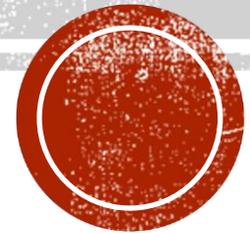


OMNI-CHARGER

By: Trinav Banerjee

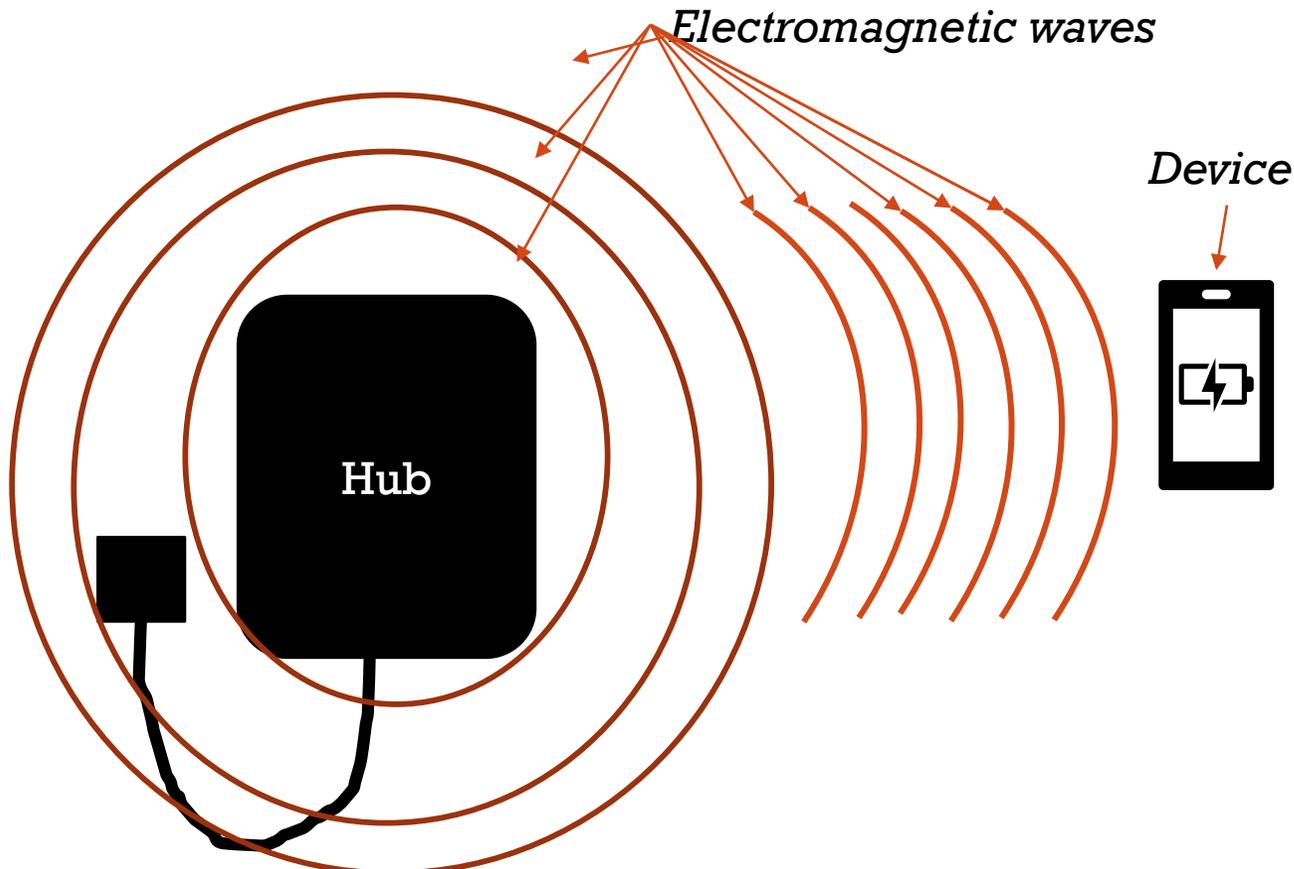


PROBLEM STATEMENT

- The problem faced was that homes have many chargers and types of ports and it may create a big mess. How could we reduce the amount of chargers in a home by a significant amount?
- Also, there are less outlets than the number of devices that need charging.
- During this process, I learned about how wireless chargers are made and I learned about induction, inductive charging, and charging coils.



POSSIBLE SOLUTION #1



Have a small hub which sends out electromagnetic waves through the air, reaching the device that needs charging and all the devices are compatible as long as it is in the range.



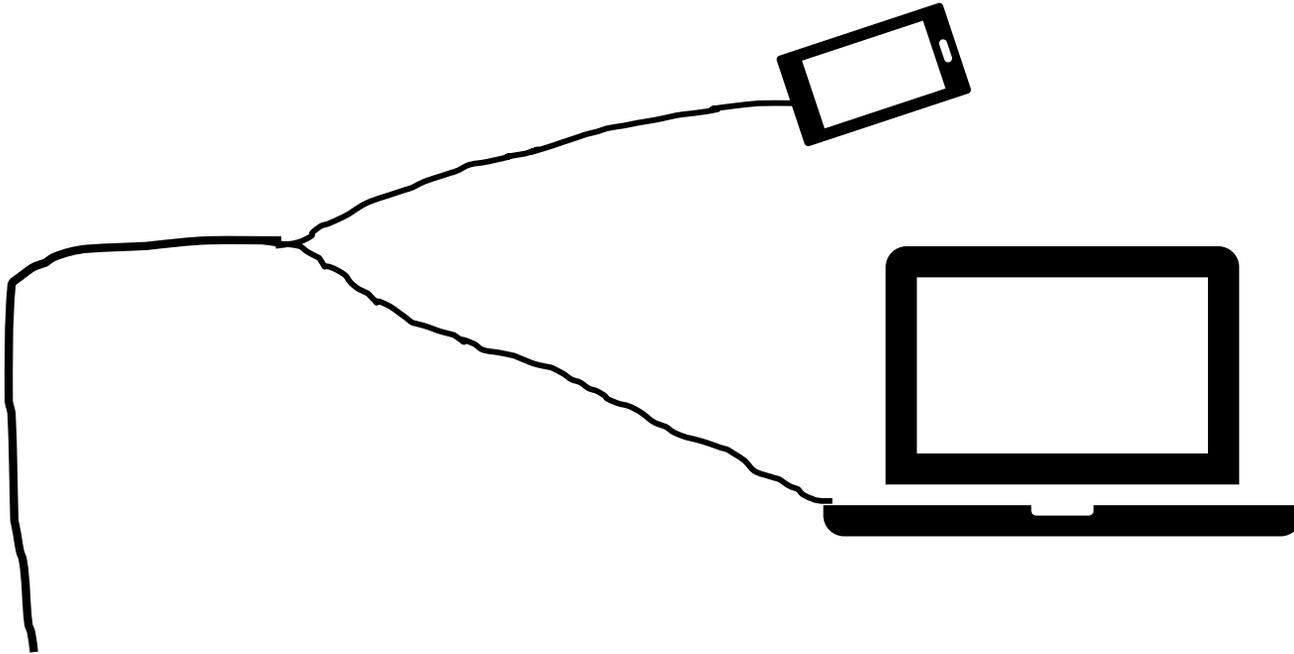
POSSIBLE SOLUTION #2



- Establish a common charging mechanism like only USB-C so there aren't as many chargers and no struggles finding the right type of chargers.



POSSIBLE SOLUTION #3



- Have 1 charger that can charge any type of device and any kind of charging mechanism using forking. For example, it can charge a phone and the same charger can charge a laptop.



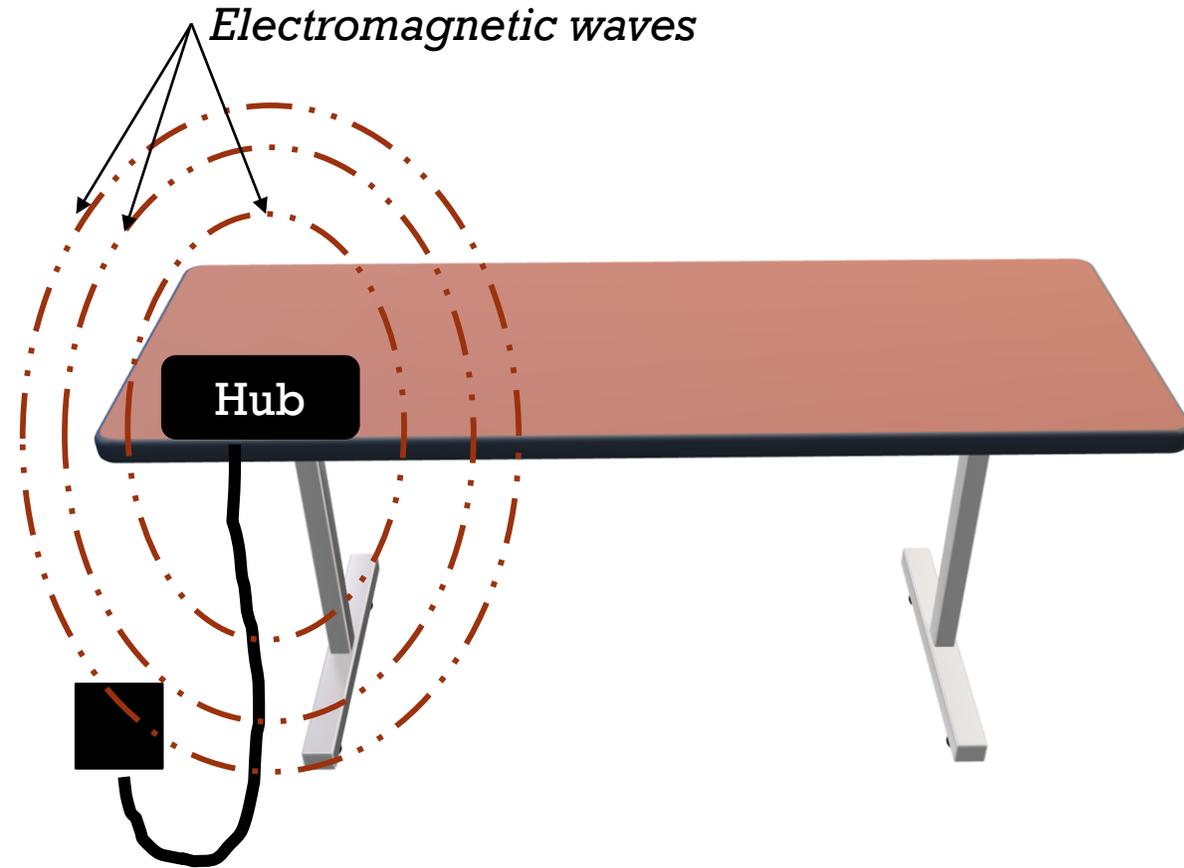
HYPOTHESIS: FEASIBLE SOLUTION

The solution that I chose out of the three ideas was Solution #1, which can be called ***Omni-Charger*** because it was the most feasible in terms of **cost**, **efficiency**, and **usability**.

1. The **cost** is lower because it doesn't require extra transformers, more number of chargers and it is reusable as it uses one hub for all devices.
2. It is **efficient** because the user doesn't have to plug in the device and a single hub can charge multiple devices
3. Finally, the **usability** is better because the user doesn't have to check the type of charger or look for the charger, they just must go near it.



RESEARCH: HOW IT WORKS



- **Omni-Charger** is possible which a hub that transmits electromagnetic waves through the coil into to the receiving coil of the device, which charges it.
- It has a range of 15 feet so that it can charge
- According to PCMag, they say “It operates similarly to Wi-Fi by transmitting power in the 900MHz frequency to the receiver, which converts the RF signal into AC power.”
- Also, according to Computer World, it says “A magnetic loop antenna (copper coil) is used to create an oscillating magnetic field, which can create a current in one or more receiver antennas.”





RESEARCH: CURRENT PRODUCTS

In the current market, Samsung and other companies are making wireless chargers that require people to place the device on the pad, making a magnetic field to transmit from one coil to another. The coils require a close distance with each other to transmit properly. The charging speed is around 10-15 watts so that it charges but it doesn't shock the human user.



RESEARCH: DISADVANTAGE/IMPROVEMENTS

In the current wireless chargers, the biggest disadvantages are:

- **Non-usability**-People aren't able to use their devices while being charged because they stop charging when there is no contact. This could be improved by having the device charge even when at a distance.
- **Non-flexibility**-Users, cannot charge a bigger device that uses more energy and a smaller device using the same pad. This could be improved by using multiple coils which can activate by the type of device.



CONCLUSION:

- In conclusion, charging without wires is possible by using a hub, that transmits electromagnetic waves through a transmitter coil and is received by the receiving coil, to charge the device.
- As showed in the research, the coils will establish a magnetic field to transmit the energy as radio frequency signals or RF signals and be converted back into AC signals.



BIBLIOGRAPHY

- PCMAG
- Computer World
- Electromagnetic Induction
- Cnet
- Forbes

