Online Challenge

By: members of 16610C

Introduction

This is our second attempt at the online challenge. The first attempt consisted of disassembling an Xbox controller. However, we quickly realized the lack of Texas Instrument components, so we decided to turn to another direction. The electronic that we chose to disassemble next is a VEX EDR controller. We chose a VEx EDR controller. Because first, we are all team members building VEX robots, so we have experience with VEX controllers. The online challenge can also help us develop a further understanding of the controller. Second, disassembling controllers are safe, and it isn't hard to disassemble. Third, we have an old and broken controller from past seasons of VEX EDR, so no further investments are needed. Lastly, this controller is fully designed by Texa instrument.

Team Members

We joined the VEX V5 Challenge, as 16610C.

Zach Chen
Team Captain, Lead Builder
Zach is a grade 10 in P.C.A.

Bobo Li
Lead Notebooker
Bobo is a grade 9 in Ridley College.

Alex Li
Lead Programmer
Alex is a grade 9 in Ridley College.

Jason Zhang
Lead Designer
Jason is a grade 10 in CrestWood.

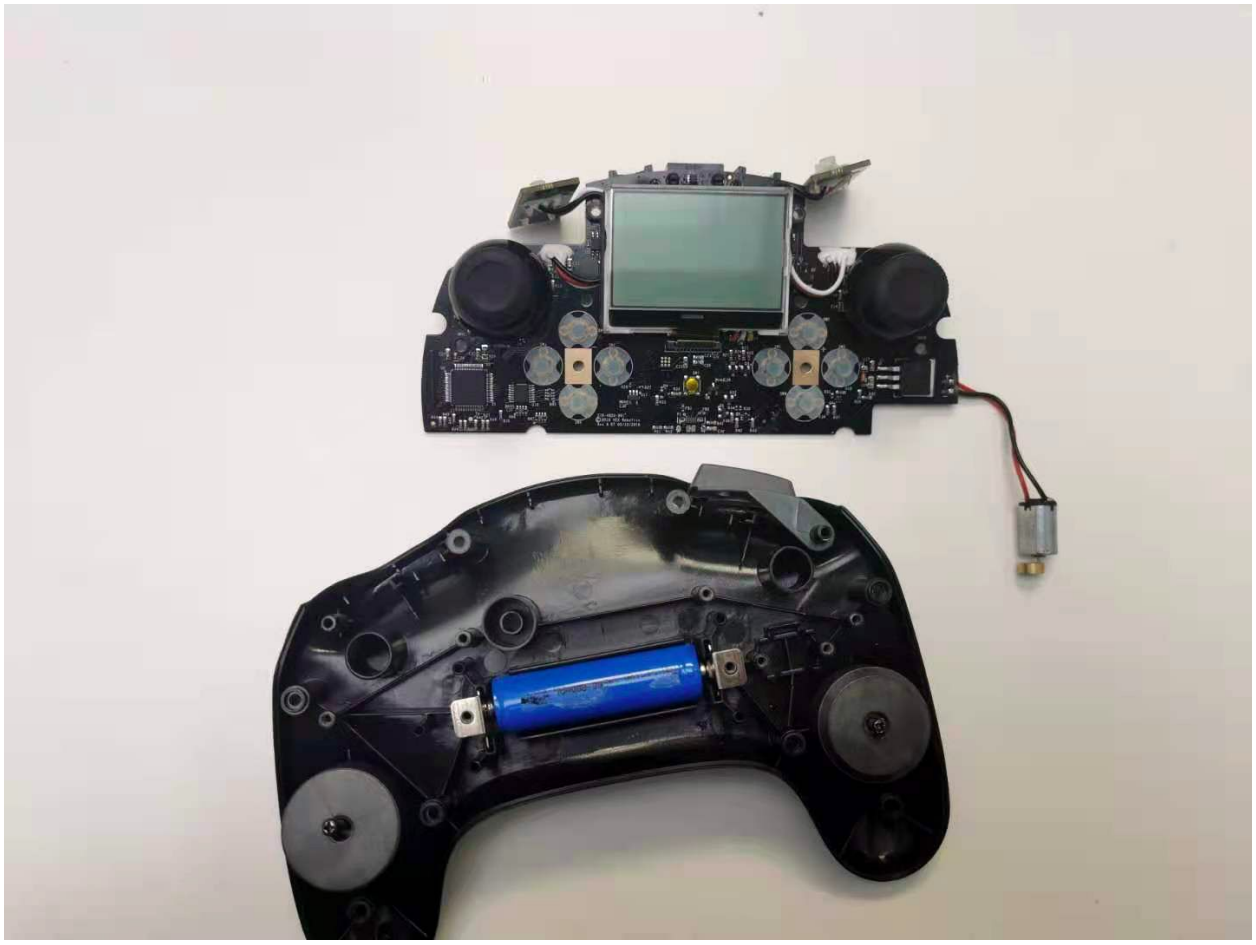
Process of dissembling

1. We unscrewed all the screws at the back of the controller. They are the one holding the top and bottom cases together.

2. We opened the top and bottom case of the controller, and removed all the buttons.

3. Then we unscrewed all the screws on the motherboard that were connecting to the bottom case.

4. Then we took the motherboard off.



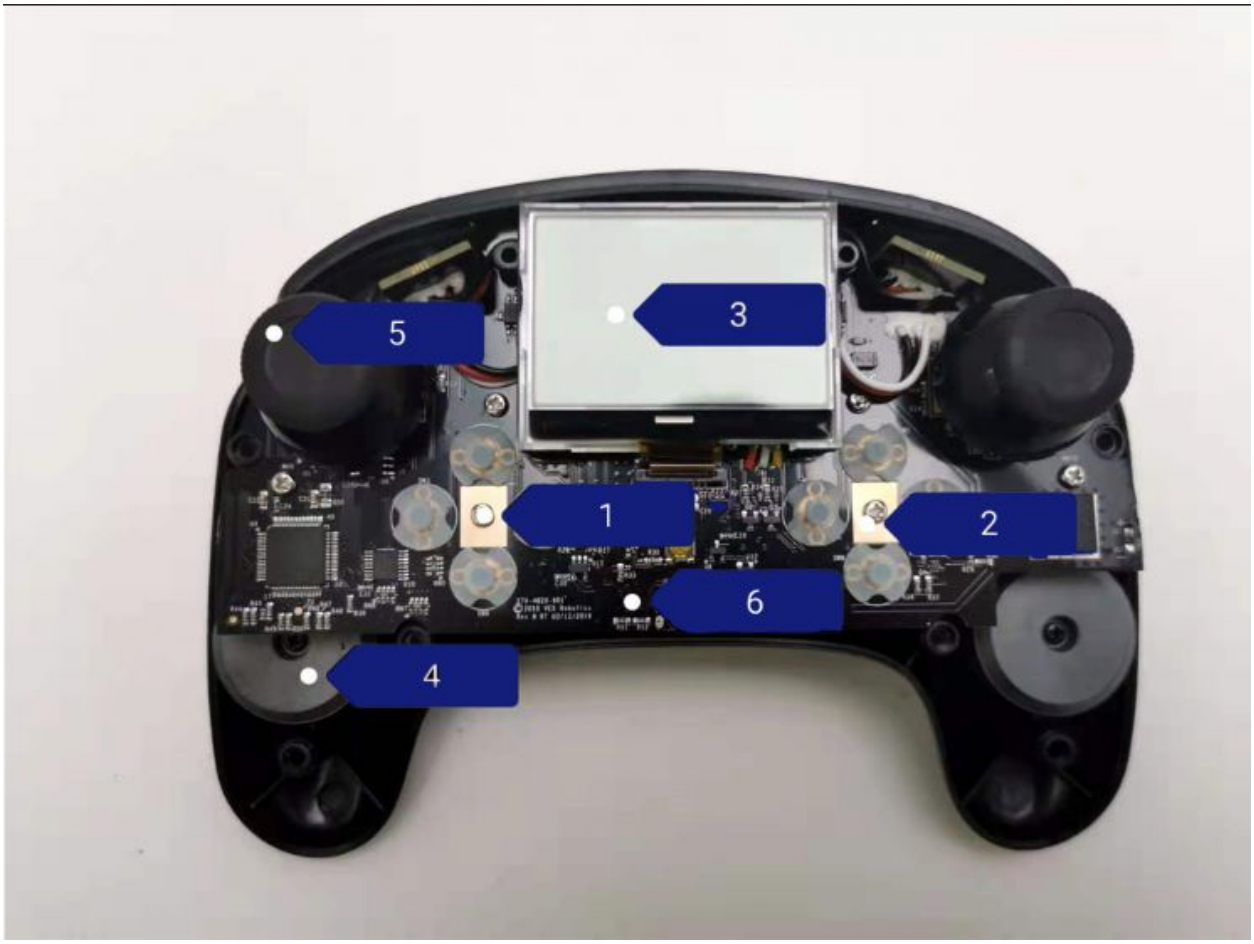
5. After, we unscrewed the screws that secured the weights to the controller.

6. We took one of the weights off. (The other weight's screw was stuck)

7. These are all the components from the controller

<u>Parts of Controller and their Functions</u>

1. Actual buttons for A, B, X and Y
2. Actual button for powering on and off
3. Actual buttons for Up, Down, Left and Right

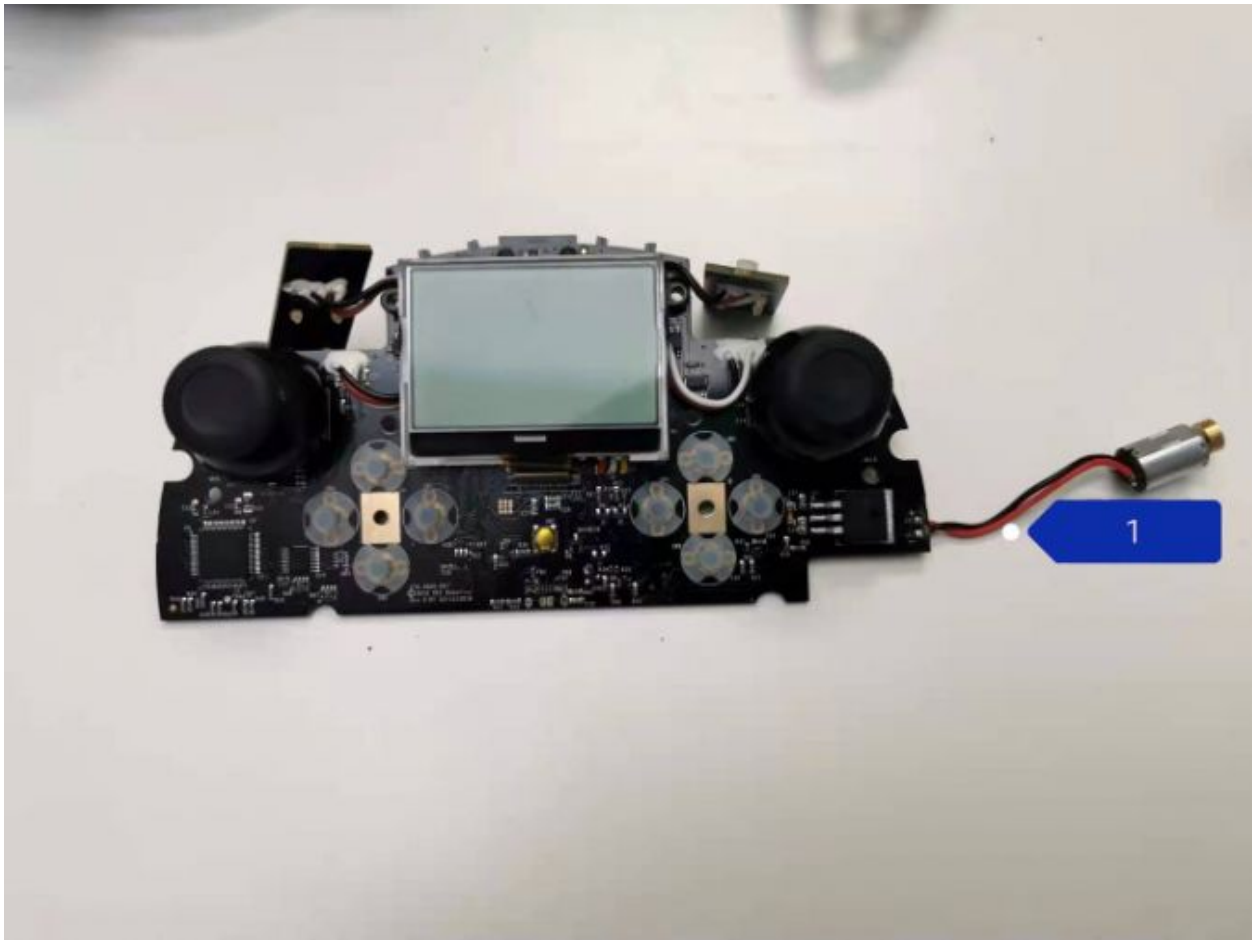


1. The button grounding for up, down, left and right on the motherboard, this will transfer the signal to the screen and the robot when the button is being pressed.
2. The button grounding for A, B, Y and X on the motherboard, this will transfer the signal to the screen and the robot when the button is being pressed.
3. The screen, this is used to display actions that are on the performed controller.
4. The weight, this is used to balance the controller out. Without this, the top will tilt and cause it to be difficult to control.
5. The joystick, this is usually used to drive the robot and perform actions on the screen.
6. The motherboard, this is used to connect components together and also a passageway for the signals plus the power.

R1 R2. This is groundings for buttons R1 and R2. The groundings are connected to the motherboard through wires.

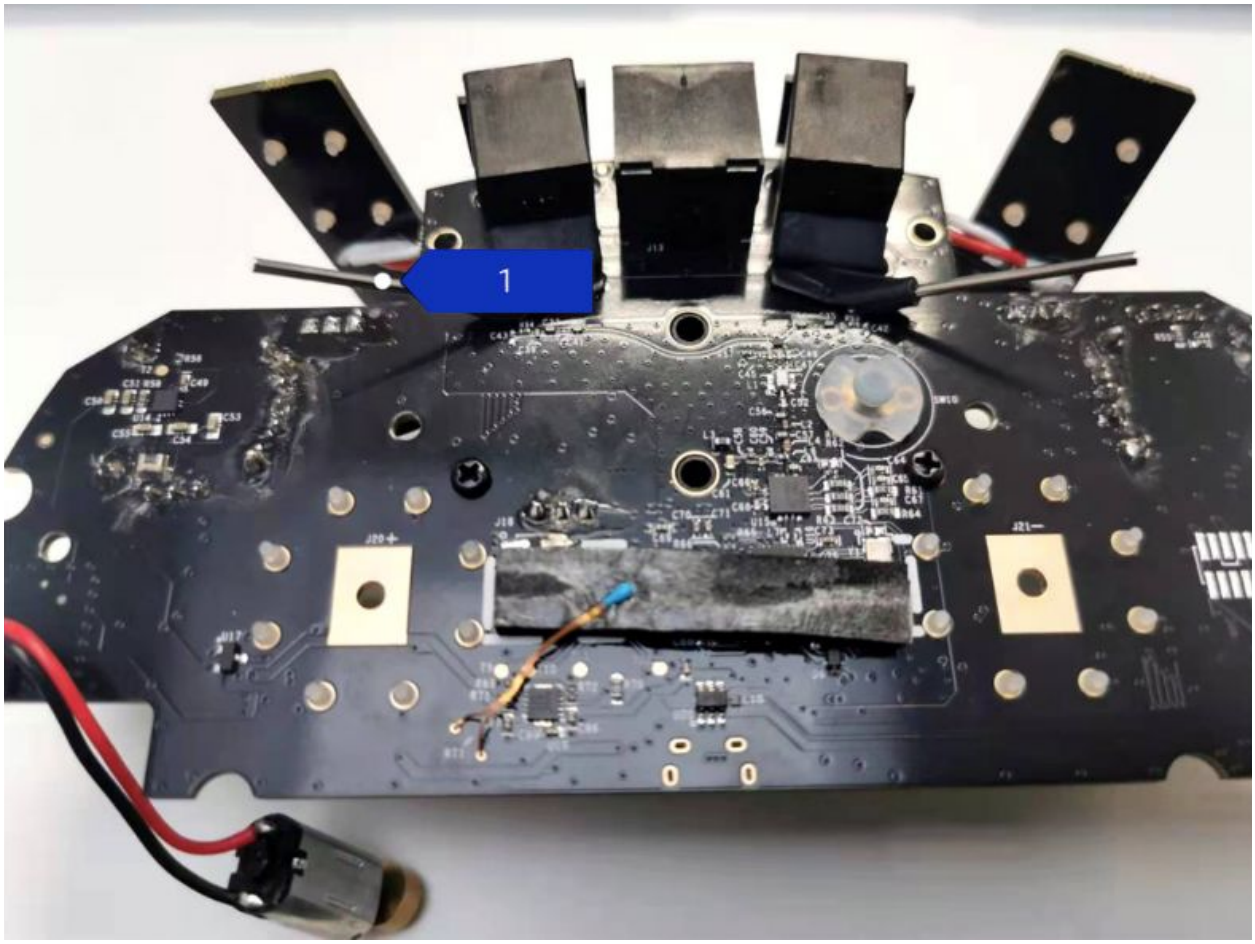
L1 L2. This is groundings for buttons L1 and L2. The groundings are connected to the motherboard through wires.

This is a chargeable battery under the motherboard, it can be connected to a charger on the outside.

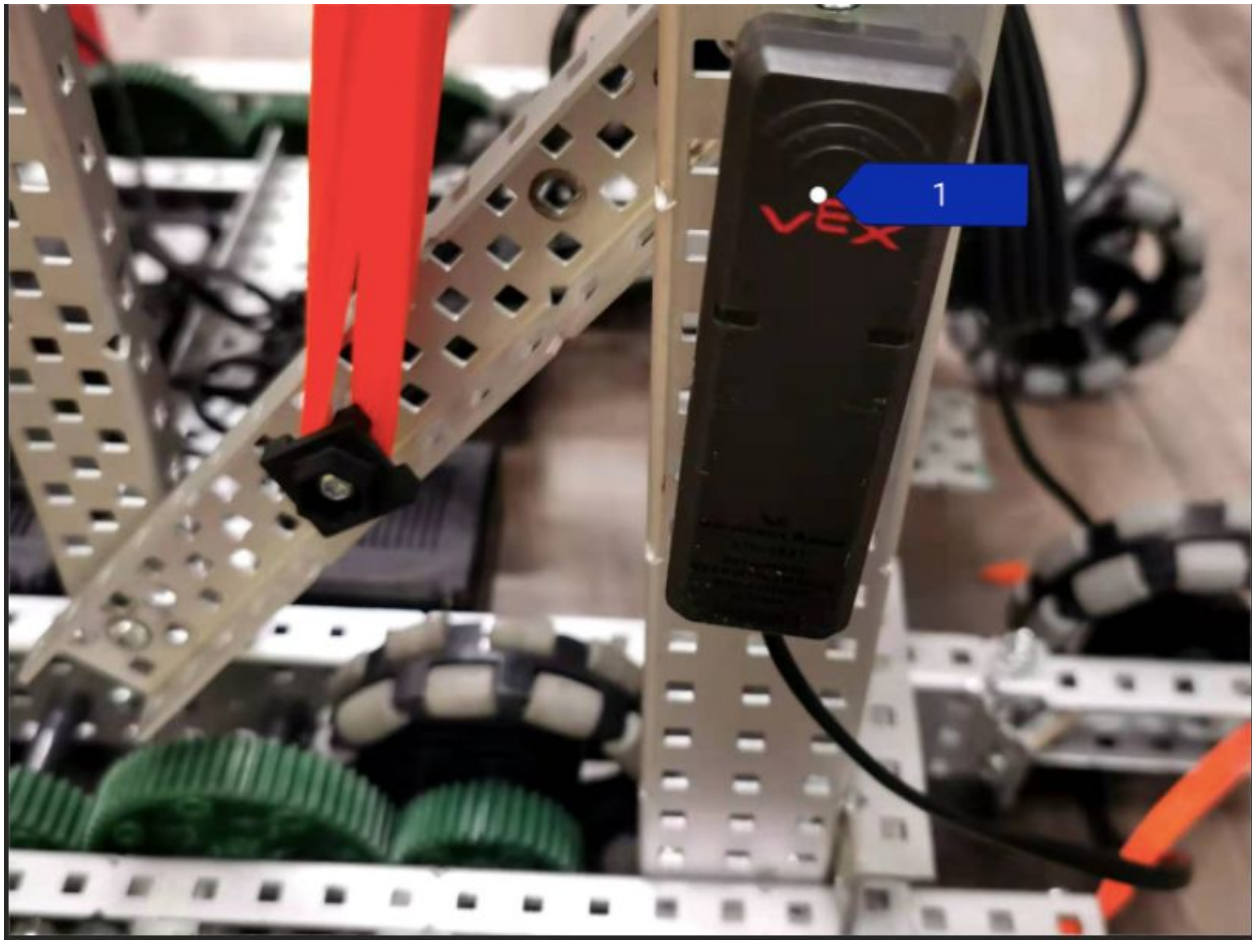


1. This used to create vibrations on the controller when turning online and offline

1. CPU, this process all the signals that have been sent by the buttons grounding, and sent the message to the RAM
2. RAM, this performs the action that the CPU had sent to it.



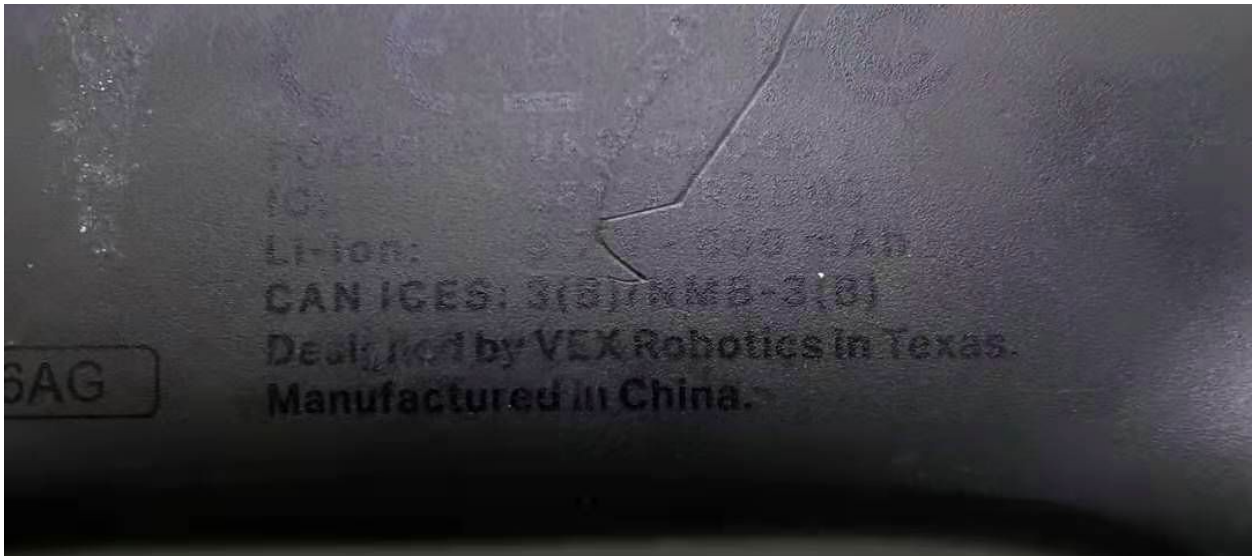
1. These are signal receiver and sender, this sends commands to the robot and tells it what to do.



1. This is the radio receiver on the robot.

Texa instrument Parts

The whole controller is designed by Texas instrument and manufactured in China.



How Every Part of the Controller Worked Together to Function

When the button shell is pressed, it touches the button grounding. This action is signalled by binary numbers(0, 1). Without any contact with the sensor, the signal sent is always 0. However, when the button is pressed, one or more ones are going to be sent to the CPU, telling it that the button has been pressed. Then the CPU processes what the button's function is and sends the message to the RAM. Then the RAM executes the instructions, sends the signal to the screen or out to the signal receiver. After the signal receiver on the robot retrieves the information, it sends it to the brain. When a signal is received, The transmitter applies an alternating electric current to the rods, which charges them alternately positive (+) and negative (−). Loops of electric field leave the antenna and travel away at the speed of light; these are the radio waves. While the antenna receives the radio wave, it vibrates. Then the signal is sent to the CPU of the robot. The CPU checks on the frequency and width of the radio wave. Additionally, there are two antennas located on the signal receiver to determine the width of the wave. Frequency and width are mostly created by the amount of electric power it receives. Meanwhile, the signal sent will be processed by the screen. And when the power button is pressed, after going through the CPU and the RAM, it will also send a signal to the vibration motor, which has a circle on top, (it is connected close to the outside rim of the circle) which will cause a vibration.

What We Learned

We learned a lot from the process of making this online challenge, especially because this is the second one that we have done. First, We have learned how vibration is usually made in an electronic, just a motor connected to a side of the circle. Second, we have learned what role the CPU and the RAM play in an electronic. They are the processor and the performer. Third, we have learned that the motherboard passes electricity and signals to all the components. And lastly, I have learned to identify electric parts and the role they play for the system.