

# Unleaping a LeapPad



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# Summary

The team became curious about how technology worked in the evolving world, so we decided to take apart the LeapPad, an electronic device for children. The deconstruction and research processes helped us learn how a device can communicate with the user and process information. While deconstructing the LeapPad, our team discovered components that contributed to the device and how many complex parts are used to make such a simple user-interface device.

Every component contributed to the functionality of the device. While taking apart the LeapPad, our team found several vital features, including the motherboard, screen, battery, and game reader; however, every single part played an important role.

The source of power, the battery, supplied electricity to the motherboard. It was able to be charged and replaced. The motherboard receives input from the screen and processes it. This battery can be recharged and replaced, giving the batteries a longer lifespan and better quality.

The ribbon cable outputs the motherboard's data, creating the user interface. This cable, using wires is like a train bringing materials from one location to the other fluently and efficiently. ZIF connectors on the ends help connect the ribbon cable and keep it in place.

The game reader processes the data from the learning game cartridge and outputs information to the motherboard using the ribbon cable.

Several buttons were used to navigate the user interface. The home button interacted with the game cartridge and directed the game to go to the home screen. The arrow button controlled what the user was selecting on the screen. The buttons send the data to the motherboard for processing.

The audio adjustment buttons communicate with the speaker to adjust the sound levels to what the user is comfortable with.

The round speaker has a red and black cable from the motherboard to the speaker to keep it connected.

Cameras collect images and information from the visual world of the user. The camera then sends the data across the motherboard to be processed and then affects the user's screen.

Ports stationed on the side of the LeapPad connect headphones and USB ports.

Working together to research and deconstruct the LeapPad, our team learned the importance of communication and collaboration and better understood how electronics functioned. One team member studied an unknown part but never announced their findings. Due to the rest of the team's lack of knowledge, the team researched the same part for an hour until the teammate said he had already found the component. From then on, our team learned how to communicate our findings.

Our team learned how to express our ideas and work together better than before, just like different components of electronics work together to create something more significant. We also learned how items used daily, like electronics, can function. It helped the team understand what went inside of an electronic and how it worked with other parts to be used by humans. This helped expand our learning and understanding of various components and characteristics of electronics.

Word Count: 499

# Device Explored Explanation

The LeapPad is a learning tablet that teaches early educational skills to kids. Our team chose this device because one of our teammates owned a LeapPad, which could not work due to irreplaceable batteries. Additionally, this device would be exciting to deconstruct due to its multiple buttons, screen, and complicated components.





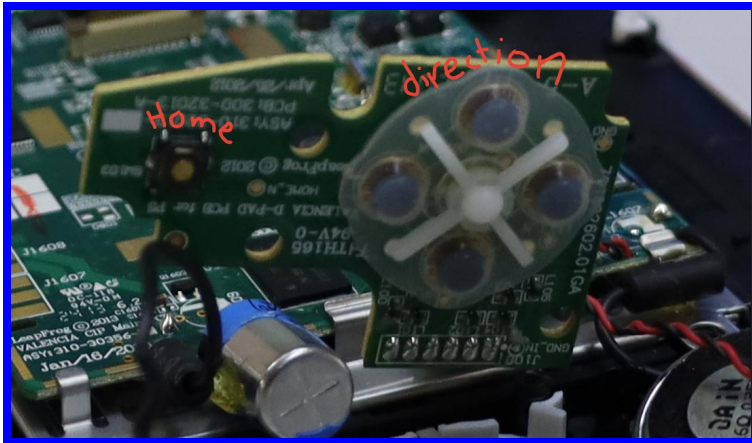
# List of Parts

## Battery



The two batteries provide power to the device. The batteries have a voltage of 2.4 and a current of 2100 mAh.

## Button Circuit Board



The button circuit board receives input from the exterior button and sends it to the motherboard through a ribbon cable. The button

circuit board, which had a yellow backside, was flipped upside down.

## Motherboard



The motherboard receives input from the user through buttons and the screen, which can be 'drawn' on with a 'pencil.' The

motherboard then supplies electricity to the other components or changes the screen based on the current Game SD Card.

## Sound Speaker



The speaker has a resistor of the value 16 ohms and will tolerate an electrical power of 0.25 Watts. The speaker receives

input from the motherboard and outputs sound accordingly.

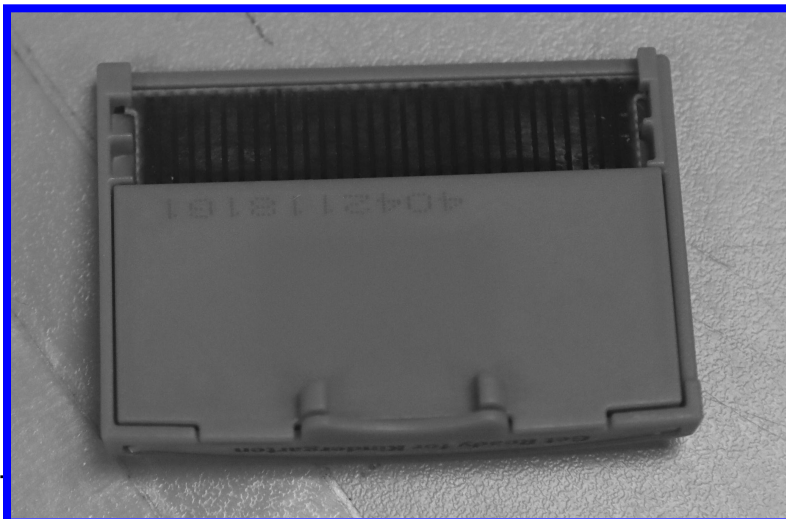
### Capacitor



The capacitor stores electricity and can store up to sixteen volts. The size of the capacitor is 1000 micro Farad.

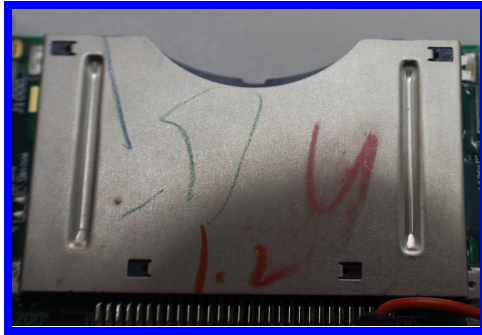
### Learning Game Cartridges

Learning Game Cartridges are cards that input the software downloaded.



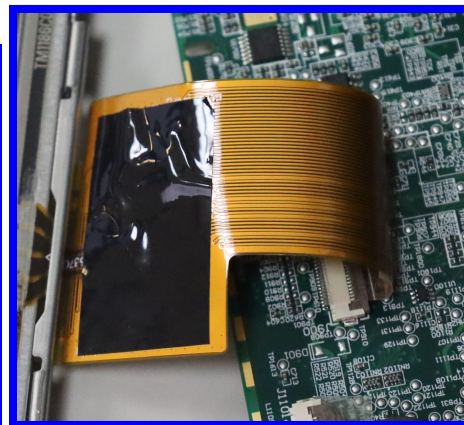


## Game Reader



The game reader has a silver cover and reads the information that the game card contains.

## Yellow Ribbon Cable



The yellow ribbon cable connects the screen and the motherboard. Information from the motherboard travels through the ribbon cable to the screen.

## Back Frame



The back frame protects the motherboard and interior components of the LeapPad. It is a frame for the back camera and batteries. The frame has holes for ports and batteries.

Additionally, it has a pen that interacts with the screen connected to it.

## Pen



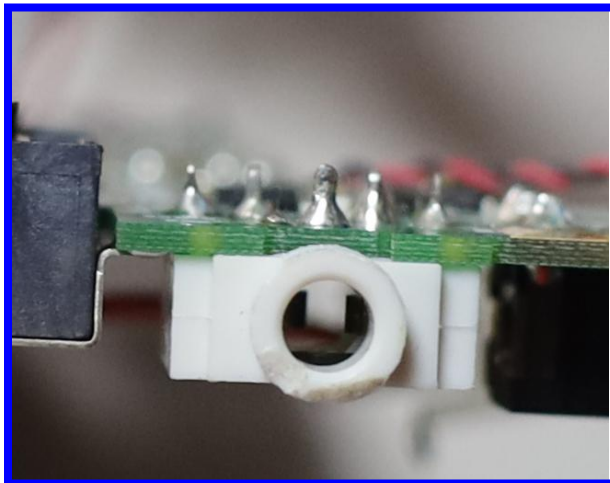
The pen interacts with the screen on the front of the LeapPad and provides input to the current game.

## Front Frame



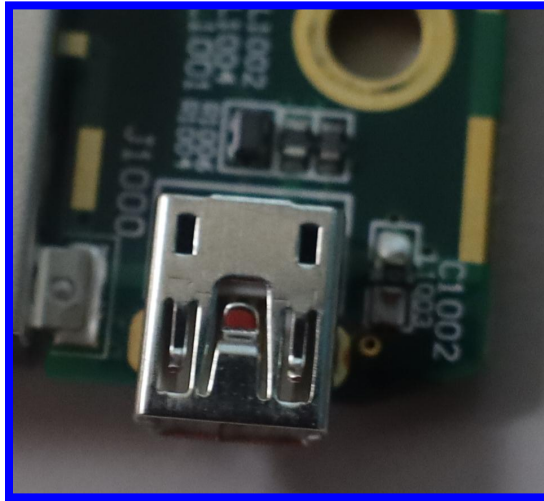
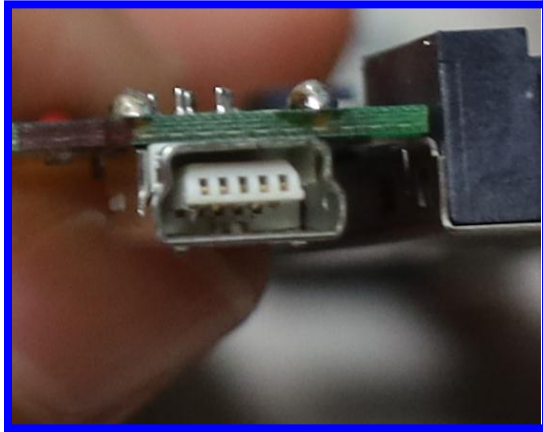
The front frame protects the motherboard and the screen. It contains buttons that control the screen, audio adjustment, and power.

## Headphone Port



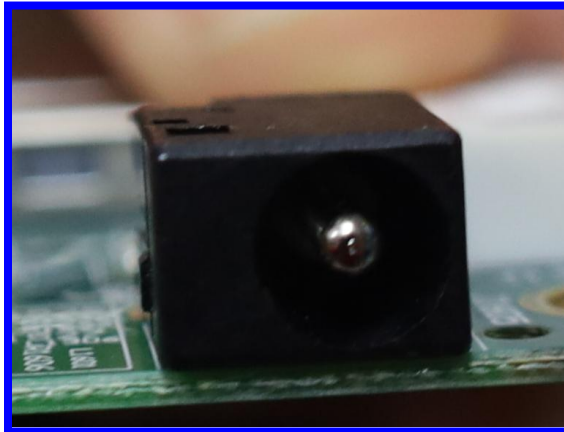
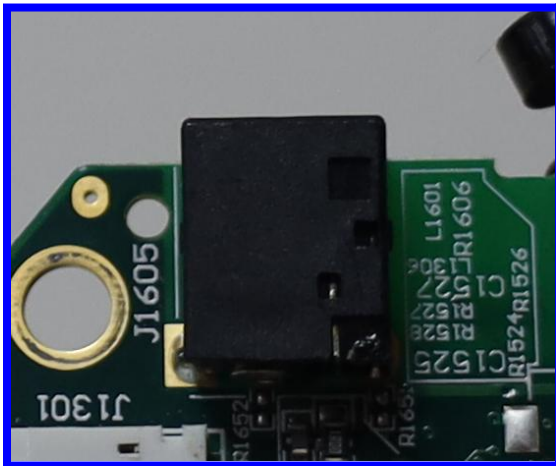
The headphone port connects headphones to the audio of the current game displayed on the screen.

## USB Port



The USB port connects outside devices to the LeapPad. You can also download information through the USB port.

## Charging Port

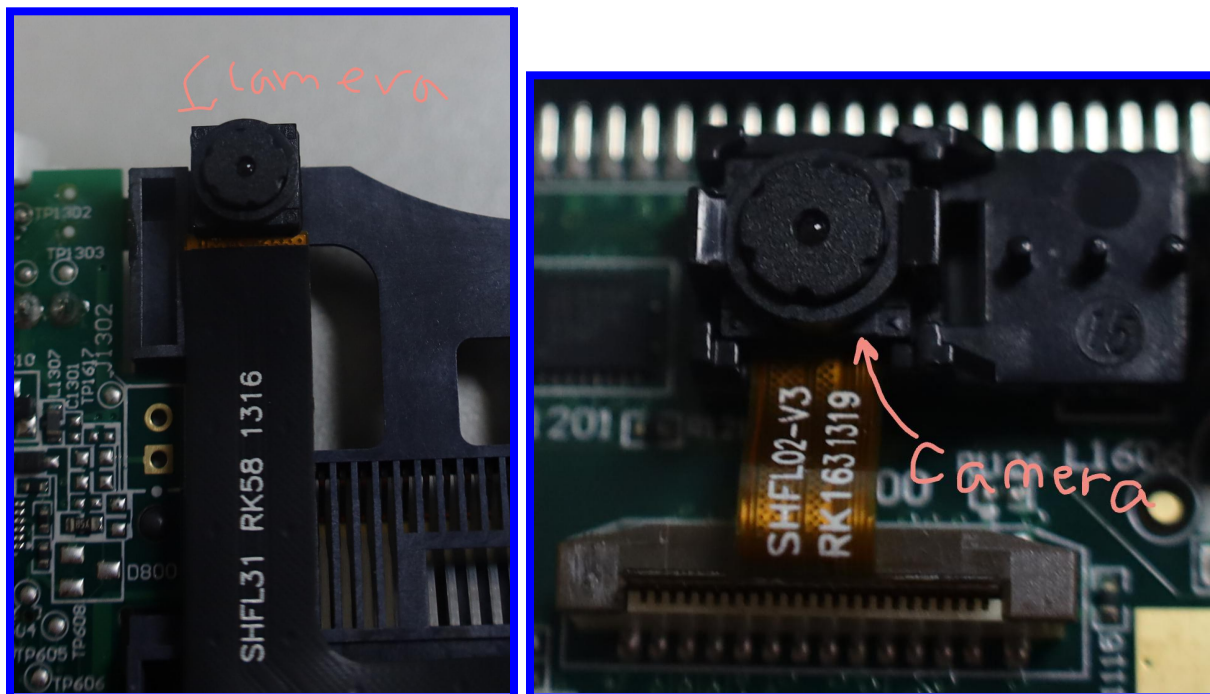


The charging port ensures that the LeapPad can charge to keep running. A charging cord is inserted in the charging port, which sends electric currents into the



LeapPad. You can tell your LeapPad is charging when an indicator light turns on. It is placed on the motherboard right next to the USB port.

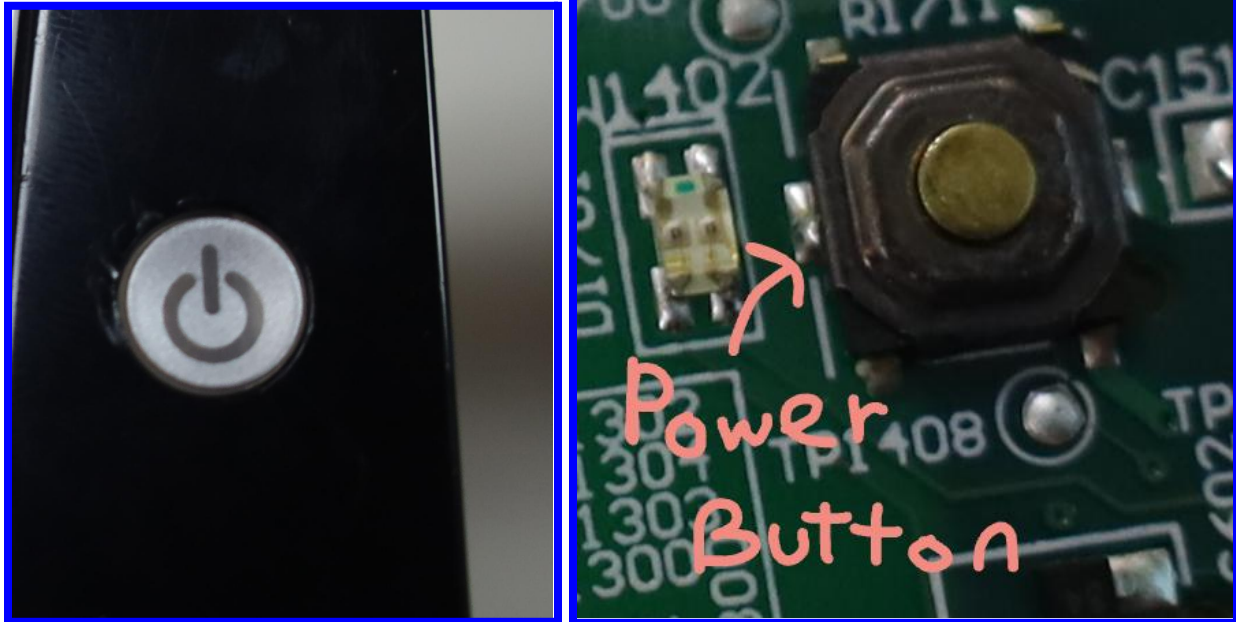
## Cameras



The camera captures pictures and images that are then sent to the motherboard in the LeapPad. It allows the user to take pictures and videos just like a phone or iPad.

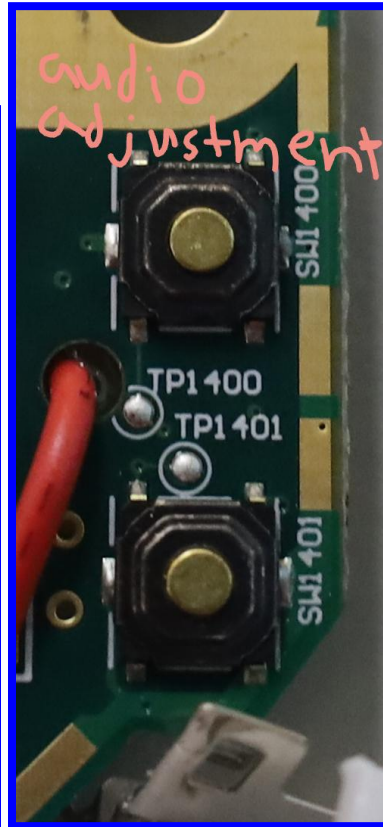


## Power Button



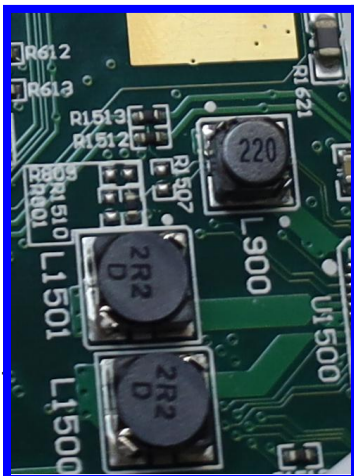
The power button controls if the LeapPad is on or off. When pressed, it turns yellow which allows the user to see that the LeapPad is now on.

## Audio Adjustment Button



The two audio adjustment buttons increase or decrease the volume of the sound. It is found on the top right side of the frame.

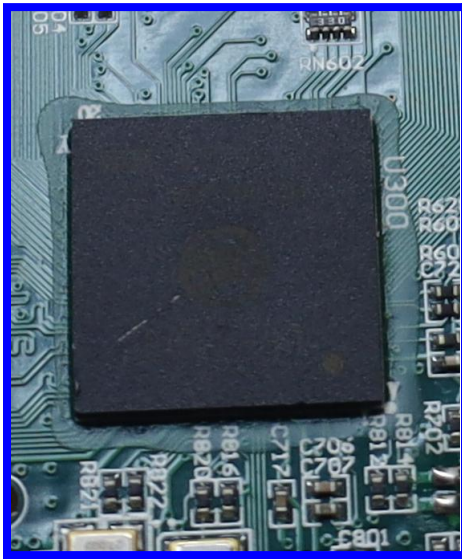
## Voltage Resistors



The voltage resistors regulate the amount of current/electricity flowing through the motherboard and ensure

that the electricity does not damage any components.

## Processor



The processor processes user input from the screen.

# Deconstruction Procedure

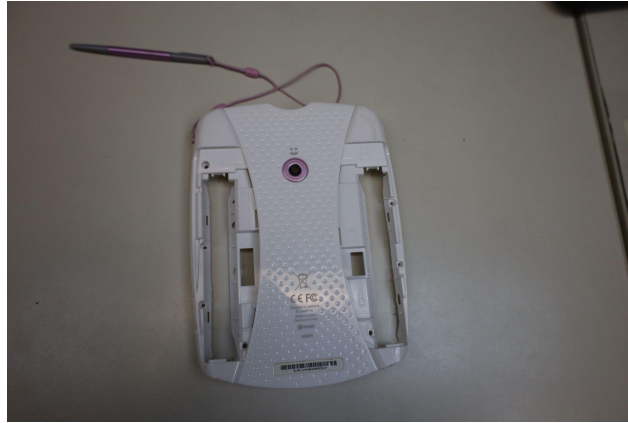
Tuesday, November 8, 2022

The builders began by removing the batteries from the device so hazardous situations would not arise later.

After removing the battery shields, the team removed the frame of the back of the LeapPad, exposing essential components, like the circuit boards and other buttons.

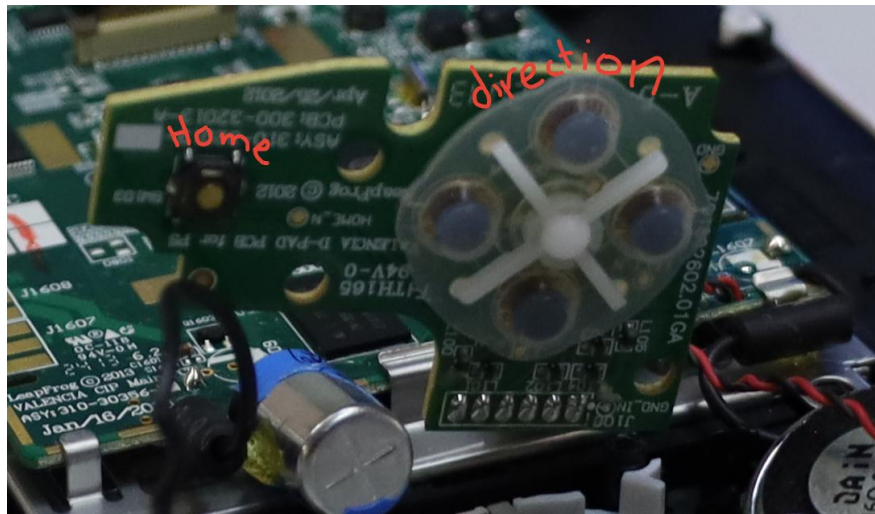


The pen was discovered attached to the back of the LeapPad. The pen is a tool that interacts with the touchscreen.

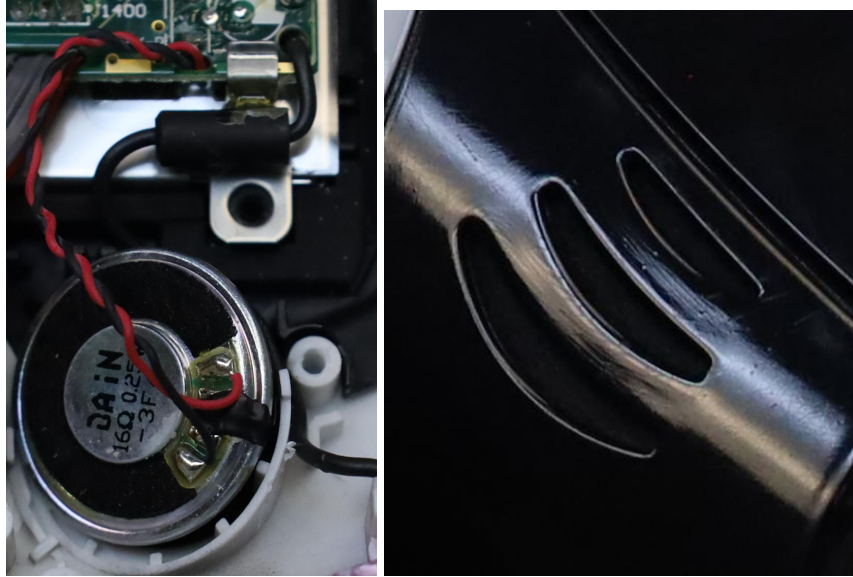


**We removed the circuit board, which has a yellow backside in the picture above, behind the home and direction buttons. The circuit board had buttons that reacted to the pressure from pressing the external home and direction buttons. The button circuit board was connected to the motherboard with a ribbon cable that communicated the external input.**

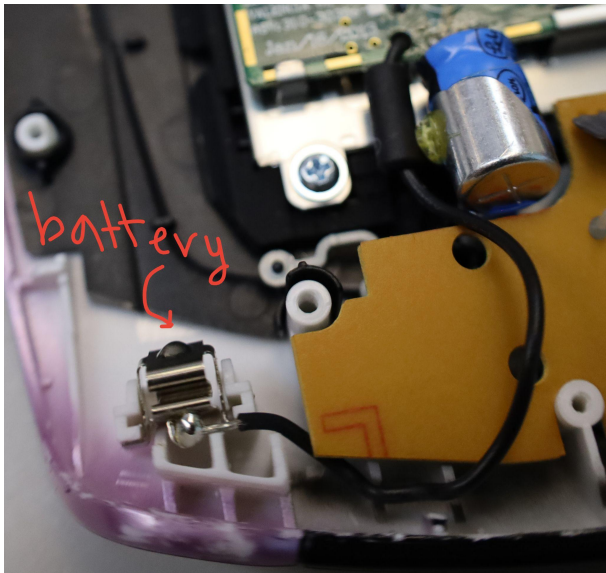
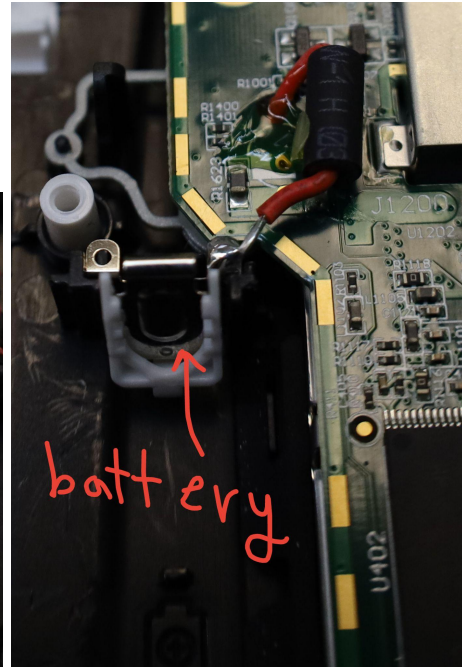
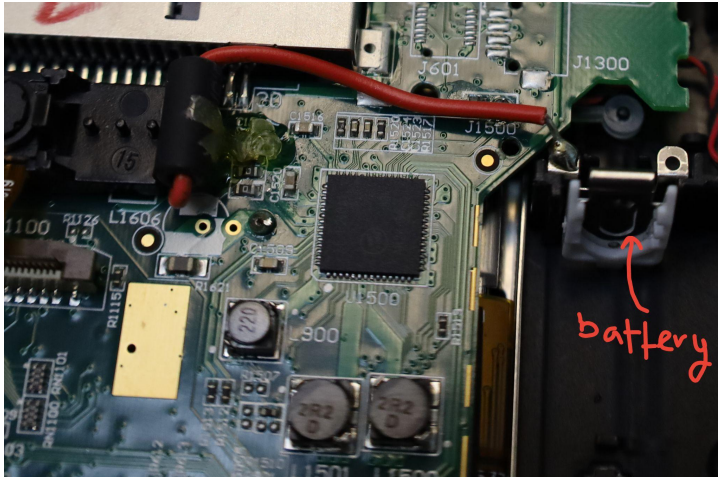




The team then examined the sound speaker which was connected to the motherboard with two negative and positive wires. A foam board was in between the speaker and the external LeapPad.



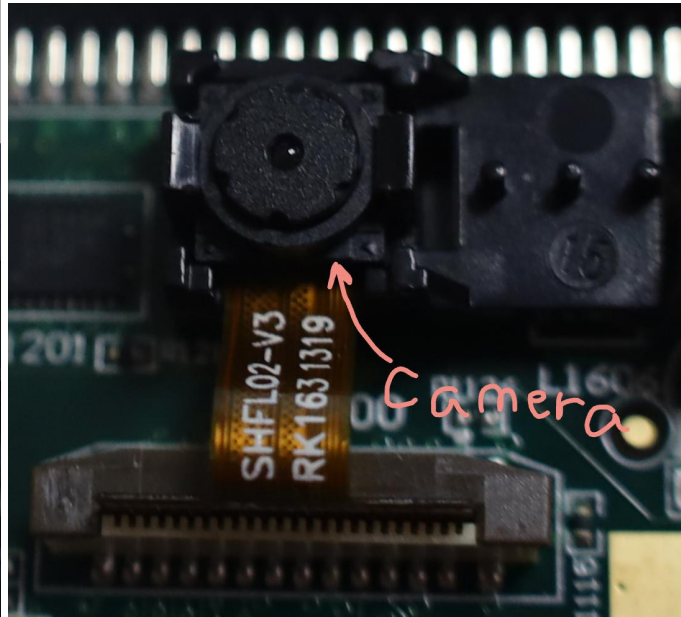
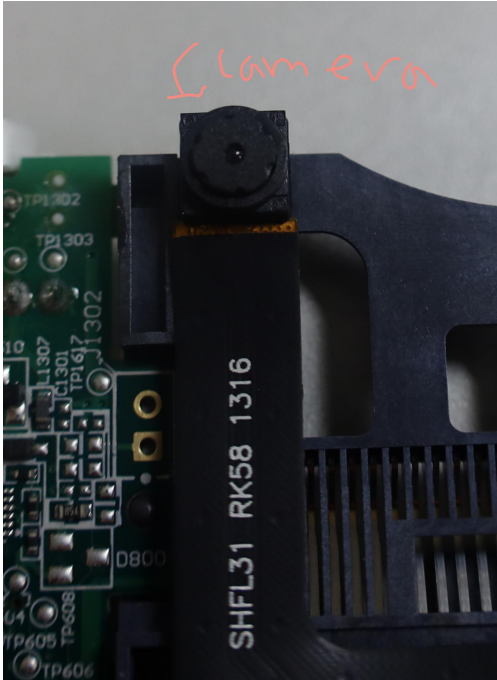
**The team then began to inspect the path of the energy. A red wire that was connected to the top of where the battery is supposed to represent where the positive electricity runs through. The black wire represents where the negative electricity runs through; the negative side of the battery pulls the energy from the positive side to the negative side.**

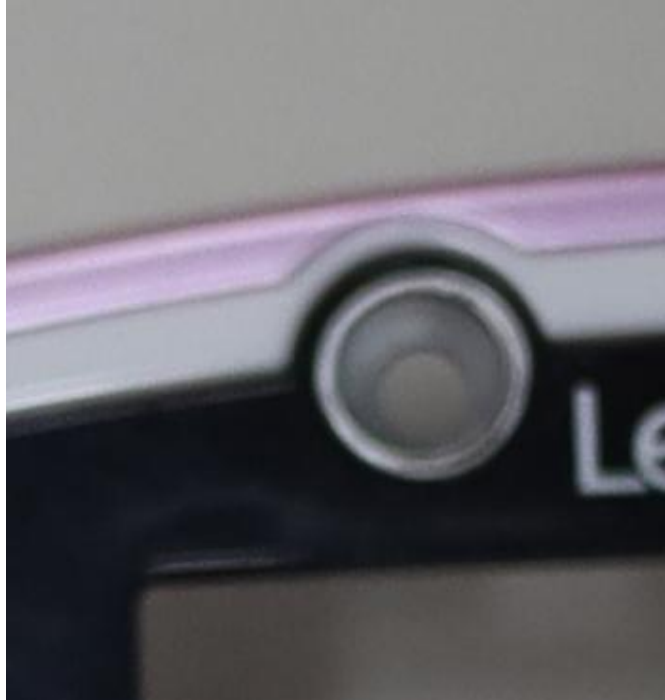


After examining the components unconnected to the motherboard, our team began examining the exterior buttons and cameras. However, the team noticed that one camera was located on the back of the



**motherboard. So the team unscrewed the motherboard from the front exterior LeapPad. One camera was found on the back of the motherboard and the other on the front of the motherboard in the middle. The image of the exterior of the back camera is found below with a smiley face above it while the camera connected to the motherboard is directly behind the cover. The image of the exterior of the front camera, which is directly above the screen, is found below.**

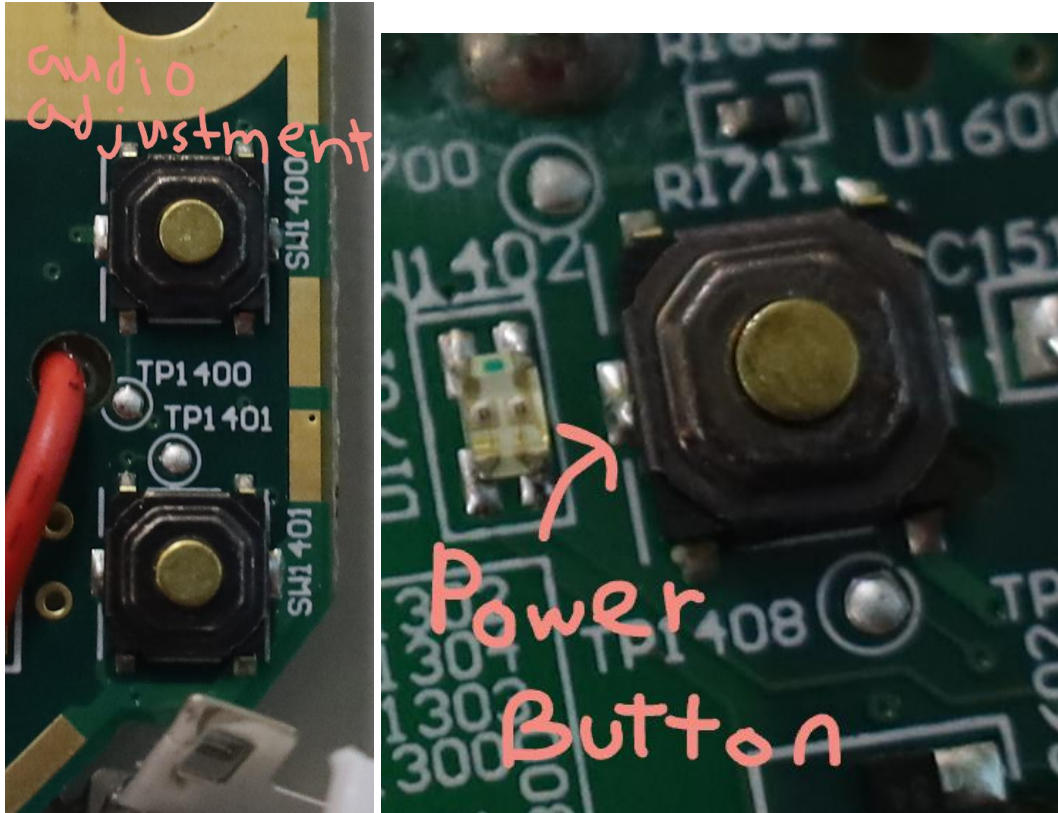




**The team then examined the power and audio adjustment buttons located on the sides of the exterior LeapPad.**



**The interior buttons were found on the backside of the motherboard.**

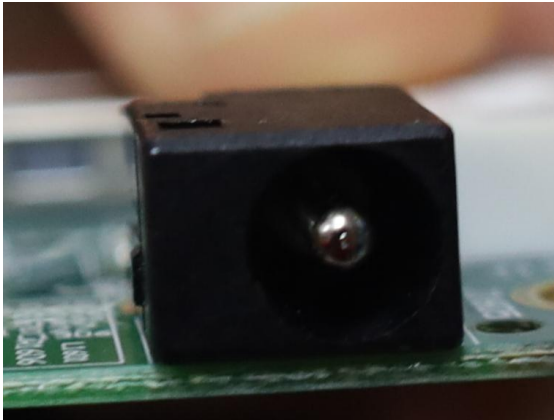
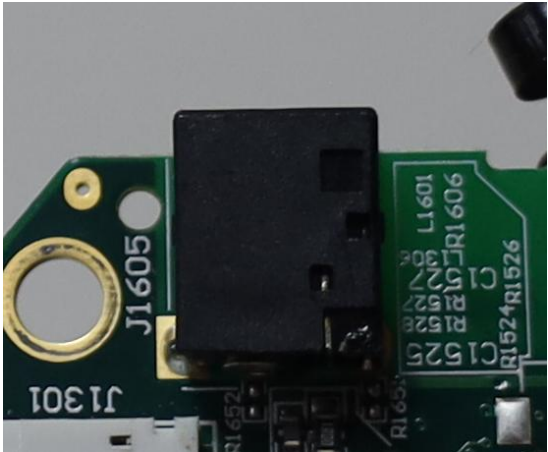
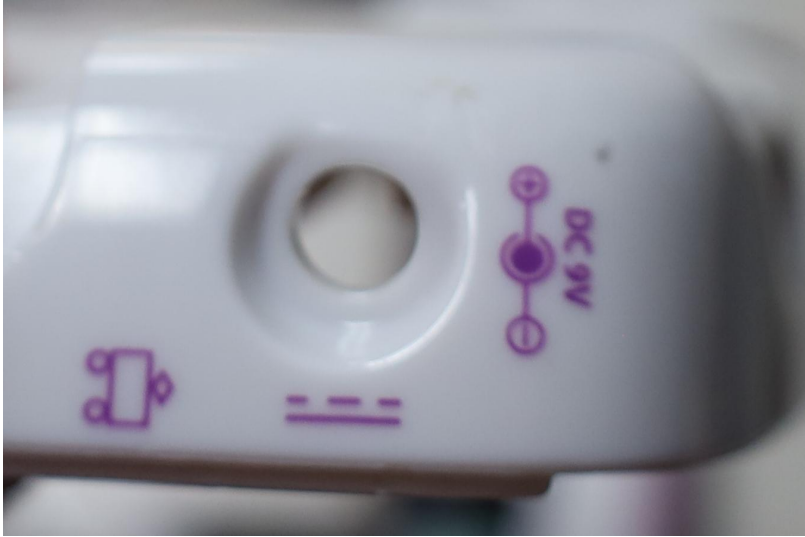


After removing the motherboard and screen from the exterior front leappad, the team discovered a rubber

screen protector bordering the edges of the screen.

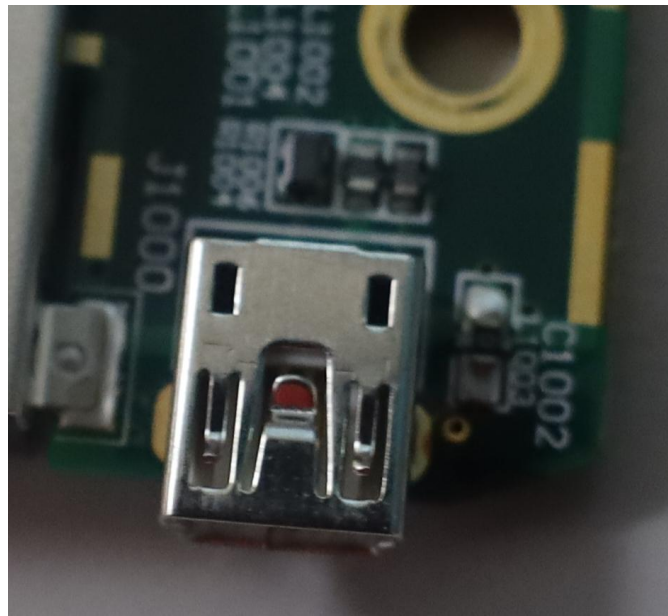
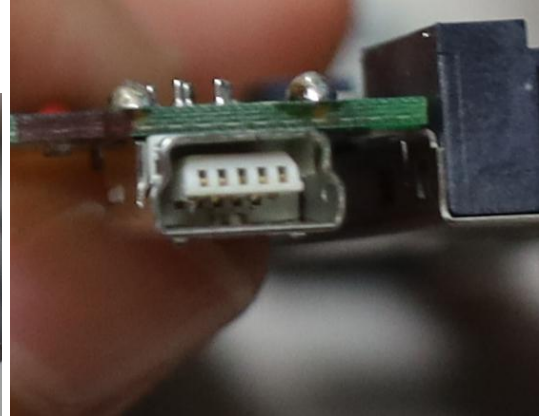


The team then examined the ports located along the back frame. A charging port was located on the left side, the headphone port was located on the top left, and the USB port was on the top right. The next three images are the exterior and interior angles of the charging port.



The next three images are of the exterior and interior angles of the USB port.

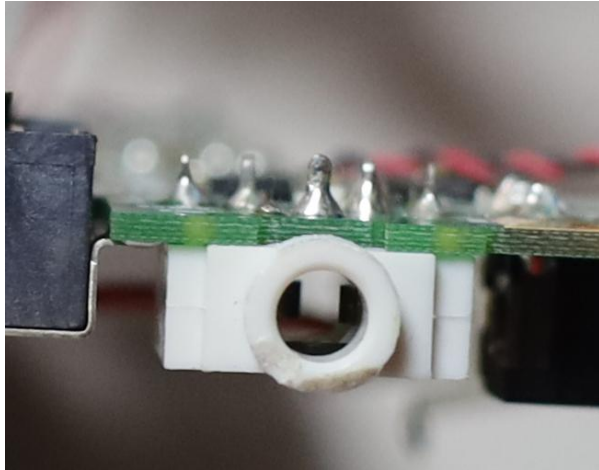




The next three images are of the exterior and interior angles of the headphone port.







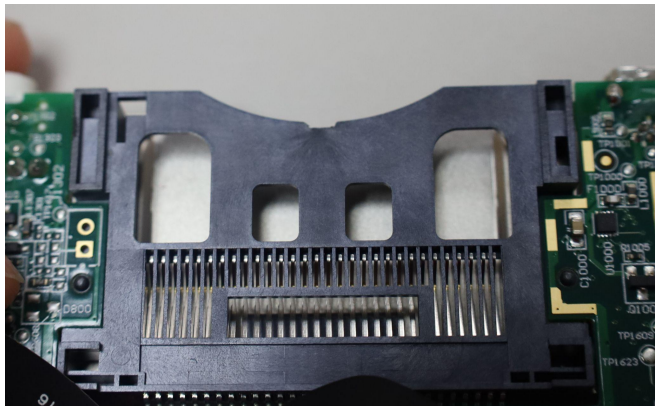
**The team then examined how the motherboard and the screen were connected. The motherboard and the screen were connected by a yellow ribbon cable.**



The team then examined how the screen received information on what to display. A learning game cartridge holds all the information about the current game played by the user.



The learning game cartridge is processed by the game reader.



## Sources

<https://www.ifixit.com/Guide/LeapFrog+LeapPad2+Explorer+Screen+Replacement/25297>

<https://www.youtube.com/watch?v=y8pKUMyIOkY>

[LeapFrog Epic 7" 31576 Tablet Replacement Speaker](#)

[https://challenges.robotevents.com/uploads/0020733\\_original.pdf](https://challenges.robotevents.com/uploads/0020733_original.pdf)

[https://challenges.robotevents.com/uploads/0019560\\_original.pdf](https://challenges.robotevents.com/uploads/0019560_original.pdf)

<https://leapfrog.happyfox.com/kb/article/308-3138/>

- 7" capacitive touch screen
- 1024 X 600 Pixel LCD resolution
- 1.3 GHz Quad-Core processor
- Based on Android OS 4.4
- 16 GB built-in memory, includes Micro SD slot, expandable to 32 GB
- Front and rear 2 MP cameras
- 5+ hours of battery life per charge

