

Grand Challenge Problem Statement

1. Headphone

Introduction:

A pair of small speaker drivers that is worn on or around the head over the using wireless technology like Bluetooth or wire.

Feature required: -

- Audio Connectivity: Bluetooth v5.0, /SD card/Aux
- Mic Connectivity: Yes
- Audio Frequency :20Hz to 20KHz

Challenges:

- Product costs should be competitive as per the market trend.
- Should not have device pairing issue/poor connectivity issue.
- Audio Sound should be dynamic with Noise cancellation.
- Mic should work well at the time of calling.

2. Wearables (Smartwatch)

Introduction:

Wearables products are those that are designed to be used while worn. These products often are close to or touch the human body which include different types of sensors. Targeted product in this category is Smartwatch.

Feature Required:

- Attractive display
- Wireless connectivity
- Gesture Control
- Different call/notification alerts
- Different OS compatibility
- Fitness features
- Call receives and decline function
- Wired / wireless charging enabled

Challenges: -

- Product cost should be competitive as per the market trend.
- There should be no device pairing/poor connectivity issue.
- There should be no lagging while using touch function.
- App should be compatible with different mobile OS.
- Smart watch should work without lagging.
- Unique design & different personalization and customization.
- Must follow IP67 /IP68 protection rating.

- Safety Security and Privacy should be maintained
- Compatibility with the third-Party app should be available

3. GPS Navigation system

Introduction:

GPS trackers have become essential tools for monitoring the location of various objects, offering a range of connectivity options such as Bluetooth, Wi-Fi, and Cellular to ensure real-time tracking. These devices are incredibly versatile, capable of providing precise location data for personal items, vehicles, or even loved ones.

Feature required:

- Wireless connectivity Bluetooth/Wi-Fi/Cellular
- Application can be used as personal tracker
- Ability to find the real time location.

Challenges:

- Product costs should be competitive as per the market trend.
- No connectivity issue
- Accurate real-time positioning
- Built in memory to store logs

4. UPS

Introduction: -

UPS system is an uninterruptible power supply which is used to provide continuity of power in the event of power grid interruption in the supply. In this category, a single phase to single phase output for household use is recommended.

Featured requirement: -

- Auto over-load handling capacity
- Comprehensive protection against short-circuits, reverse polarity, battery over-charge, deep discharge etc.
- Protection from Input mains
- Bypass switch for supplying output directly from grid in case of Home UPS fault.
- Noiseless Operations with the help of low harmonic distortion
- Intuitive Display to easily understand status of mains availability, battery status, etc.
- Output Wattage 360W
- Output Voltage: 230V AC, 50Hz

Challenges: -

- Product cost should be competitive as per the market trend.
- Product should be safe for sensitive appliances with sine wave output.
- Design should be compact in size for the high wattage design.
- Wide input power regulation
- High efficiency <80% power backup,

- Thermal management to be incorporated

5. RFID Access Control

Introduction: -

Radio Frequency Identification (RFID) is a technology that uses electromagnetic fields to automatically identify, and track tags attached to objects. The tags contain electronically stored information, which can be read from a distance using an RFID reader.

Featured requirement: -

- Memory Capacity: Sufficient storage for unique identifiers and additional data (if required).
- Connectivity: Support for various communication protocols (TCP/IP, Wi-Fi, Bluetooth, RS232/RS485).
- Compatibility: Ability to work with different types of RFID tags (ISO standards compliance).
- Power Supply: 12V DC
- Design: Antenna design that matches the read range and environmental conditions (indoor/outdoor).
- Orientation and Placement: Flexible installation options to ensure optimal performance.
- Remote Management: Remote configuration and management capabilities for the system.
- Backup and Recovery: Regular data backup and easy recovery options.

Challenges:

- Product costs should be competitive as per the market trend.
- Product should be safe for sensitive appliances with sine wave output.
- Data Security: Ensuring that data transmitted between RFID tags, readers, and backend systems is encrypted and secure from interception or tampering.
- Authentication: Preventing unauthorized access by implementing strong authentication mechanisms.

6. Portable Power Tank with Solar Charging

Introduction:

A portable power station is a versatile and compact device designed to provide electrical power in situations where conventional power sources are unavailable or impractical. These devices are essential for outdoor activities, emergency situations, and remote work. They are essentially large batteries with multiple output options, capable of powering various electronic devices and small appliances.

Featured requirement: -

- Lithium-Ion: Common for its high energy density and lightweight.
- Lithium Iron Phosphate (LiFePO4): Known for its safety, stability, and long cycle life.

- AC Output: The number and type of AC outlets, with output power in watts (200W).
- DC Output: Number of DC ports and their power ratings (e.g., 12V/10A). (12v/5A)
- USB Output: Number and types of USB ports (e.g., USB-A, USB-C) and their power ratings (e.g., 5V/2.4A, PD 60W). (only USB-A 5V/2.4A 2 ports. USB-C PD complex)
- Peak Power: The maximum power the device can supply for a short period, important for starting devices with high inrush currents.
- AC Charging: Product can be charged from 220V AC /50Hz.
- DC Charging: Product can be charge from external 16V/5A DC source
- Solar Charging: Input voltage and power rating for solar panels, often with an integrated MPPT (Maximum Power Point Tracking) controller for efficiency.
- Type: Pure sine wave or modified sine wave.
- Efficiency: Conversion efficiency, typically around 85-95% for pure sine wave inverters.
- Compact designs & light weight for portability
- The temperature range for safe operation, typically from -10°C to 40°C (14°F to 104°F).
- The number of charge and discharge cycles the battery can undergo before its capacity drops below a certain level, usually specified for lithium-based batteries (e.g., 500-2000 cycles).

Challenges: -

- Product cost should be competitive as per the market trend.
- Product should be safe for sensitive appliances with sine wave output.
- Design should be compact in the size for the high wattage design.
- Wide input power regulation
- High efficiency <80% power backup,
- Thermal management is recommended.