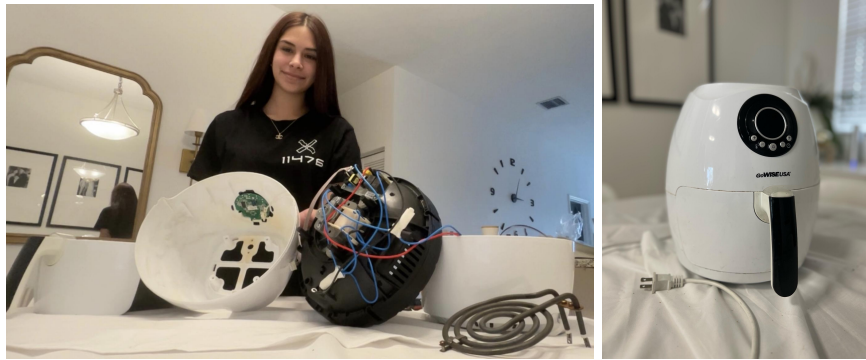
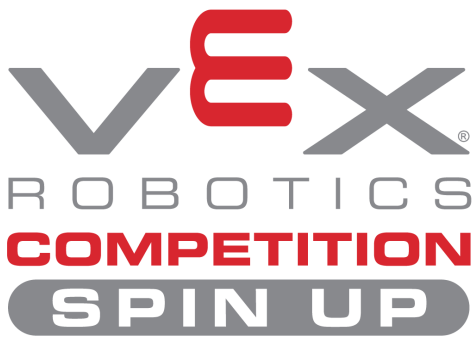


REVERSE ENGINEERING CHALLENGE

SUMMARY REPORT



THE DISASSEMBLY OF A GoWISEUSA Air Fryer



Team 11476X:

Kyomi Abreu
Sophia Pinkston
Victoria Velazquez
Juan Gonzalez
Yeliel Hernandez
Javier Garcia



Mater Academy Charter High School
Hialeah Gardens, Florida
LionTech Robotics

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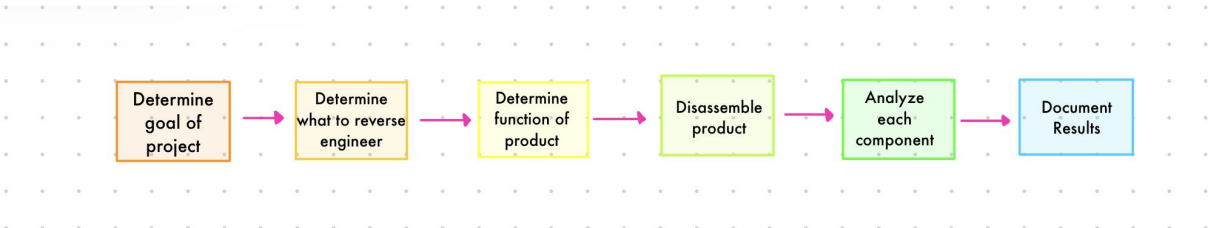
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About Us:

We are 11476X. Our team consists of 6 members, all different in various ways. After months of working tirelessly on building our robot and strictly following the engineering design process, we thought it would be interesting to do the complete opposite. By doing this challenge we get to implement the skills we have gained from assembling and reassembling our robot a countless number of times, and disassemble this AirFryer that Kyomi’s mom allowed us to experiment with.

This is a GoWISEUSA Electric Programmable Airwise Fryer (GW22634). It had stopped working as well as it did before and we want to not only explore the different components of this machine and also see if we can discover why it stopped performing at its maximum capability. We attempted to find a process similar to the Design Process we use in our engineering notebook to keep ourselves organized while we perform this project.

Our Reverse Engineering Design Process:



(Figure 1)

Our Project Goal:

By performing this project, we hope to learn more about how an air fryer works and what components are inside of this machine that make the process of oil-less frying so much more simple and ideal for people to use in the kitchen. We want to put our Robotics Skills to the test and see if we are able to identify most of the electrical and mechanical components of this airwise fryer.

Our Reverse Engineering Product:



Electric Programmable Airwise Fryer

Model: HF-598LCD

Item NO.: GW22634

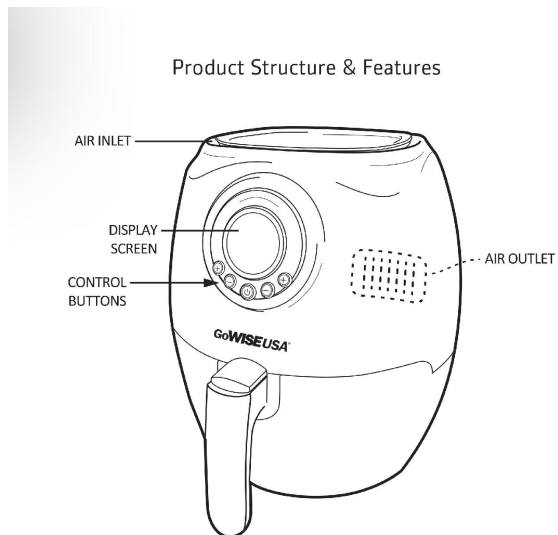
Rating: 120V 60Hz 1200W

Capacity: 2.75 QT

Serial NO.: 171030028372

(Figure 2)

What is the Function of this Product?

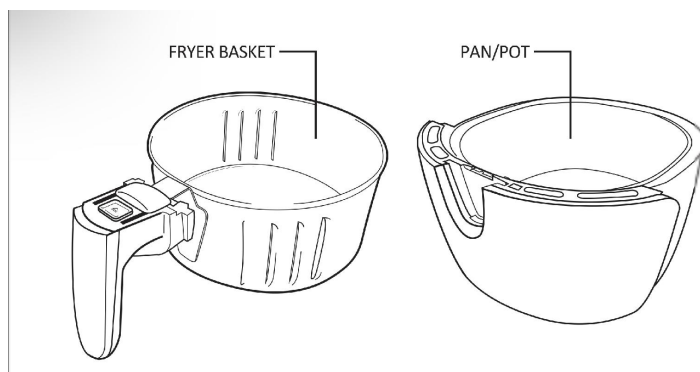


In this diagram, the exterior components of the product are displayed.

This product includes:

- Air Inlet
- Display Screen
- Control Buttons
- Air Outlet
- Fryer basket
- Pan/Pot

(Figure 3 & 4, Top to Bottom)



This product is used as a healthy and simpler alternative to Oil-Frying things in a pan or pot. Using the air absorbed through the Air Inlet, this machine surrounds the food in the

Fryer Basket with hot air. Using the Display Screen and Control Buttons, you can set the temperature (170 degrees Fahrenheit- 400 degrees Fahrenheit) and a timer that goes up to 30 minutes. Constantly cycling air in through the inlet and out through the outlet. This machine circulates enough hot air in the Pan for your food to be prepared in the sufficient amount of time.

Disassembly Process

Materials:

- Phillips Head ScrewDriver
- Flat Head ScrewDriver
- Pliers
- Electric Programmable Airwise Fryer
- White Table Cloth (So screws and other components can be seen easier)



Step 1: Remove the Pan and Fryer Basket from inside the Air Fryer. (Figure 5)



Step 2: Turn over the Air Fryer and remove the top of the wire cover. (2x Screws on Cover, 4x Screws inside to keep wires in place)

11476X Reverse Engineering Challenge

(Figure 6)



Step 3: Take off the bottom cover of the Air Fryer (5x Screws)

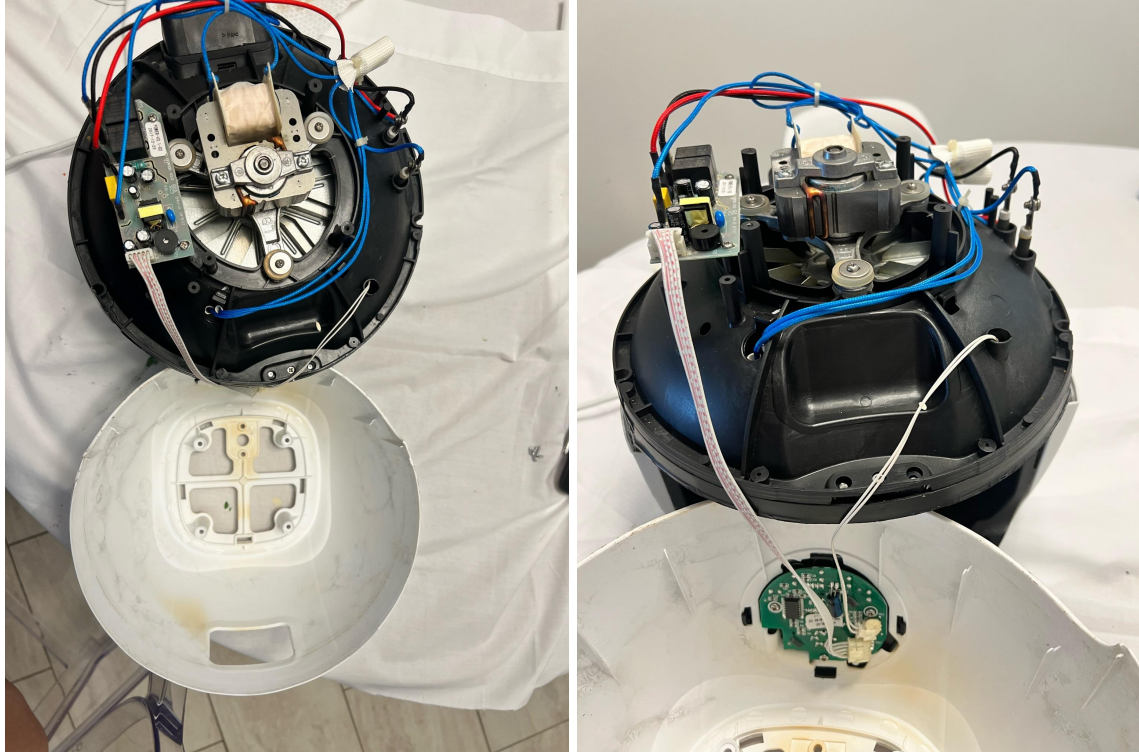
(Figure 7)



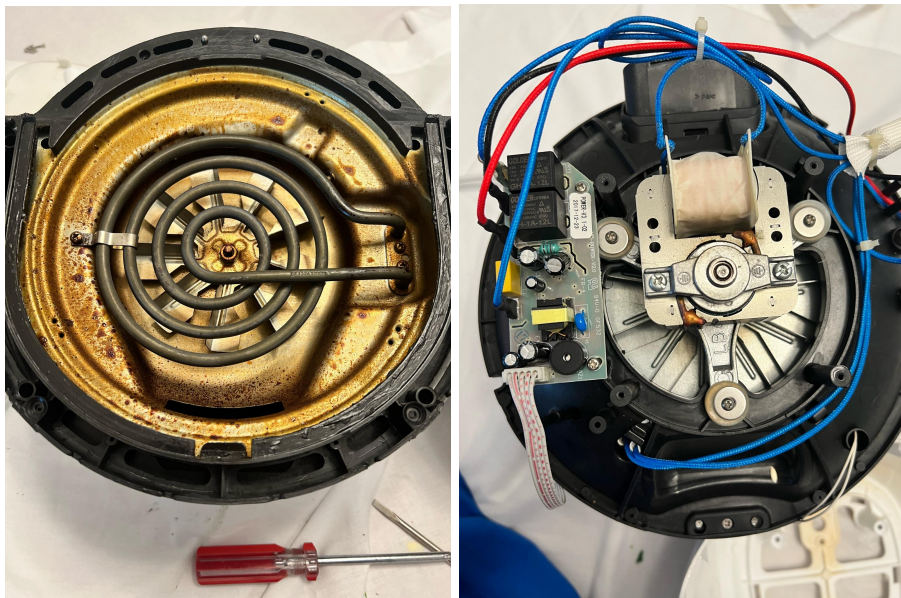
Step 4: Place the Air Fryer on its bottom with the Top side up and remove the cover of the air inlet. (It was just a snap off, no screws or other components)

(Figure 8)

11476X Reverse Engineering Challenge



Step 5: Take off the complete top cover. (Used a flathead screwdriver to help nudge off the plastic cover)
(Figure 9 & 10, Left to Right)



(Bottom View)

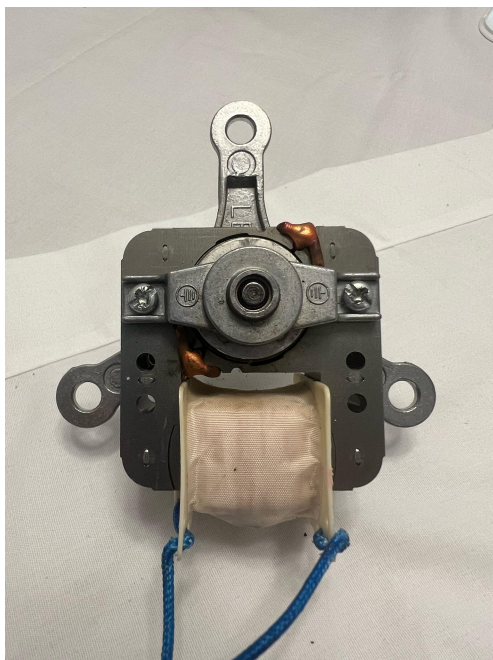
(Top View)

Step 6: Detach the top half of the Air fryer from the bottom half (7x screws, four surrounding the top rim of the machine and three in the entryway of the basket)
(Figure 11 & 12, Left to Right)

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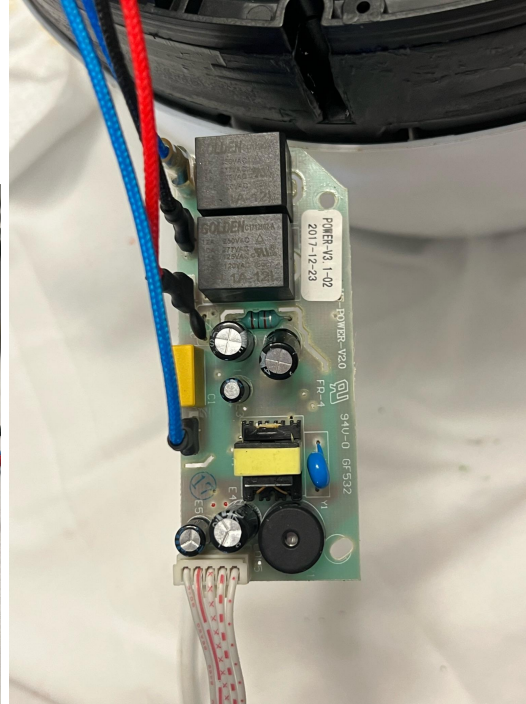
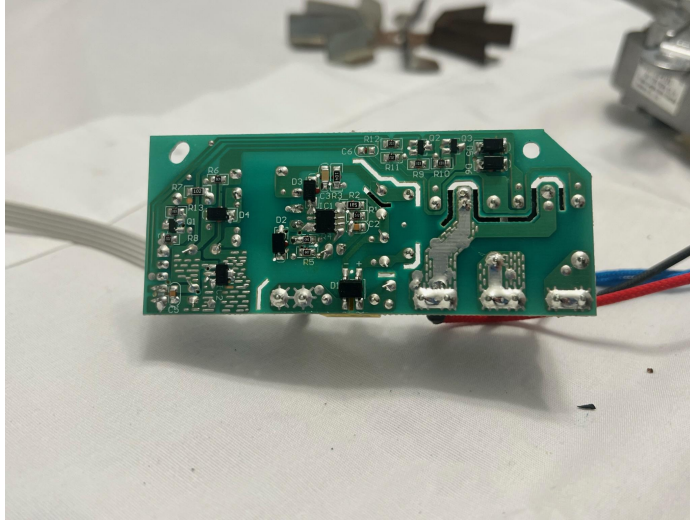


Step 7: Looking at the bottom view provided in Step 6, detach the coil and fan. This will allow for further disassembly of the electrical components in Top View. (3x Screws and 1x nut)
(Figure 13 & 14, Left to Right)



Step 8: Remove Fan motor from the Air Fryer for further analysis. (3x screws)
(Figure 15)

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Step 9: Remove Circuit Board from Air Fryer for further analysis. (2x screws)
(Figure 16 & 17, Left to Right)



Step 10: In the top plastic cover, remove the snap on display screen for further analysis of the circuit board.
(Figure 18 & 19, Left to Right)

Fully Disassembled AirWise Fryer



(Figure 20)

Component Summary

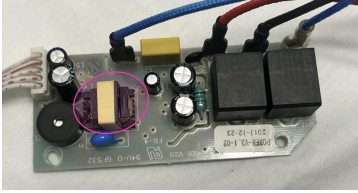
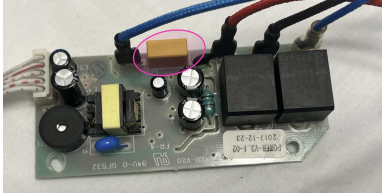
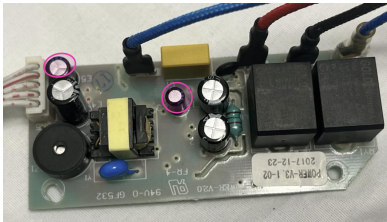
NON-ELECTRIC, ELECTRIC

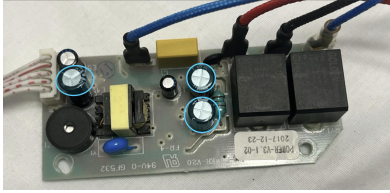
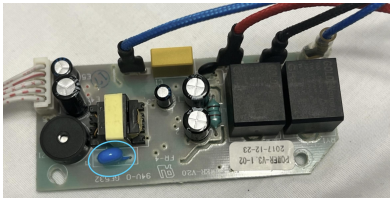
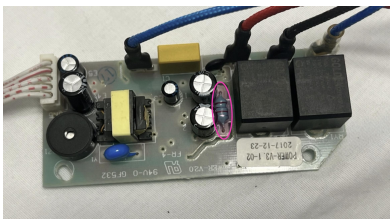
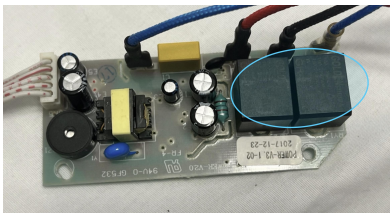
<u>COMPONENT</u>	<u>QUANTITY</u>	<u>FUNCTION</u>
<i>Screws</i>	x26	The screws in this machine are used to keep the separate components of this Air Fryer together.
<i>Plastic Covers</i>	x2	These plastic covers are used to protect the inner shell of the Air

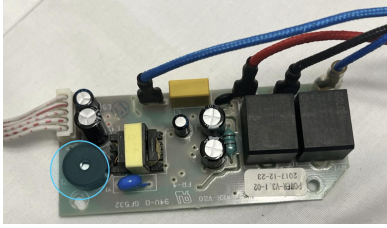
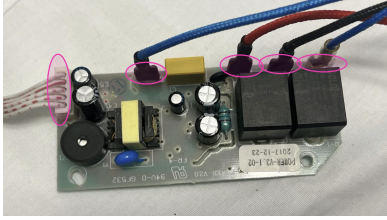
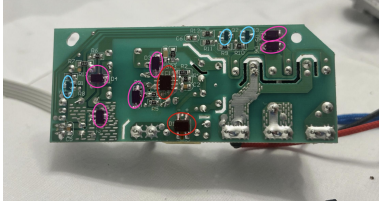
		Fryer and insulate the heat circulating through the air fryer that may heat up the inner shell. White plastic components in Figure 21 . (Second and Last, From left to Right)
Air Inlet Cover	<i>x1</i>	This inlet cover is used to leave space for air to travel inside of the Air fryer to start the cooking process. Figure 8 .
Air Outlet	<i>x1</i>	This is where the used heated up air exits the Air Fryer, and is the end of the 'air cycle'. Labeled in Figure 3 .
Pot/Pan	<i>x1</i>	The pot/pan collects any crumbs or excess grease that was previously on the food. Right of Figure 5 .
Frying Basket	<i>x1</i>	The frying basket is a strainer basket that holds the bigger portions of the food that is to be prepared. It has a handle and can be removed from the pot to facilitate the cleaning process. Left of Figure 5 .
Coil	<i>x1</i>	The coil is what heats up the circulating air in the machine. Main Heat Source. Figure 13 .
Fan	<i>x2</i>	Fans in this product facilitate the circulation of air that essentially prepares the food placed in the basket. Figure 14 .
Fan Motor	<i>x1</i>	Fan motor is the main power source of the two fans located in the top half of this product. Figure 15 .
Circuit Board	<i>x2</i>	Circuit Boards send signals to



		other components located in the product. There is a Circuit Board for both the functioning air fryer and another circuit board for the display screen. Figure 16 & 19.
Display Board (including buttons)	<i>x1</i>	The display board and its buttons allows people to set the necessary temperature and timer on their air fryer. Figure 20.
Nut	<i>x1</i>	The nut in this product was used to secure the fan that was most directly on top of the fryer basket. Figure 14.
Top Half of Air Fryer	<i>x1</i>	The top half of the Air Fryer is the black component shown in Figure 10. This is where all the electronic components are stored.
Bottom Half of Air fryer	<i>x1</i>	The bottom half of the Air Fryer is the black component shown all the way to the right in Figure 21. This component is where the user places the Pot/Pan and Fryer basket to prepare their food.
Wires	<i>x11</i>	Wires are used to distribute power around the product. In this case they transmit electricity from an outlet to the appliance and then to all the separate electrical functions in the appliance. Figure 6, 7, and 12.

Circuit Board Breakdown

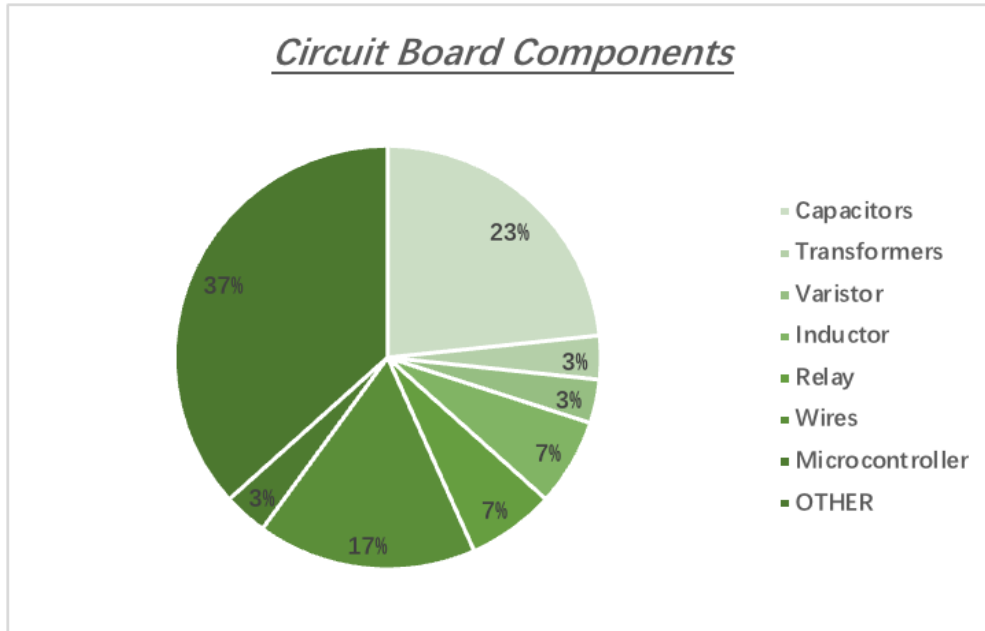
<u>Component</u>	<u>Quantity</u>	<u>Function</u>
<p>Choke Coil Inductor/Transformer https://www.prisource.com.tw/index.php?p=faq&pid=34</p>  <p>(FIGURE 21)</p>	x1	<p>The function of a Choke Coil Transformer in the circuit board of an electrical device is to “allow DC current to Flow through while blocking AC current from passing.” Essentially this type of transformer ensures that the electrical flow of the device remains uninterrupted.</p>
<p>Suppressor Capacitor https://epci.eu/emi-suppresson-polypropylene-film-capacitors-explained-kemet-tech-note/ (FIGURE 22)</p> 	x1	<p>By reducing oppositional flow or, “impedance”, the Suppressor Capacitor suppresses any electric noise that is made by the electrical flow traveling to the power circuit.</p>
<p>Electrolytic Capacitor https://eepower.com/capacitor-guide/types/electrolytic-capacitor/ (FIGURE 23)</p> 	x2	<p>Electrolytic Capacitors are capacitors used to increase the capacitance that it could withstand.</p>
<p>Aluminum Capacitor https://www.sciencedirect.com/topics/engineering/aluminum-electrolytic-capacitor</p>	x3	<p>Aluminum Capacitors are similar to electrolytic capacitors and also contain electrolytes. They are used when a large</p>

 <p>(FIGURE 24)</p>		<p>amount of capacitance is needed and there is no concern for leakage.</p>
<p>Varistor https://www.utmel.com/blog/categories/resistor/varistor-definition-function-working-and-testing (FIGURE 25)</p> 	<p>x1</p>	<p>A Varistor has a similar function to a resistor. It lessens the amount of current passing through it as long as the amount of voltage is less than what the varistor is capable of withstanding.</p>
<p>Color Ring Inductor https://www.utmel.com/blog/categories/inductors/what-is-color-ring-inductor-how-to-read-inductor-color-code (FIGURE 26)</p> 	<p>x1</p>	<p>The color ring inductor prevents changes in current. It stores energy as well as filters the current so that no unstable current can pass through or cause more changes in the power circuit.</p>
<p>Electromagnetic Relay https://www.galco.com/comp/prod/relay.htm (FIGURE 27)</p> 	<p>x2</p>	<p>Electromagnetic relays are used to control the power of the product. Either turn on or off. They do this by opening or closing off the power from one electrical circuit to the other.</p>
<p>Pot Core Inductor https://www.engineersgarage.com/articles-basic-electronic</p>	<p>X1</p>	<p>Using a pot core inductor as opposed to another type of inductor results in a more</p>

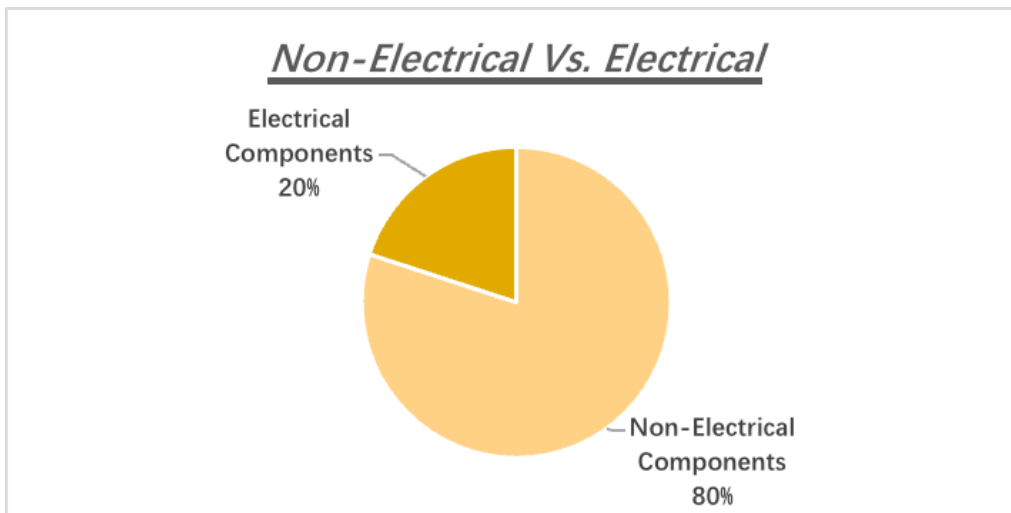
<p>s-inductors-solenoid-toroid-pot-core-ac-dc-signal-analysis-applications/ (FIGURE 28)</p> 		<p>secure, preventative unwanted inductance as well handle a larger amount of inductance and current carrying capacity.</p>
<p>Output Wires https://energyeducation.ca/encyclopedia/Wire (FIGURE 29)</p> 	<p>x5</p>	<p>Wires are used to transfer electricity.</p>
<p>Unidentifiable Components Due to illegible lettering and lack of electrical information online about our product, the following pieces of the underside of the power board were unable to be identified.</p>  <p>https://www.techtarget.com/whatis/definition/transistor (FIGURE 30)</p>	<p>x11</p>	<p>Due to the differing sizes, we would make the assumption that these pieces are transistors. Transistors are used to regulate and control electrical current flowing through a system as well as amplify signals sent through the currents. (These will be labeled in following charts)</p>

<u>Component</u>	<u>Quantity</u>	<u>Function</u>
<p>Electrolytic Capacitor Eepower.com (FIGURE 31)</p> 	<p>x1</p>	<p>Electrolytic Capacitors are capacitors used to increase the capacitance that it could withstand.</p>
<p>Microcontroller https://www.techtarget.com/itagenda/definition/microcontroller (FIGURE 32)</p> 	<p>x1</p>	<p>Microcontrollers control small features of a larger component, in this case they control the display screen Figure 19. This allows the user to choose the temperature and time necessary to prepare the food.</p>

Component Overview

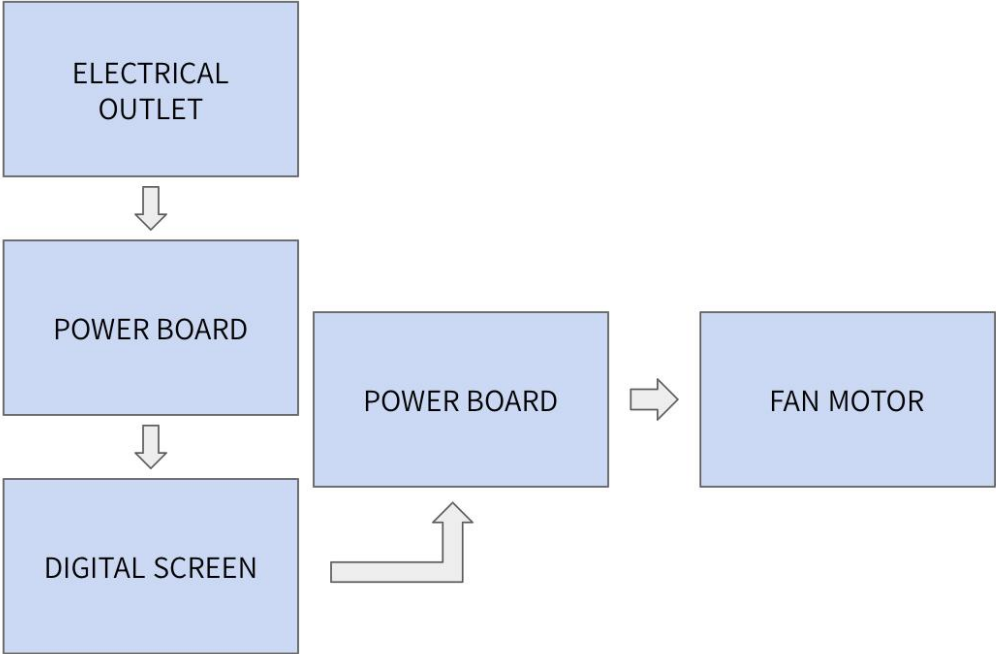


(FIGURE 33)

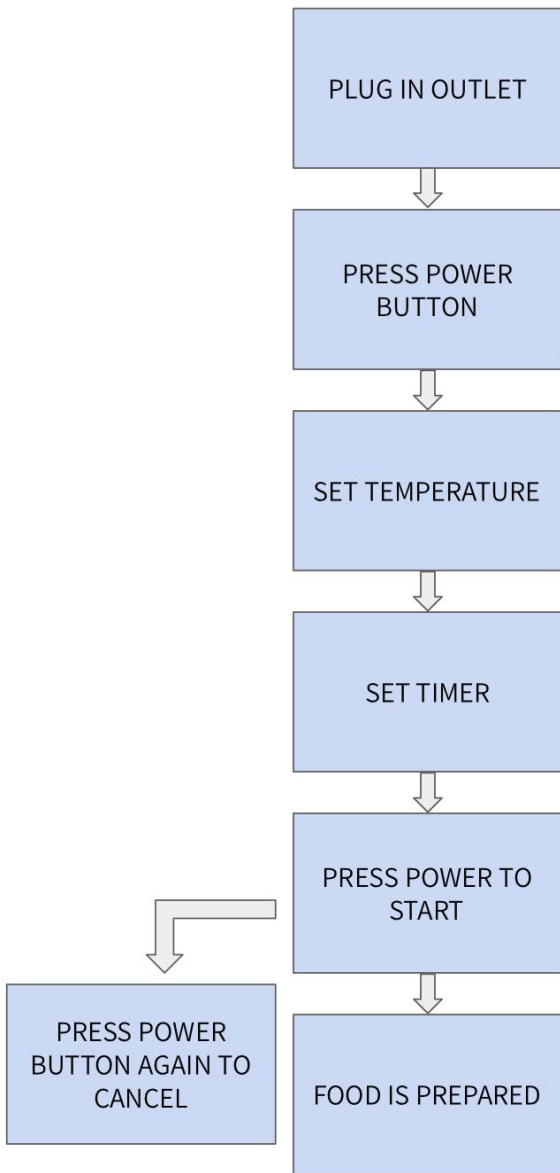


(FIGURE 34)

How does it work?



FLOW OF POWER (FIGURE 35)



HOW TO SUCCESSFULLY USE THIS PRODUCT (FIGURE 36)

To learn more about this product, visit [Images.thdstatic.com](https://images.thdstatic.com)

Conclusions

By performing this task, we hoped to learn more about the inside workings of everyday household machines. Using skills learned in our Robotics class, we were able to properly disassemble this machine. One important thing that we learned is that the engineering design process can be applied outside of just VEX robotics. We were also able to look deeper into circuit boards that we hadn't gotten to inspect prior to this since it isn't a direct part of building our robots. Now we have more of an understanding of what goes on inside the brain of our robot that allows us to properly program it to function; as well as just a general better understanding of how everyday electronics work.

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