Week 1 Report

Requirements

Tribe - CADMUS

18th January, 2023

ELP 305

Contents

1 Tribe Members

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2 Problem Statement

To design a mobile charger for Indian users to be used by mobile phones made after Dec 31, 2024.

3 Week 1: Requirements

Here are the requirements we have compiled for the following.

3.1 Input/Output

1. Input Voltage: 100-240V AC, 50-60 Hz
2. Output Voltage: 5V and 9V with maximum output current of 2.4A and 1.67A respectively

3.2 Plug

1. The plug should fit well in the socket to prevent it from being accidentally pulled out.
2. The plug needs to be sturdy enough to endure being inserted and removed from the socket several times.
3. There should be no sharp edges or other metal protrusions on the plug that might cause an electrical shock.
4. The plug needs to be safe by the standards of the market it's destined for, such as BIS in India.
5. The connector should conform to current specifications for charging mobile devices.

3.3 Safety Features

1. Over-voltage, over-current, and short-circuit protection
2. FCC, CE, RoHS, and UL certification for safety and quality assurance
3. Energy efficiency compliance with Bureau of Energy Efficiency (BEE) standards.
4. High resistance in a circuit may cause other parts to overheat and fail. To be safe, we should aim for a temperature of 45°C or less while operating at full capacity.
5. There should be good insulation from interference, voltage surges and electrical noise. PP/PE insulation is the standard norm.

3.4 Cable

1. A cable length of around 24-36 inches would be more suitable, as it allows for more flexibility in positioning the charger and the phone while charging.
2. The length of the cable can have an effect on safety, as well as the thermodynamics of wire heating. Longer cables generally have more resistance than shorter cables, which can lead to an increase in the amount of heat generated during charging. This can be a safety concern, as excessive heat can damage the charger, the cable, and the device being charged.
3. The potential of a short circuit or other electrical hazards increases with cable length, which is already more vulnerable to physical damage and wear and tear.
4. Use only cables and chargers that have been certified as safe by the appropriate authorities, and only for their intended use, to reduce the potential for harm. That means not just making sure the cable isn't frayed or broken, but also utilising the right cable for the device.
5. Thermodynamic considerations for wire heating should be made while designing both the cable and the charger to ensure maximum charging efficiency and to reduce the amount of heat created by the cable and the charger.

3.5 Connector

1. Type-C USB connector for charging newer models of mobile phones after Dec 31, 2024 as it will become the standard in India.

2. Connector should have fast charging capability.

3.6 Exterior Body

1. We should keep the size of the charger to be around 3 to 5 inches in length, and 1 to 2 inches in width for easy portability as well as light in weight.

2. The charger should also be able to withstand sudden impacts without damage to the inner circuit, such as falling on the ground.