Team 11124R T-Rex Push-Ups
Elyria Robotics
Electronics Online Challenge

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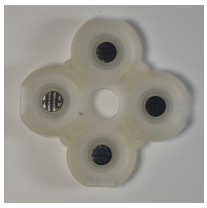
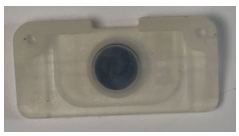
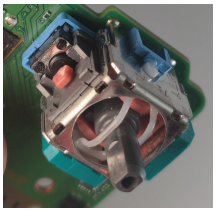
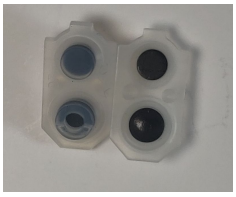
Introduction: The device I decided to dismantle is a Dualshock 4 remote manufactured by Sony Corporation, model CUH-ZXT2U. I dismantled the dualshock 4 remote because I was curious to see the cause of stick drift. Stick drift is an issue that causes analog stick modules to give input when not being touched. This can cause unwanted input on the controller and in robotics most people drive with the joysticks and if the joysticks happen to have stick drift the robot would be driving when it is not wanted. There are 4 categories wiring, sensors, structure, and motherboard components all parts are listed and provide 4 pieces of useful information: the parts name, a picture of it, who made it or its number, and what it does in the remote. Inside the remote there were no TI components.

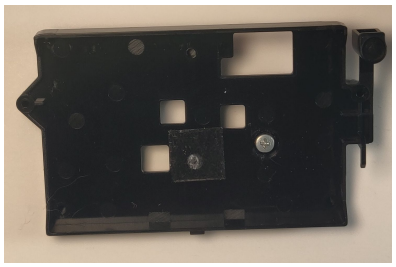
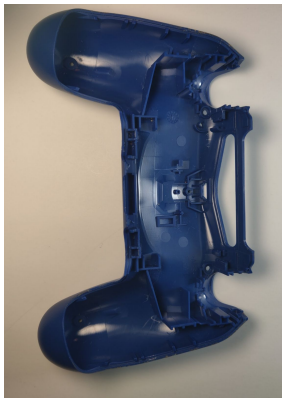
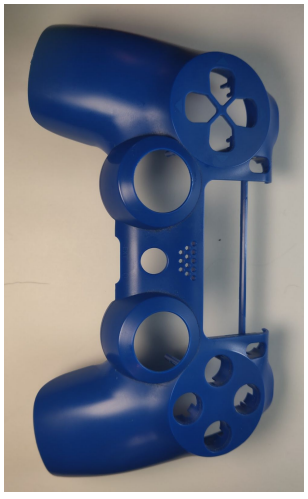
How it Works: Controllers are meant to control things, anything from a robot to a character in a video game. When any sensor except for home button, joystick, share, options, and touchpad are pressed or pulled in pushes a conductive rubber pad into the ribbon circuit completing a circuit through contact with the receiver on the motherboard sending a signal to the ARM processor letting it know a circuit was completed. Once the ARM processor knows the circuit is completed it sends out another signal to the bluetooth antenna that sends a signal to the PS4 or the device the remote is being used on and completes an action based on the sensor triggered. With the other sensors they are directly connected to the main motherboard except for the touchpad it is wired to the motherboard. The other sensors home button, joystick, share, and options are directly connected to the motherboard including the rumble motors that vibrate the controller. The main motherboard also contains a 4 devices that are PMIC's(Power Management Integrated Circuit) The three part numbers are T260, 6EDBS, CYTT210, and S2P6001A. You can see them below with their function in the Motherboard Components section.

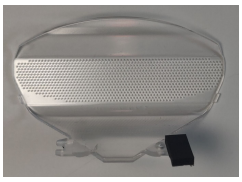
What I Learned: When I first started this project I was curious as to what I would find. The thing that confused and amazed me the most is that buttons aren't directly wired to the motherboard, when I saw the Ribbon Circuit I just thought it was a piece of plastic to show the layout of the buttons but it was a circuit! The RKJXK122400Y analog module is the cause of stick drift, when the module starts to

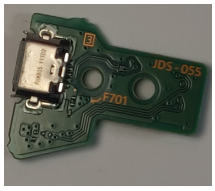
near the end of its lifetime(100,000) cycles it can start to give off false input causing stick drift. When it comes to the PMIC's I never knew that you could fit such complicated technology in such a small area, the ARM processor is extremely small but it runs the entire system. The remote was a lot more of a challenge than I thought due to the schematics not being posted online, this caused me to search by part number to figure things out.

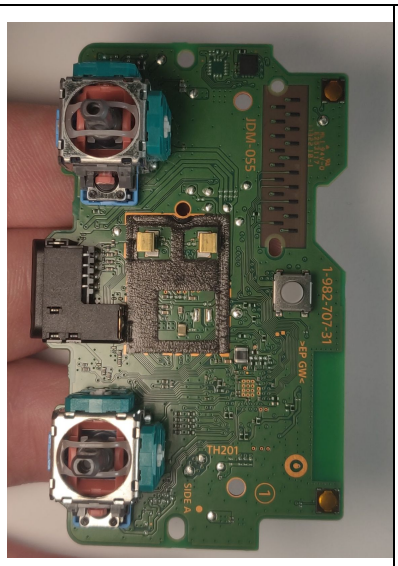
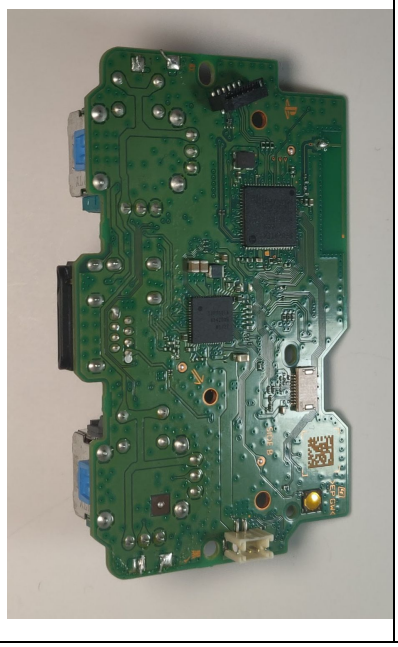
Sensors			
Component Name	Pictures	Part Number/Manufacturer	Comment
X, Circle, Triangle, and Square Button		Sony Corporation	When you push a button the corresponding conductive rubber pad is pushed down.
X, Circle, Triangle, and Square Conductive Rubber Pad		Sony Corporation	These conductive rubber pads complete a circuit temporarily when they connect to the Ribbon Circuit
Directional Pad		Sony Corporation	When you push down one direction you push the corresponding conductive rubber pad down.
Directional Pad Conductive Rubber Pad		Sony Corporation	These conductive rubber pads are pushed down to the Ribbon Circuit and send a signal to the motherboard.
Home Button		Sony Corporation	When this button is pushed you travel to the home menu, you push down its conductive pad
Home Button Conductive Rubber Pad		Sony Corporation	The conductive pad is then pushed onto the button on the motherboard to complete a task.
Joysticks		Sony Corporation	The joystick is connected to the analog stick modules and when pushed down it uses

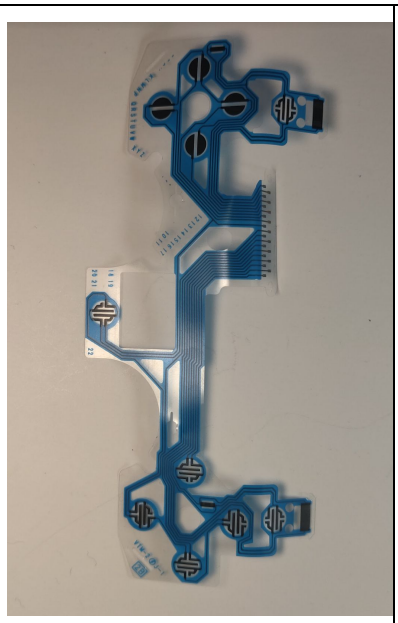
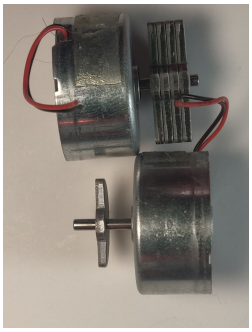
			the R3 button.
Analog Stick Module		RKJXK122400Y/Alps Alpine	This module is complicated, it is being constantly pushed into the center by springs and is pushed down to press R3.
Touch Pad		Sony Corporation	The touch pad is not connected to the Ribbon Circuit so it can tell when it is scrolled on.
R2, R1, L2, L1 Triggers		Sony Corporation	When a trigger is pulled it will push the corresponding conductive rubber pad down.
R2, R1, L2, L1 Conductive Rubber Pads		Sony Corporation	When these rubber pads touch the Ribbon Circuit it completes a circuit temporarily to go to the motherboard.

Structure			
Part Name	Pictures		Comments
Battery Holder		Sony Corporation	This structure is used to keep the battery in place.
Touch Pad Holder		Sony Corporation	This structure makes sure the touchpad stays in place.
Bottom Housing Piece		Sony Corporation	This piece covers up all the wires and circuits from the bottom
Top Housing Piece		Sony Corporation	This piece is placed on the top of the bottom piece to cover up the top of the controller encasing the wiring.

¼in. Screws		Sony Corporation	Used to hold the top and bottom housing piece together.
Locks the Plastic window Holder in Place		Sony Corporation	This piece lock the window holder in place.
Plastic Window and USB and LED Motherboard holder		Sony Corporation	This piece hold in the plastic window and the LED and USB Motherboard
Plastic Window		Sony Corporation	This allows light to shine out of the remote.
Inner Housing Piece made of ABS (Acrylonitrile butadiene styrene)		Sony Corporation	This piece has everything except for the usb port, buttons, and directional pad attached to it. It also holds the option and share button.

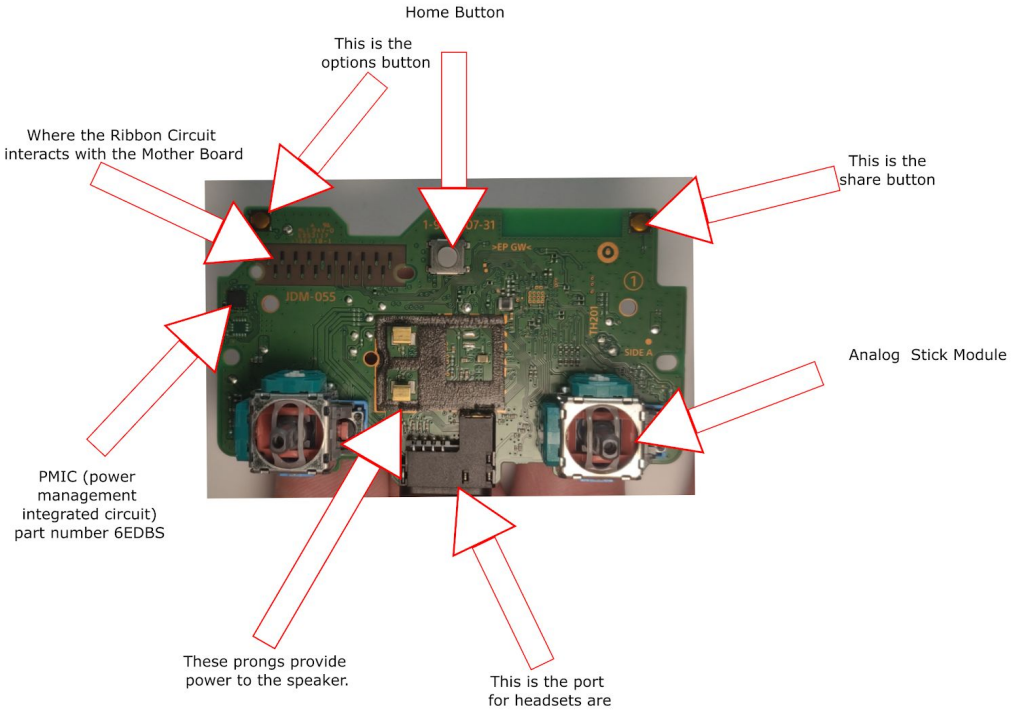
Wiring			
Part Name	Picture	Part Number/Manufacturer	Comment
USB and LED Motherboard		Sony Corporation	This small motherboard is located at the very bottom of the bottom housing piece, it has a led and a USB charging port.
3.65 Volt Lithium Ion Battery		Sony Corporation	This 3.65V battery powers the whole controller and gets charged by the USB motherboard.
Wire	 	Sony Corporation	This wire goes from the USB to the motherboard in order to charge the battery

Top of the MotherBoard		Sony Corporation	The top of the motherboard has many components that allow the system to function connected by circuits.
Bottom of The Motherboard		Sony Corporation	The bottom of the motherboard has many components that are vital to allow the system to work.

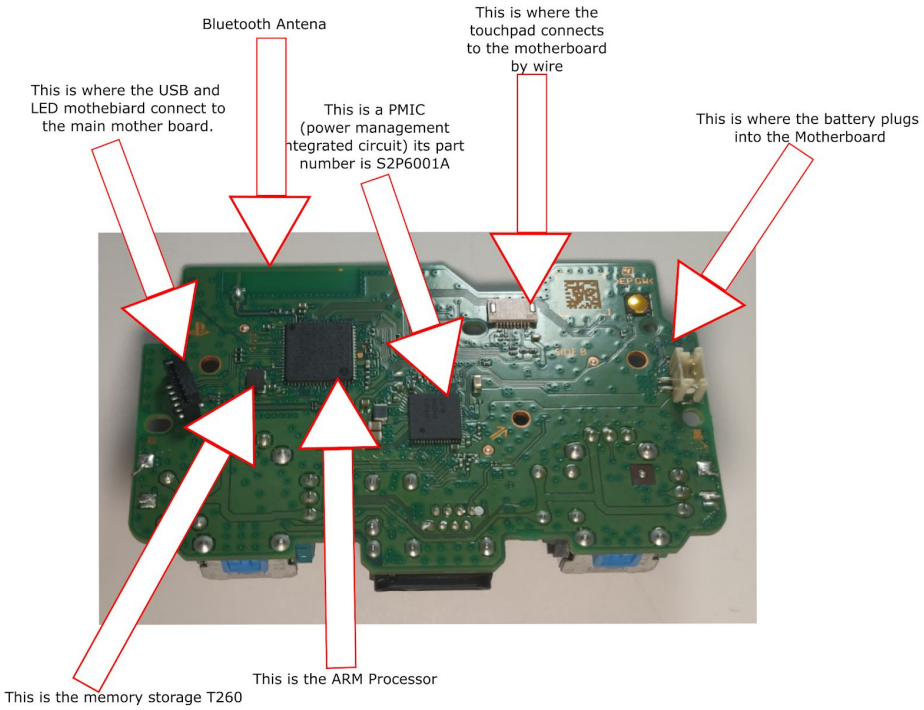
Ribbon Circuit		Sony Corporation	This thin type of circuit allows the conductive rubber pads to complete circuits and send info to the motherboard.
Rumble Motors with Wheels		Sony Corporation	These devices are stored in the inner housing piece and they allow the controller to vibrate.

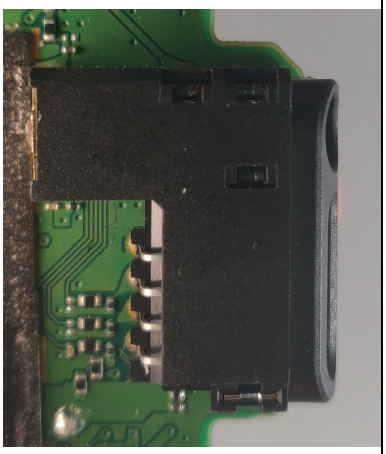
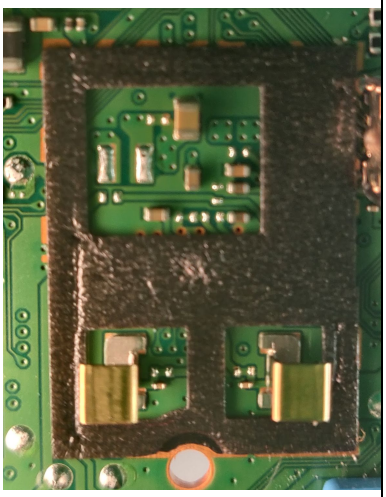
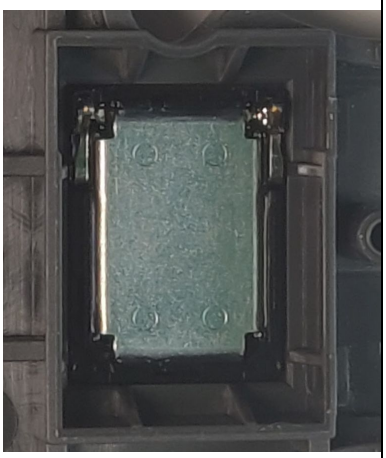
These are diagrams of where everything is on the Motherboard and its name

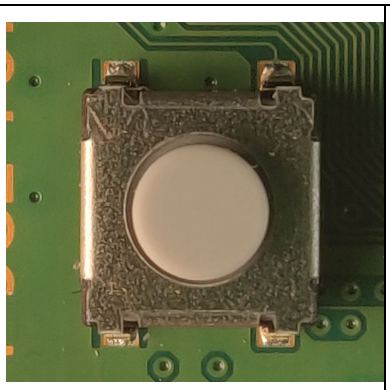
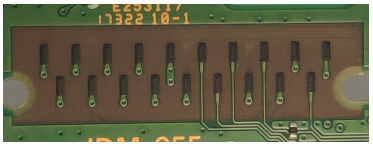
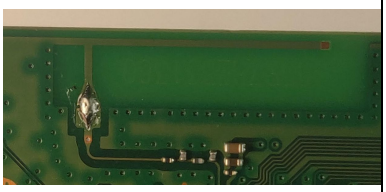
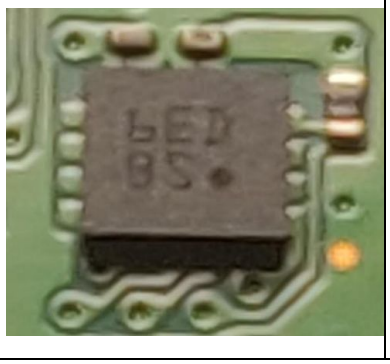
Top/Side A

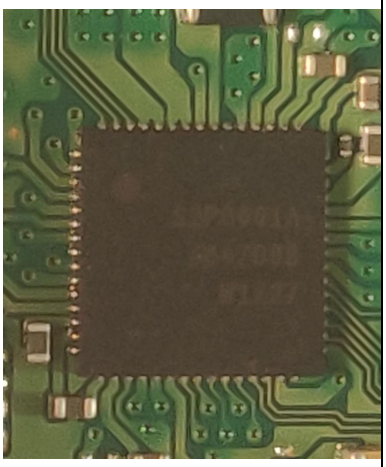
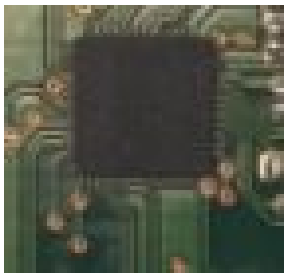
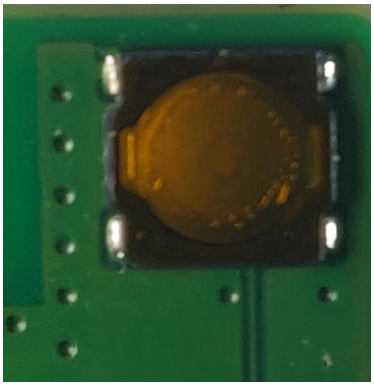


Bottom/Side B



Motherboard Components.			
Part	Picture	Part Number/Manufacturer	Comment
Audio Inputs		Sony Corporation	Allows for headsets and headphones to be plugged in.
Speaker Powering Antenas		Sony Corporation	The two golden collared antennas tough the two speakers antennas allowing the speaker to work.
Speaker		Sony Corporation	This speaker plays noise to make gameplay more immersive.

Home Motherboard Button		Sony Corporation	When this button is pushed it sends you to the home menu.
Ribbon Circuit Receiver		Sony Corporation	This receiver allows the motherboard to sense when a button has been pressed.
Bluetooth Antenna		Sony Corporation	This bluetooth antenna sends signals to the PS4 allowing them to link.
PMIC Memory Storage		T260	This component is directly tied to one component, the ARM processor; this is part of the reason controllers auto connect once linked.
PMIC Power Manger		6EDBS	This PMIC control the amount of power going into the motherboard

ARM Processor		Mediatek/MT3610N	This processor acts as the brain for the entire controller everything leads to here.
PMIC Power distributor		S2P6001A	This PMIC distributes power across the entire remote.
Touch Pad PMIC		CYTT210	This PMIC send signals back to the main motherboard to tell what nodes we crossed by the user finger
Options/Share Button		Sony Corporation	There are two of these buttons on the left and right side that open the options and the share menu.