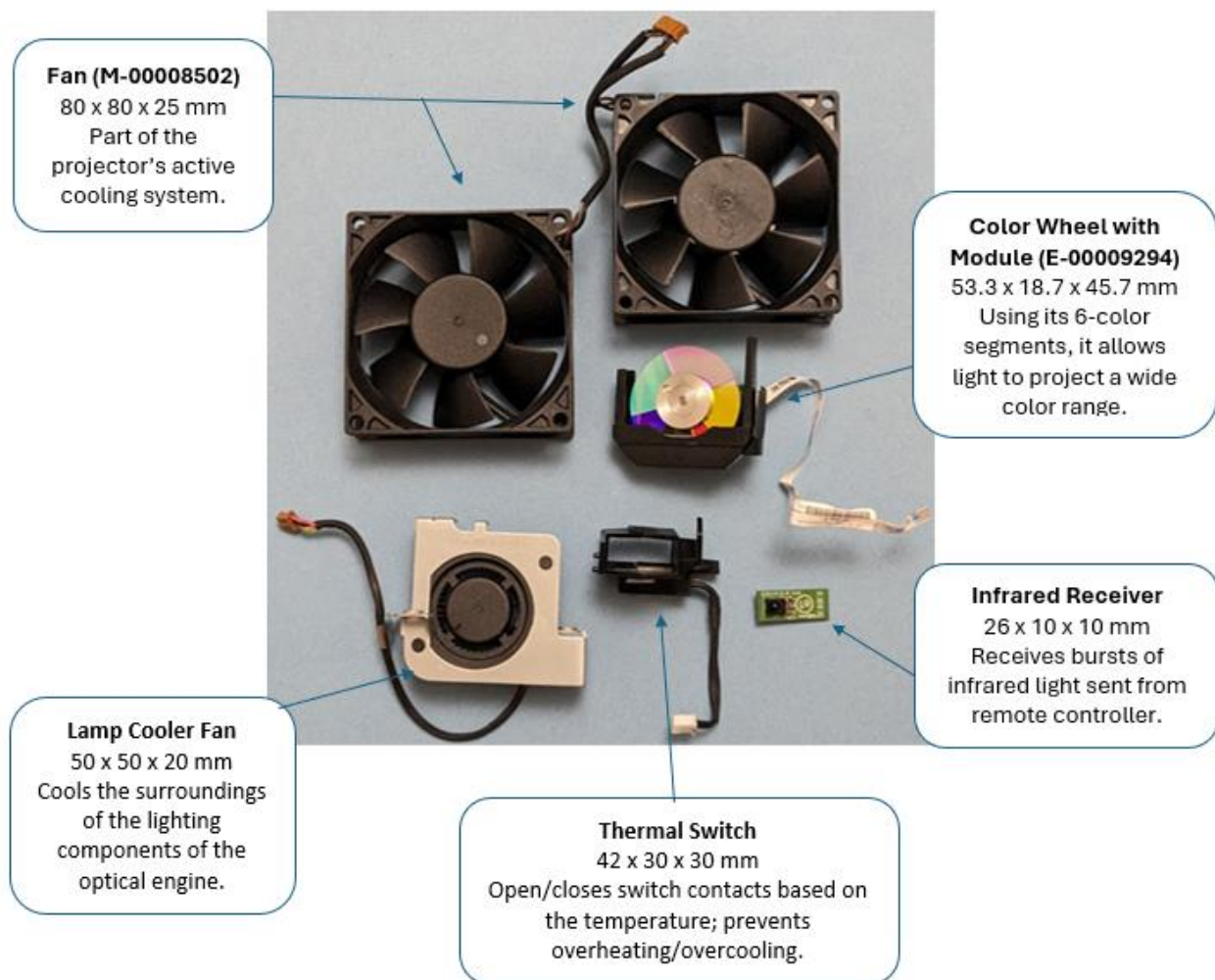


7.2 Optics Assembly



The projector lens enlarges, focuses, and zooms the projection onto the screen. DLP chip and optics tunnel consists of up to thousands of mirrors to reflect light towards and/or away from lens. The heat sink is for removing much heat as the light exerts off a lot of heat. [Further information here.](#)

7.3 Small Electrical Parts



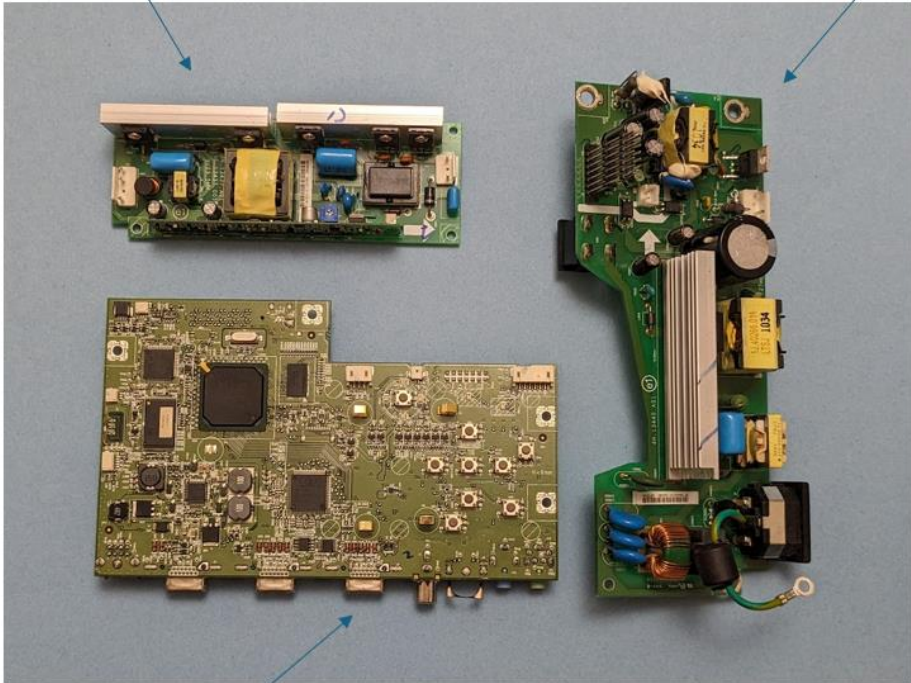
The parts in this section mainly function for the projector's cooling system. The thermal switch is used to regulate temperature when the projector starts overheating, while the fans perform the cooling. Finally, the speaker is used for outputting audio. [Further information here.](#)

7.4 Printed Circuit Boards (PCB)

7.4.1 PCB Outline

Lamp Ballast
143 x 49 x 25 mm
Regulates electrical currents that ignites the mercury vapor

Power Supply
200 x 82 x 63 mm
regulating and supplying power to projector



Main Motherboard
200 x 82 x 60 mm
connects all the different functions (volume, video, connection, power)

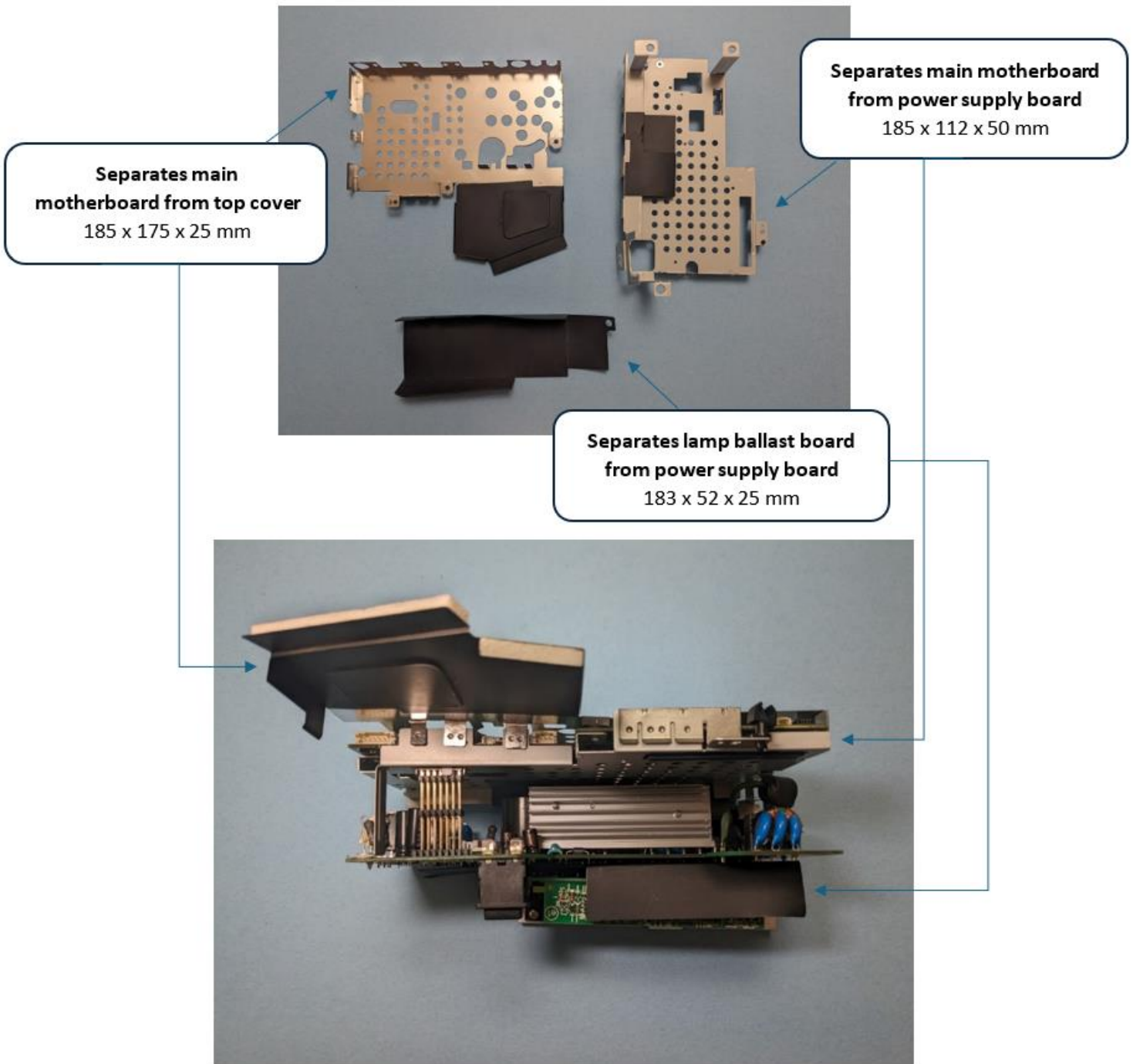
[More detailed view here](#)

7.4.2 PCB Components

We found many PCB components, the ones below were the most specific to the projector, but we have a [link to the rest of our findings](#).

<p><u>Display and Deflection Processor</u></p> <p>Transforms digital YUV signals into the RGB color space while providing picture enhancement: digital-color-transient-improvement/dynamic luma peaking.</p>	
<p><u>Analog-Front-End 1000</u></p> <p>Process analog signals before they are digitized on the motherboard-noise filtering, voltage regulation.</p>	
<p><u>Digital-Micromirror-Device Driver</u></p> <p>Controls and coordinates the movement of individual micromirrors in a DMD chip</p>	
<p><u>Crystal Oscillator</u></p> <p>Creates electric signals to generate the required picture frequency</p>	
<p><u>Double-Data-Rate-Two Synchronous-Dynamic Random-Access-Memory</u></p> <p>Memory storage; more efficiency/speed loading projector's background programs</p>	
<p><u>DIP 4pin Reinforced-Insulation-Type Photocoupler</u></p> <p>Supplies an electrical signal to the lamp ballast to stimulate light emission</p>	

7.4.3 PCB Covers/Separators



(Demonstration of when put covers and PC boards are put back together)

8. LESSONS LEARNED:

- How to utilize different strategies of research when identifying electronic components, especially the chips, from their markings
- How to interpret/utilize information from datasheets for describing functions
- How each component of the projector's PCBs function
- How the projector displays effective images

9. CONCLUSION:

The ViewSonic projector consists of many electrical and mechanical parts, and every component enables the projector to make retrieved data and a lightbulb turn into screen-shared visual and audio medias. While reengineering, we've learned the importance of organizing/categorizing information and learned to use different markings on chips for identification to help us find the right datasheet. We developed the skill of being more precise and careful because some parts are more fragile and smaller than VEX parts. The deconstruction process not only allowed us to dig into the inner workings of a projector, but also allowed us to understand the fundamental electronic concepts embedded in PCBs and power supplies.