Reverse Engineering Online Challenge

Team 39599B
Winters Robotics
Winters, California, United States
Participants: Jack Tuel, Julian Garcia, Miles Mariani

Table of Contents

Team introduction

Our team (39599B) consists of 3 members. From left to right; Julian Garcia, Miles Mariani, and Jack Tuel.

My name is Julian Garcia and I've been in robotics for about 3 years. I'm a senior in high school and plan on going to college for computer science.

My name is Jack Tuel, I am a junior in highschool and have been in robotics for 3 and a half years.

My name is Miles Mariani, I am a sophomore and I have been in robotics for 2 years.

Introduction

What is the color laser printer?

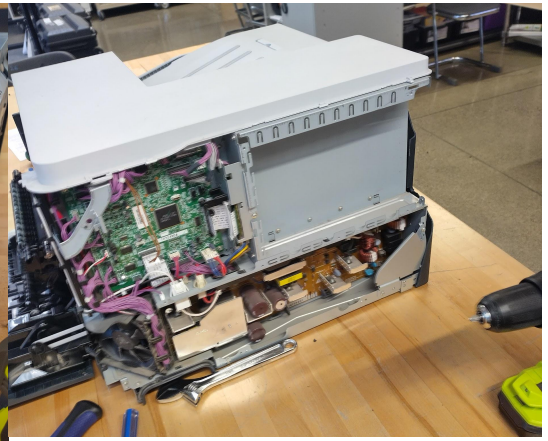
A color laser printer is a special kind of printer that uses lasers and an O.P.C (organic photoconductor) drum to print out images on paper.

Why did we choose the color laser printer?

We Chose to explore a color laser printer because we were interested in learning how the machine incorporated lasers to help print out paper more accurately.

Disassembly Process

Step one: Remove the outside plastic shells.

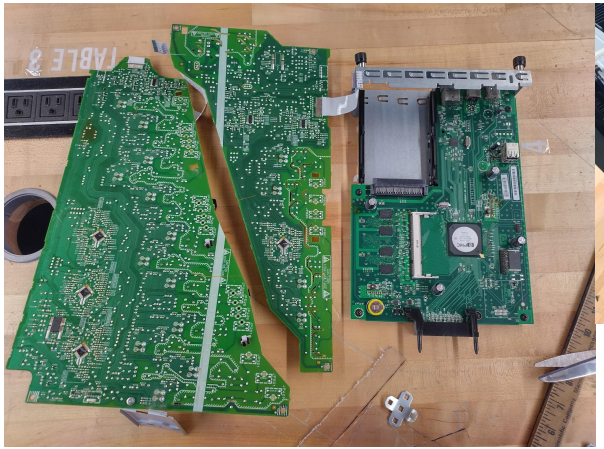


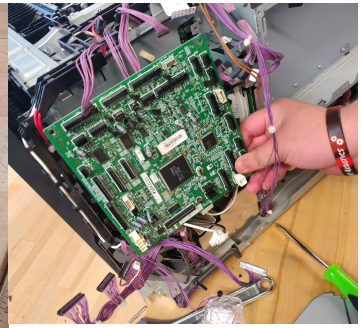
Step two: Remove the ink cartridges from the printer.

Disassembly Process

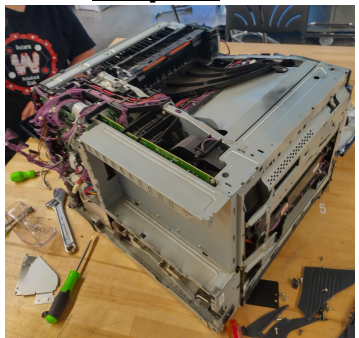
No. 2

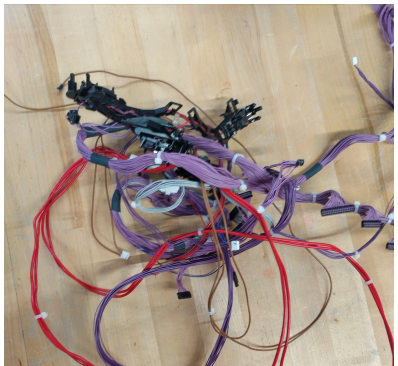
Step 3: Remove the outer motherboards





Step 4 : remove wires



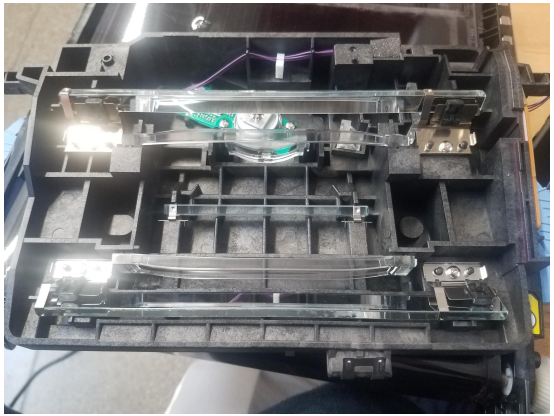


Disassembly Process

No. 3

Step 6: Take out inner laser mechanisms

Step 7: Take apart the inner laser components

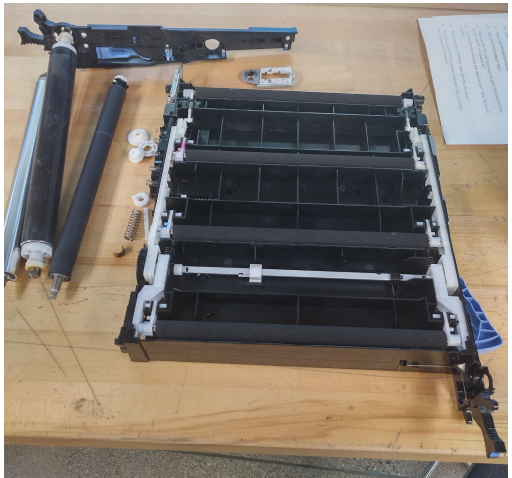


Disassembly Process

No. 4

Step 8: take out the O.P.C drum along

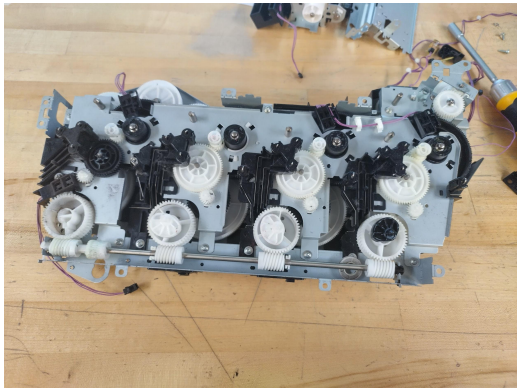
Step 9: Take apart the O.P.C. drum

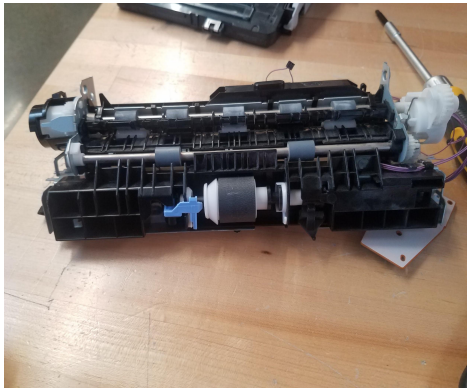


Disassembly Process

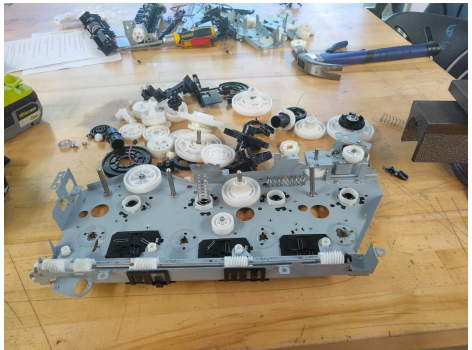
No. 5

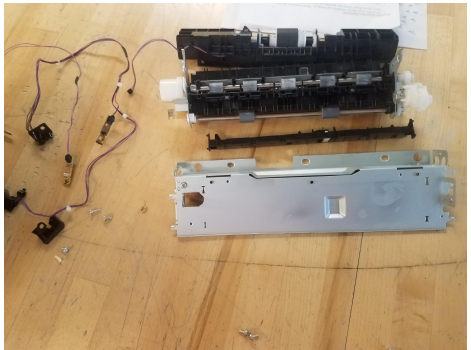
Step 10: Take out the paper moving mechanisms





Step 11: Take apart the paper moving mechanisms

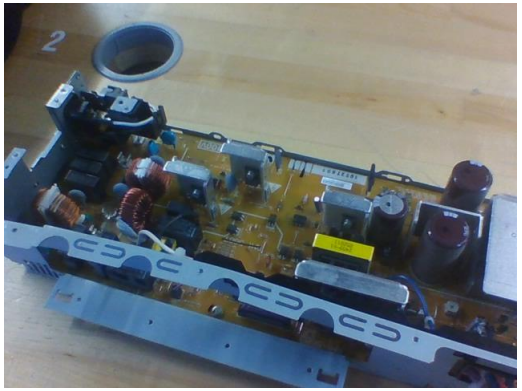




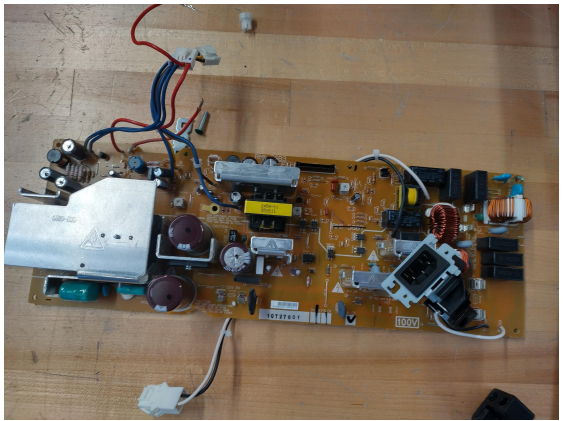
Disassembly Process

No. 6

Step 12: Take out the power supply

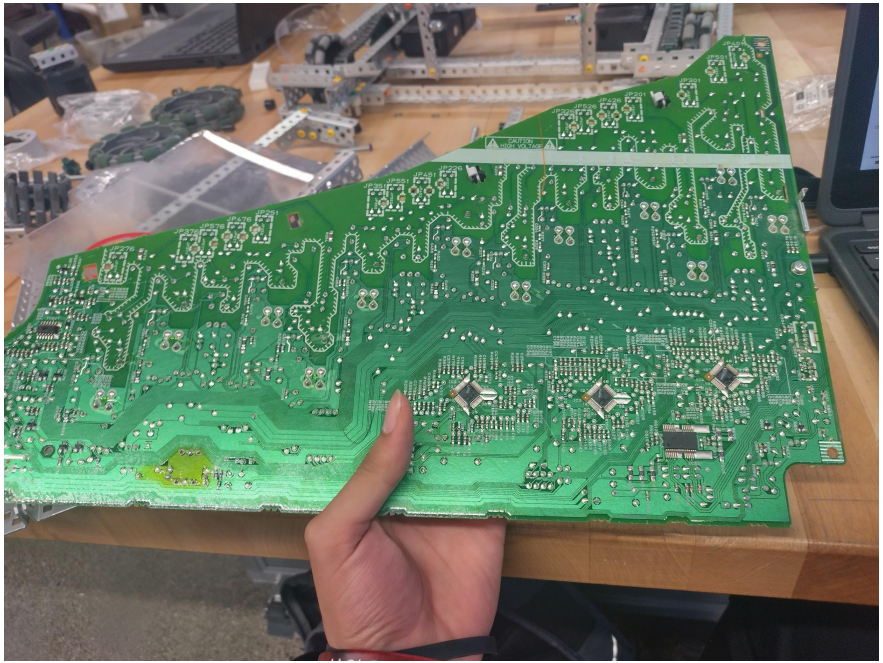


Step 13: take apart the power supply



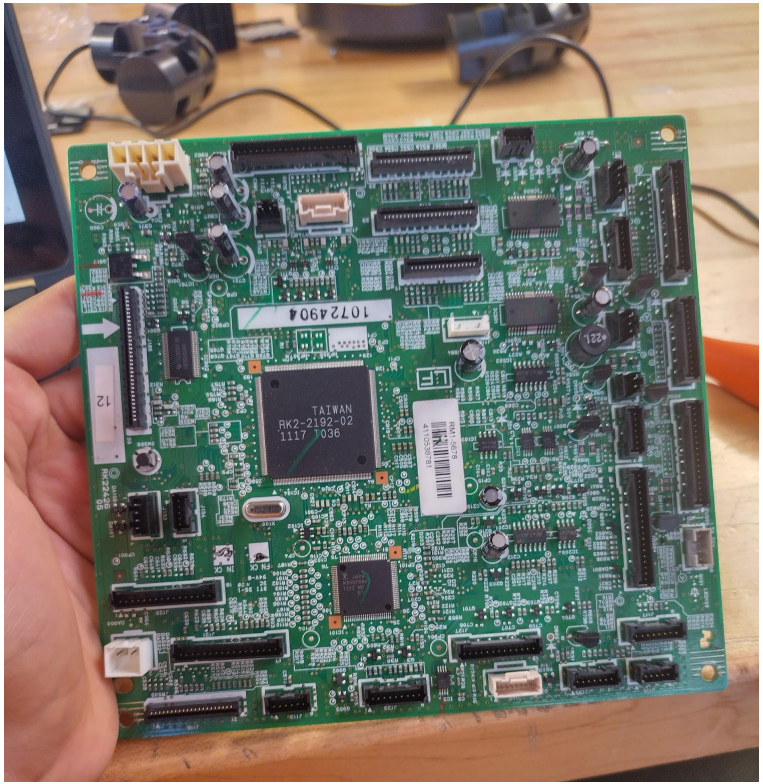
Major Components

Motherboard 1- this motherboard is in charge of controlling the motors that control the cylinders in the ink cartridges and the the O.P.C tube. Therefore this motherboard is mainly responsible for the picture bieng printing on the paper.



Major components

Motherboard 2- This motherboard was in charge of powering all the components in the printer. It had many connections that went throughout the printer.

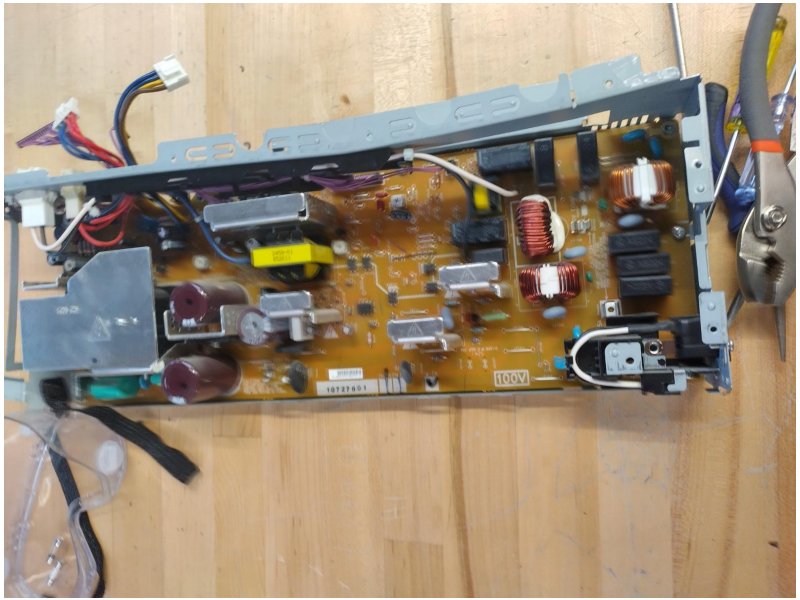


Major Components

Motherboard 3 - This motherboard is in charge of controlling the screen output. Therefore this motherboard is responsible for outputting the correct messages.

Major Components

Power Supply- takes the AC from the wall outlet, converts it to unregulated DC, and reduces the voltage using an input power transformer, typically stepping it down to the voltage required by the load.

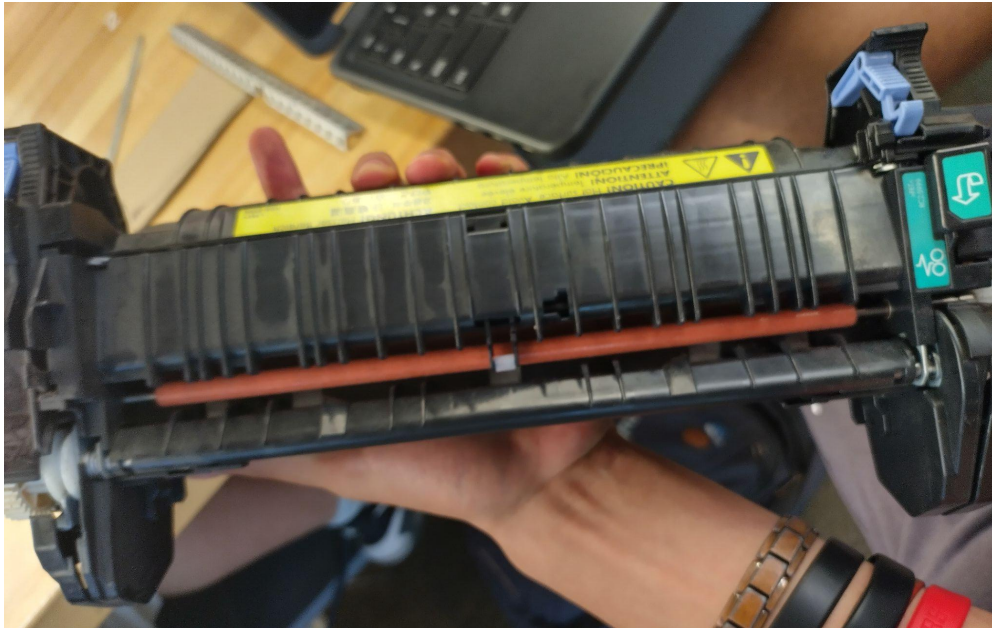


Major Components

Ink Cartridges - The Ink Cartridges contain the ink that's used in the printing process. There are four different cartridges. Those four cartridges contain Magenta, Cyan, Yellow and Black (Key). The laser heats up the roller tubes, then the ink powder becomes attached to the rollers, then the ink is transported onto the O.P.C. where the ink is then transported to the heated paper.

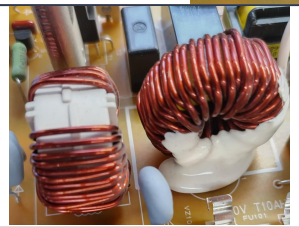
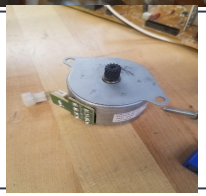
Major Components

Paper heater(couldn't find the actual name): It melts the ink onto the paper after it gets covered in it by the O.P.C. drum. This melts the powder and it gets sucked up by the paper forming a paper copy.



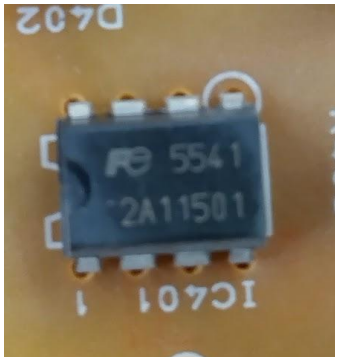
Components list

No. 1

Capacitors- They store energy in the form of an electrostatic field between its plates.	
Filters- circuits that select certain bands of frequencies to pass along, or accept, and other bands of frequencies to stop, or reject.	
Resistors- A resistor is an electrical component that limits or regulates the flow of electrical current in an electronic circuit.	
Stepping Motor- A DC electric motor that converts digital pulses into mechanical shaft rotation.	
Transformer- A transformer is a passive component that transfers electrical energy from one electrical circuit to another circuit, or multiple circuits.	

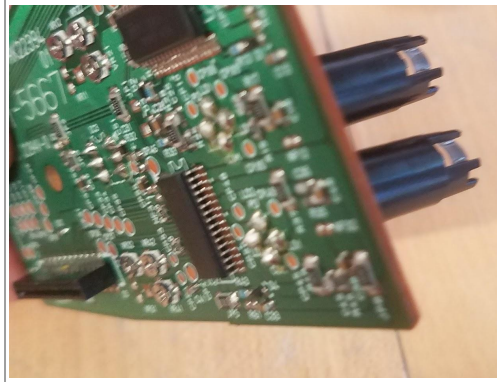
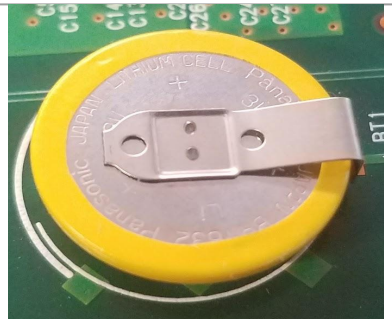
Components list

No. 2

Mirror - Reflects the laser to help in the printing process.	
Transistor- A transistor can act as a switch or gate for electronic signals, opening and closing an electronic gate many times per second.	
Microchip- A Microchip is a set of electronic circuits on a small flat piece of silicon. On the chip, transistors act as miniature electrical switches that can turn a current on or off.	

Components list

No. 3

Laser - The laser is used to imprint the desired shape onto the drum unit.	
Battery - Batteries Provide power to flow through the circuit board.	
Button- Turns on or off the printer.	

Summary Report

We used the color laser printer to gain a better understanding as to how printers work. This experience helped us gain teamwork skills, communication skills and gain a better understanding as to how the components we studied worked.

We started our project by deconstructing the printer and taking pictures of our progress. We eventually made it to the point where we had taken out most of the larger components of the printer and proceeded to disassemble the smaller components. While we were doing this we were also researching how the components worked and how they helped contribute to the printing process.

I found the way that the way the lasers contributed to the printing process the most interesting about this project. I expected the printer to just drop ink on certain parts of the paper to create the desired output, but I found it interesting and surprising when I learned that the ink was stored in a powder form instead of a liquid form and went through multiple complex processes to end up on the paper with the desired output.