Electronics Online Challenge Sponsored by Texas Instruments

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VEX HS Robotics
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Contents

1. Summary

As a team, we decided what to take apart from three different devices: a Samsung LCD TV, an Apple keyboard, and a Samsung DLP TV. After briefly researching each device, we ruled out the LCD TV because of potential hazards, and chose the DLP TV. The main reason we chose the DLP TV over the Apple keyboard was because the DLP system was designed and patented by Texas Instruments and was almost guaranteed to have multiple Texas Instrument chips in it. The second reason is that the TV was quite large, and so would have many different components to take apart and research.

After taking apart the TV, we had 11 circuit boards with a total of 64 different chips on them. There were 4 Texas Instrument chips, but the main one was the DMD (Digital Micromirror Device) which is classified as a chip.

The DMD is a key component in the projection system. It uses microscopic mirrors arranged on a matrix. When a current is passed through the matrix the mirrors tilt towards the light source, creating white, and when there is no current passing through them they tilt away from the light, creating black. Rapidly changing between these two states creates different shades of gray, and when working together, black and white pictures. This is then used to transform the primary colors of the RGBY color filter into different shades as well. It can create up to 1024 different shades of color, creating dynamic images.

Another Texas Instrument chip was the DAD2000 which generated the micromirror clocking pulses required by the DMD. Without the DAD2000 chip, the DMD chip would not work.

There were 2 other Texas Instrument chips, the DDP3021 which is a signal processor, and the PMD1000 which is a power and motor control driver. Both of these chips revolve around the DMD device helping to create stunning images.

We learned many things from this challenge. We learned all about the DLP system from the many different types of lens to the DMD to the screen itself and how it was composed of a complex lens and a textured screen. We also learned about different PCB (Printed Circuit Board) components and how to safely handle them. For example, to never touch a capacitor unless you've been properly grounded and then to still avoid touching them, and to always wear safety glasses. This also taught us how to better handle stripped screws, which we can apply to building in VEX.

Summary Word Count: 413

2. Components List

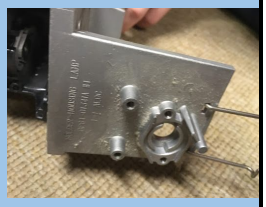
2.1 Outer TV Structure

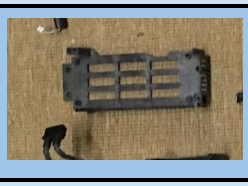
Outer TV Structure	Component Name	Quantity	Part Number	Picture
	Dust Covers	2	BP63-00832A	
	Cover-Duct Out(top)	1	BP63-00905A	
	Cover-Duct Out(bot)	1	BP63-00905A	
	Cover-Rear(bot)	1	BP63-00880X	
	56K6 Holder Mirror	1	BP61-01404X	
	BRKT-Screen Top	1	BP61-01396A	**See Holder Mirror
	BRKT-Screen Bottom	1	BP61-01401A	**See Holder Mirror
	BRKT-Screen Left	1	BP61-01397A	**See Holder Mirror

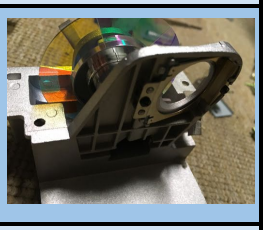
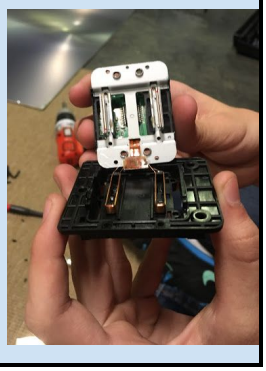
	BRKT-Screen Right	1	BP61-01398A	**See Holder Mirror
	Cover-Rear	1	BP63-00886X	
	Cover-Front	1	BP63-00887X	
	Rear Component Structure	1	BP61-01383A	

2.2 Projection Component Structure

Projection Component Structure	Component Name	Quantity	Part Number	Picture
	Bracket-Engine Base	1	BP61-01410A	
	Cover P/J lens #1	1	BP63-00901A	

	Refining Lens Structure (RLS)	1	PC-GF-30(1396-066)	
	RLS Cover	1	PC-GF-30(9500-024)	
	Base Engine	1	BP61-01338A	
	Cover-Duct(Top)	1	BP63-00841A	
	Holder-Housing Lamp	1	BP61-01341A	
	Cover-Lamp	1	BP63-00839A	
	Cover-Duct(Bot)	1	BP63-00842A	

	Holder-Lamp	1	BP63-01342A	
	Holder Ballast	1	BP61-01345A	
	Cover Wheel	1	BP63-00864	
	Cover-Duct-Right	1	BP63-00851A	
	Cover-Duct	1	BP63-00843A	
	Shield Case-DMD (F)	1	BP63-00837A	
	Holder Ballast Cable	1	BP61-01343A	

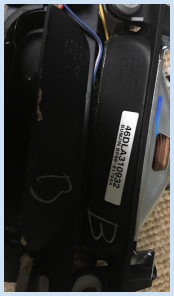
	Catleya	1	BP63-01829A	
	Bracket-panel	1	BP61-01368A	
	Cover CW	1	BP63-00840A	
	VCM Driver Support	1	NA	

2.3 Main PCB Component Structure

Main PCB Component Structure	Component Name	Quantity	Part Number	Picture
	Holder Terminal	1	BP61-01381X	
	SH-Jack Front	1	BP63-00827X	

	SH-Case Top	1	BP63-00828X	
	SH-Case Bottom	1	BP61-01327A	

2.4 TV Front Component Structure

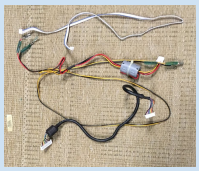
TV Front Component Structure	Component Name	Quantity	Part Number	Picture
	Holder-Speaker	2	BP61-01336X	
	Speaker/Button Support	1	BP61-00625X	

2.5 Screws

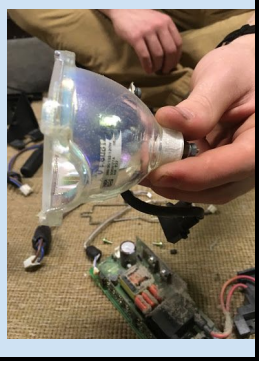
Screws	Component Name	Quantity	Part Number	Picture
	Gold Screws	57	N/A	

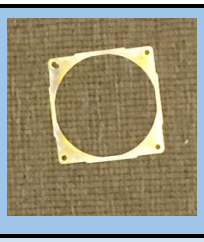
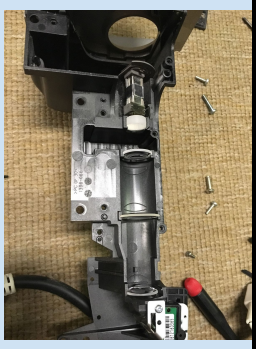
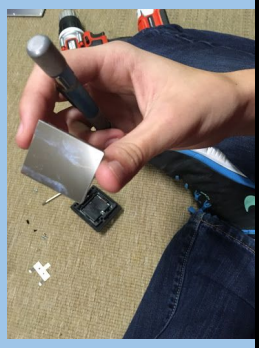
	Black Screws	72	N/A	**See above
	Silver Screws	38	N/A	**See above

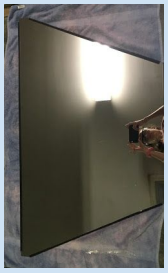
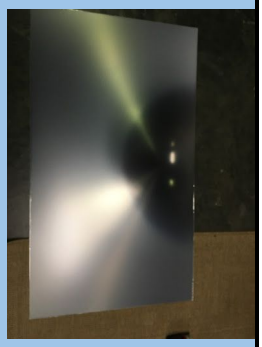
2.6 Wires

Wires	Component Name	Quantity	Part Number	Picture
	DVI Cable	1	N/A	 
	2 pin wire	1	N/A	**See above
	13 pin wire	1	N/A	**See above
	4 pin Y-Cable	1	N/A	**See above
	5 pin wire	1	N/A	**See above
	12 pin wire	1	N/A	**See above
	600V AWM wire	1	N/A	**See above
	48 pin wire	1	N/A	**See above
	Crimp wire	1	N/A	**See above
	4 pin Y-Cable	1	N/A	**See above
	3 pin wire	1	N/A	**See above

2.7 Lens and Projection Components

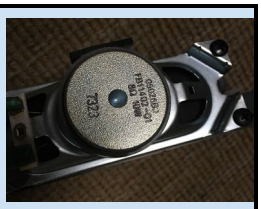
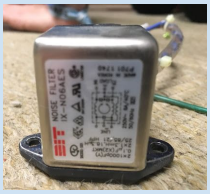
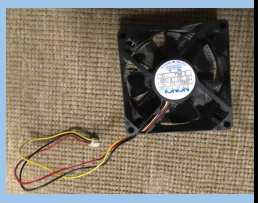
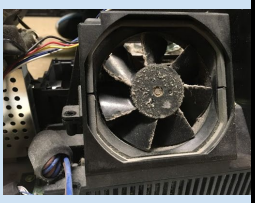
Lens and Projection Components	Component Name	Quantity	Part Number	Picture
	Lamp	1	N/A	

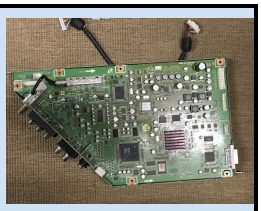
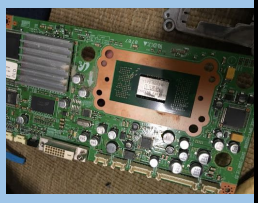
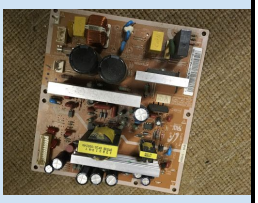
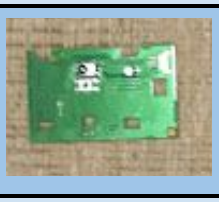
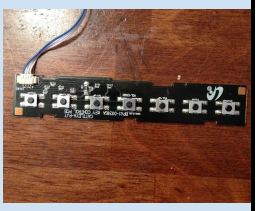
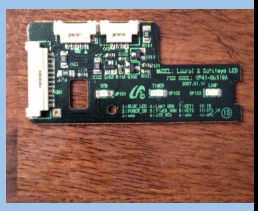
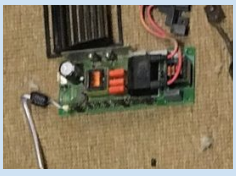
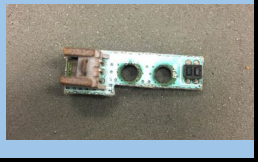
	Glass Cover	1	N/A	
	Refining Mirror Tunnel	1	N/A	
	Optic Lens(Plano-Convex)	4	N/A	**See above
	Optic Lens(Double Convex)	1	N/A	**See above
	Small Angled-Mirror	1	N/A	**See above
	Projection Lens(Plano-Convex)	3	N/A	
	Small Mirror	1	N/A	
	Projection Lens(Plano-Concave)	1	N/A	*See projection lens (plano-convex)

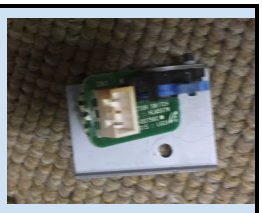
	Projections Lens(Converging Meniscus)	1	N/A	
	Plastic Projection lens(Converging Meniscus)	1	N/A	**See above
	Plastic Projection Lens Cover	1	N/A	
	Large Angled-Mirror	1	N/A	
	Fresnel Lens	1	BP67-00356A	
	Lenticular Screen	1	BP67-00357A	

2.8 Electrical Components

Electrical Components	Component Name	Quantity	Part Number	Picture

	Speaker	2	FB11402-01	
	RGBY Color Filter Device	1	N/A	
	Noise Filter	1	IX-NO6AES	
	DMD Board Fan(Smaller)	1	G6015S12B2-BA	
	Lamp Fan(Bigger)	1	G8025S12B2-AE	
	Digital Micromirror Device(DMD)	1	1272-5003W	

	Main Circuit Board	1	BP96-01831A	
	DMD Board	1	BP96-01829A	
	Power Supply Board	1	BP44-01002A	
	Speaker/Button Circuit Board	1	BP41-00306A	
	Speaker/Button Circuit Board 2	1	BP41-00316A	
	LED Control Board	1	BP41-00319A	
	Ballast Board	1	BP47-00037A	
	Continuous Wave(CW) Sensor Board	1	K520_CW_SENSOR_V1.0	

	Detector Switch Board	1	BP96-01799A	
	Thermostat Board	1	AA41-00801D	
	SP VCM Driver Board	1	N/A	
	Tuner	1	BP40-00001A	
	Module-RF Splitter	1	BP59-00099A	

3. Projection Assembly

This table shows the path the light from the lamp takes to get to the screen.

Lens and Projection Assembly		
Component	**Position in Assembly**	**Information**
Lamp	1st	120 Watt Bulb
Color Filter	2nd	RGBY Filter
Glass Cover	3rd	Helps filter light
Refining Mirror Tunnel	4th	Used to focus light
Optic Lens	5th	Plano-Convex
Optic Lens	6th	Plano-Convex
Optic Lens	7th	Double Convex
Optic Lens	8th	Plano-Convex
Angled-Mirror	9th	Reflects light into DMD
Optic Lens	10th	Plano-Convex
Digital Micromirror Device(DMD)	11th	Developed by TI
Projection Lens	12th	Plano-Convex
Projection Lens	13th	Plano-Convex
Projection Lens	14th	Plano-Convex
Mirror	15th	Reflects light to last projection lenses
Projection Lens	16th	Plano-Concave
Projections Lens	17th	Converging-Meniscus
Plastic Projection lens	18th	Converging-Meniscus
Plastic Projection Lens Cover	19th	Shapes Image
Angled-Mirror	20th	Reflects image to screen
Fresnel Lens	21st	Directs light straight out and produces proportional image
Lenticular Screen	22nd	Directs light in all directions for viewing from all angles

4. PCB Components

PCB Components					
Sub-Assembly Generator (AG)			**Bidirectional Diode (BD)**		
Board	**Quantity**	**Purpose**	**Board**	**Quantity**	**Purpose**
Main PCB	0	Generator with sub-assembly characteristics. Used to easily attach to the PCB or other components.	Main PCB	50	It is a diode that protects a circuit against electrostatic discharge. It is built with two devices, and four regions total, two with P-type conductivity and two with N-type conductivity.
DMD Board	0		DMD Board	34	
Power Supply Board	0		Power Supply Board	0	
Ballast Board	26		Ballast Board	6	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Capacitor (C)			**Capacitor Network (CN)**		
Board	**Quantity**	**Purpose**	**Board**	**Quantity**	**Purpose**
Main PCB	598	Stores electrons similar to a battery without producing them.	Main PCB	22	A series of connected capacitors to distribute power. It's purpose is to make sure no capacitors are overloaded.
DMD Board	385		DMD Board	16	
Power Supply Board	21		Power Supply Board	2	
Ballast Board	62		Ballast Board	0	
Speaker/Button PCB	2		Speaker/Button PCB	1	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	1	
LED Control Board	0		LED Control Board	3	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	1	
Detector Switch Board	0		Detector Switch Board	1	

Thermostat Board	0		Thermostat Board	2	
SP VCM Driver Board	4		SP VCM Driver Board	0	
Capacitor Switch (CS)			Capacitor Socket (CX)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	A switch connecting to a capacitor.	Main PCB	0	Connects capacitors to the board or to other components.
DMD Board	0		DMD Board	0	
Power Supply Board	11		Power Supply Board	3	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Crystal Capacitor (CY)			Diode (D)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Capacitor connected to a crystal.	Main PCB	116	Conducts current in one direction with low resistance on one side and high resistance on the other.
DMD Board	0		DMD Board	15	
Power Supply Board	5		Power Supply Board	8	
Ballast Board	0		Ballast Board	15	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Diplexer (DP)			Display (DS)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	A passive device that does frequency-domain multiplexing.	Main PCB	0	Output device that shows visual or tactile information.
DMD Board	0		DMD Board	0	
Power Supply Board	1		Power Supply Board	7	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Miscellaneous Diode (DZ)			Terminal Oscillator (EY)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Unique type of diode, more than likely unipolar.	Main PCB	0	Produces a sine or square wave.
DMD Board	0		DMD Board	0	
Power Supply Board	7		Power Supply Board	10	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Fuse (F)			Fiducial (FD)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB		Device that safely stops a current if it exceeds a certain level.	Main PCB	0	Used as a point of measure in a produced image.
DMD Board			DMD Board	1	
Power Supply Board			Power Supply Board	0	
Ballast Board			Ballast Board	1	
Speaker/Button PCB			Speaker/Button PCB	0	
Speaker/Button PCB 2			Speaker/Button PCB 2	0	
LED Control Board			LED Control Board	0	
Continuous Wave(CW) Sensor Board			Continuous Wave(CW) Sensor Board	0	
Detector Switch Board			Detector Switch Board	0	
Thermostat Board			Thermostat Board	0	
SP VCM Driver Board			SP VCM Driver Board	0	
Fuse Connector (FP)			Transformer Fuse (FT)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Connects fuses in more dangerous currents.	Main PCB	13	A fuse specifically designed for a transformer.
DMD Board	0		DMD Board	0	
Power Supply Board	3		Power Supply Board	0	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Oscillating Transformer (GT)			Transformer Hardware (HT)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	1	Creates a free-running signal with few components.	Main PCB	0	Used to fasten transformers to the PCB.
DMD Board	0		DMD Board	0	
Power Supply Board	2		Power Supply Board	3	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Integrated Circuit (IC)			Jack (J)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	34	Complex and compact electronic circuits designed to do a specific task.	Main PCB	0	An electrical connector.
DMD Board	21		DMD Board	0	
Power Supply Board	3		Power Supply Board	36	
Ballast Board	11		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	1	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	2	
Jack Link (JL)			Motor Jack (JM)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Links different connectors.	Main PCB	0	Connects a motor to the PCB.
DMD Board	0		DMD Board	0	
Power Supply Board	4		Power Supply Board	5	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Inductor (L)			Buzzer (LS)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	40	Stores electrical energy in an electromagnetic field by using insulated coiled wires around a core. Requires a current flowing through it to store energy.	Main PCB	0	An audio signalling device that can confirm user input or be used as an alarm or timer.
DMD Board	13		DMD Board	0	
Power Supply Board	2		Power Supply Board	1	
Ballast Board	8		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	1		SP VCM Driver Board	0	
Inductor Socket (LX)			Operational Amplifier (OP)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Connects inductors to the PCB or to other components.	Main PCB	3	A high-gain voltage amplifier.
DMD Board	0		DMD Board	1	
Power Supply Board	2		Power Supply Board	0	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	3	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	3	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	1	
Detector Switch Board	0		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Coupling (PC)			Diode Connector (PD)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Transfers energy from one component to another.	Main PCB	0	Connects multiple diodes to one another in a series.
DMD Board	0		DMD Board	0	
Power Supply Board	3		Power Supply Board	1	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Transistor (Q)			**Resistor (R)**		
Board	**Quantity**	**Purpose**	**Board**	**Quantity**	**Purpose**
Main PCB	17	Amplifies or switches electrical signals.	Main PCB	651	Provides electrical resistance. Can be used to maintain certain amperage or power levels for certain components as to not overload them.
DMD Board	5		DMD Board	147	
Power Supply Board	2		Power Supply Board	19	
Ballast Board	1		Ballast Board	130	
Speaker/Button PCB	1		Speaker/Button PCB	3	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	8	
LED Control Board	3		LED Control Board	10	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	5	
Sub-Assembly Resistor (RA)			**Voltage Regulator (REG)**		
Board	**Quantity**	**Purpose**	**Board**	**Quantity**	**Purpose**
Main PCB	27	Resistor with sub-assembly characteristics. Used to easily attach to the PCB or other components.	Main PCB	9	Device that maintains the voltage of a power source within certain limits.
DMD Board	6		DMD Board	0	
Power Supply Board	0		Power Supply Board	0	
Ballast Board	0		Ballast Board	7	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
RF Inductor (RF)			RF Inductor Switch (RFS)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Inductors with higher resistance and higher losses. Usually built as air cores.	Main PCB	0	A switch that controls an RF inductor.
DMD Board	0		DMD Board	0	
Power Supply Board	1		Power Supply Board	1	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Resistor-Inductor Circuit (RL)			Resistor Switch (RS)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Electric circuit composed of resistors and inductors.	Main PCB	0	Switch controlling a resistor.
DMD Board	0		DMD Board	0	
Power Supply Board	1		Power Supply Board	15	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Resistor Switch Fuse (RSF)			Resistor Socket (RX)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB		A fuse connected to a resistor switch.	Main PCB	0	Connects resistors to the PCB or other components.
DMD Board			DMD Board	0	
Power Supply Board			Power Supply Board	1	
Ballast Board			Ballast Board	0	
Speaker/Button PCB			Speaker/Button PCB	0	
Speaker/Button PCB 2			Speaker/Button PCB 2	0	
LED Control Board			LED Control Board	0	
Continuous Wave(CW) Sensor Board			Continuous Wave(CW) Sensor Board	0	
Detector Switch Board			Detector Switch Board	0	
Thermostat Board			Thermostat Board	0	
SP VCM Driver Board			SP VCM Driver Board	0	
Relay (RY)			Sub-Assembly Switch (SA)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Electrically operated switch.	Main PCB	0	Switch with sub-assembly characteristics. Used to easily attach to the PCB or other components.
DMD Board	0		DMD Board	0	
Power Supply Board	1		Power Supply Board	0	
Ballast Board	0		Ballast Board	2	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Switch (SW)			Transformer (T)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	1	Interrupts an electrical current with physical manipulation.	Main PCB	0	Transfers electrical energy between electrical circuits by using electromagnetic induction.
DMD Board	0		DMD Board	0	
Power Supply Board	0		Power Supply Board	1	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	1		Speaker/Button PCB	0	
Speaker/Button PCB 2	7		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	1		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Thermistor (TH)			Test Point (TP)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Resistor whose resistance depends on its temperature.	Main PCB	19	Used to monitor the circuit or produce test signals.
DMD Board	0		DMD Board	72	
Power Supply Board	1		Power Supply Board	0	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Transformer Switch (TS)			Tuner (TU)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	A switch controlling a transformer.	Main PCB	1	Recieves radio frequency transmissions and converts them for processing.
DMD Board	0		DMD Board	0	
Power Supply Board	1		Power Supply Board	0	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	
Integrated Circuit (U)			Vacuum Tube Socket (VX)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	0	Same as Integrated Circuit (IC) just with a different reference designator.	Main PCB	0	The connection point of a vacuum tube.
DMD Board	0		DMD Board	0	
Power Supply Board	0		Power Supply Board	1	
Ballast Board	0		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	

Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	2		SP VCM Driver Board	0	
Crystal Oscillator (X)			Zener Diode (ZD)		
Board	Quantity	Purpose	Board	Quantity	Purpose
Main PCB	5	Electrical circuit that uses a vibrating crystal's mechanical resonance to create precise electrical frequencies.	Main PCB	0	Diode that allows reverse flow at a specific voltage.
DMD Board	1		DMD Board	0	
Power Supply Board	0		Power Supply Board	3	
Ballast Board	1		Ballast Board	0	
Speaker/Button PCB	0		Speaker/Button PCB	0	
Speaker/Button PCB 2	0		Speaker/Button PCB 2	0	
LED Control Board	0		LED Control Board	0	
Continuous Wave(CW) Sensor Board	0		Continuous Wave(CW) Sensor Board	0	
Detector Switch Board	0		Detector Switch Board	0	
Thermostat Board	0		Thermostat Board	0	
SP VCM Driver Board	0		SP VCM Driver Board	0	

5. Integrated Circuit Information

5.1 Main PCB

Main PCB				
IC Number	**Manufacturer**	**Part/Model**	**Function**	**Datasheet**
IC 2	NeoFidelity	3000	Digital audio amplifier	Link
IC 100	Atmel	640	Data memory	**
IC 101	ATI Xilleon	242	Used for accelerated video decoding	
IC 152/IC 154	NXP	LVC16373A	Implements buffer registers	Link
IC 153	Samsung	KFG5616U1A	Memory solution	Link
IC 211/IC 212	Monolithic Power Systems	MP1583DN	Step-down regulator	Link
IC 213	Semtech	SC4521	Step-down switching regulator	Link
IC 247	BCD	39150	three-terminal regulator	Link
IC 386/IC 387	Nexperia	PA9546A	Quad bidirectional translating switch	Link
IC 401	Qimonda	HYB18T512161BF-25	DRAM	
IC 420	Atmel	ATMEL652	Microprocessor	
IC 421	Samsung	S3F84BBXZZ	CMOS microcontroller	Link
IC 422				
IC 424				
IC 631	Sipex	3232EC	Transceiver solution	Link
IC 633	Micrel	2544	Power Switch	Link
IC 695/IC 696	STMicroelectronics	TEA6425	Switches between video and chroma signals	Link
IC 697	STMicroelectronics	TEA6422	Switches 6 stereo inputs on 3 stereo outputs	Link
IC 698/IC 755/IC 756	Samsung	Q709	Logic Control	
IC 835	MStar	MST3389M-LF-110	Audio system decoding	
IC 836	Catalyst Semi	24WC08WI	Logic control	
IC 966	Infineon	BE218	Quad buffer/line driver	Link
IC 967	Toshiba	VHC244	Octal bus buffer	Link
IC 985	STMicroelectronics	062C	Low-power JFET dual operational amplifiers	Link

IC 986	Burr Brown(Texas Instruments Now)	PCM1754	CMOS, monolithic, integrated circuit, which includes stereo digital-to-analog converters and support circuitry	Link
IC 987	SRS Labs	MLT 22 643	Psychoacoustic 3D audio processing technology	
IC 1402	Doestek	DTC34LM85AL	data converter, converts data to data streams	Link
IC 1403	Samsung/DNIe	SDP54	Video processing	

**: Information is unknown or not found

5.2 Ballast Board

Ballast Board (ICs were not labelled with numbers)				
IC Number	**Manufacturer**	**Part/Model**	**Function**	**Datasheet**
#1	STMicroelectronics	358	Low-power dual operational amplifiers	Link
#2	STMicroelectronics	VH618		
#3	Vishay	SFH6106-1	Optocoupler, Phototransistor Output	Link
#4-#6	STMicroelectronics	TEA1521I	Switched Mode Power Supply (SMPS) controller	Link
#7	STMicroelectronics	L6385D	High-voltage high and low side driver	Link
#8	STMicroelectronics	78LOSA	Positive Voltage Regulators	Link
#9	Infineon	PC936F	Microcontroller with accelerated two-clock 80C51 core	Link
#10	STMicroelectronics	258	Low-power dual operational amplifiers	Link
#11	Infineon	UBA2033IS	HF full bridge driver IC	Link

5.3 Power Supply Board

Power Supply Board				
IC Number	**Manufacturer**	**Part/Model**	**Function**	**Datasheet**
IC 801	STMicroelectronics	VIPer12A	Low power offline switched-mode power supply primary switcher	Link
IC 802/ICS 802	KA Electronics	KA I31LZ		

5.4 DMD Board

DMD Board				
IC Number	**Manufacturer**	**Part/Model**	**Function**	**Datasheet**
IC 100	THine	TH63LVD104A	Step-down regulator	
IC 101	Samsung	J709	Logic control	
IC 200	Texas Instruments	DDP3021	Signal Processor	
IC 301	Micron	7AA31		
IC 302	Texas Instruments	71TI		
IC 400	Analog Devices	AD7801	Voltage out DAC	Link
IC 401		65D6I41L		
IC 403	Texas Instruments	DAD2000	Generates the Micromirror Clocking Pulses required by the DLP Digital Micromirror Device(DMD)	Link
IC 404				
IC 501	Macronix	T070621		
IC 750	Texas Instruments	PMD1000	Power and motor control driver	Link
IC 800	Nexperia	8574TS	General-purpose remote I/O expansion	Link
IC 801	Anpec	APL1117	Three-terminal adjustable regulators	Link
IC 802		71RL		
IC 803	Infineon	BF886	RF Transistor	Link
IC 804				
IC 805				

IC 806				
IC 807				
IC 811	National Semiconductor	CPRLM	Voltage comparators	Link
IC 900	Texas Instruments	1272-5003W	DMD	N/A

5.5 VCM Driver Board

SP VCM Driver Board				
IC Number	**Manufacturer**	**Part/Model**	**Function**	**Datasheet**
U1	On Semiconductor	TCA03720W		
U2	Integral	IL358	Low Power Dual Operational Amplifier	Link

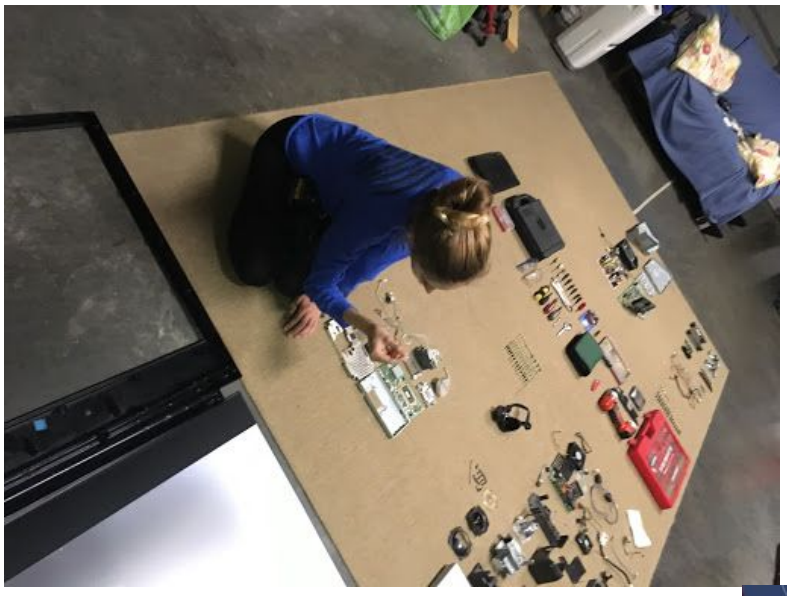
6. Other Pictures

Picture 1: The TV prior to deconstruction.

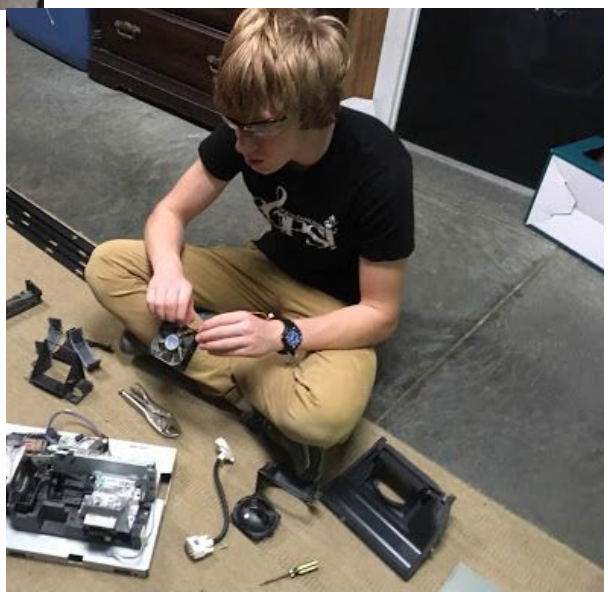
Picture 2: Open back of the TV (on right)

Picture 3: Speaker setup (on left)

Picture 4: Savannah using a specialized drill on old and stripped screws (on right)



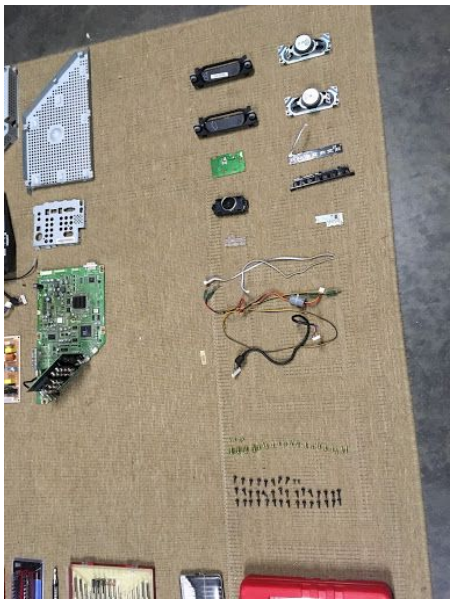
Picture 5: Mary examining different pieces to fit them in the catalog (left)



Picture 6: Ryan taking apart the main projection components (right)

Picture 7: Cici searching for IC datasheets

Picture 8: After everything was deconstructed, we reassembled the projection sequence to better understand how it worked and how the pieces fit together (left)



Picture 9: We made sure to organize the pieces along the way to keep track of everything (left)