To provide a comprehensive document based on the discussions and experiments we conducted today, I'll outline a draft for your prototype documentation that aligns with the given KPIs. You can adapt the content further to fit your exact project needs.

---

### Concept Specifications

#### General Description

This concept explores an innovative interactive installation for a park, utilizing Arduino-based technology to create an eco-friendly, responsive environment that enhances visitor engagement through sensory feedback. The installation, "Enlightened Park for Glow with Plant-E," aims to blend technology with natural elements to promote sustainability and interaction.

#### Design Specification

\*\*Design Goals\*\*

The primary goal is to foster a unique visitor interaction that not only entertains but also educates on sustainability. The installation uses motion sensors, touch sensors, and LED displays to react dynamically to visitor presence, enhancing the park's ambiance and delivering messages about environmental conservation.

\*\*KPIs:\*\*

\*\*Analysis-U2.1\*\*

- \*\*Functionality Benchmarking:\*\* The design leverages state-of-the-art sensory technology to ensure a high level of user interaction that complements the Glow festival's theme, aiming for maximum engagement and minimal environmental impact.

\*\*Analysis-U2.2\*\*

- \*\*Core Values Reflection:\*\* The product design integrates Plant-E's values by using energy-efficient components and materials that reflect commitment to sustainability, showcasing how modern technology can align with eco-friendly practices.

\*\*Advise-U2.1\*\*

- \*\*Interactive Techniques:\*\* Recommend using capacitive touch sensors for interactive light displays and ultrasonic sensors for movement detection to enhance user interaction while ensuring power efficiency.

\*\*Advise-U2.2\*\*

- \*\*Realisation Choices:\*\* Propose the use of solar panels to power the installation sustainably, employing Arduino controllers for managing sensor inputs and outputs to create a responsive environment.

\*\*Advise-U2.3\*\*

- \*\*Objectives for Iterations:\*\* Focus on refining sensor sensitivity and expanding the variety of interactions in subsequent iterations to keep the installation fresh and engaging.

#### Design Description

\*\*Design-U2.1\*\*

- \*\*User Interaction Design:\*\* The design features a pathway lined with pressure-sensitive lights that illuminate based on visitor movement. Adjacent interactive stations use capacitive touch for more direct interaction, changing colors or playing sounds when touched.

#### Realisation

\*\*Realisation-U2.1\*\*

- \*\*Prototype Development:\*\* Utilize Arduino kits and assorted sensors to build the first prototype, testing each component for functionality and interactivity within the specified design framework.

#### Design Testing

\*\*Design-U2.2\*\*

- \*\*Usability Testing:\*\* Plan to conduct initial tests at the demo market, observing and recording visitor interactions and collecting feedback to evaluate the installation’s performance and user engagement.

#### Technical Specification

\*\*Technical Description\*\*

The system incorporates:

- \*\*Arduino Uno:\*\* Manages inputs from ultrasonic sensors and outputs to LED strips.

- \*\*Sensors:\*\* Ultrasonic sensors for distance measuring and motion detection; capacitive sensors for touch interaction.

- \*\*Outputs:\*\* RGB LED modules for visual feedback and piezo buzzers for auditory signals.

\*\*KPIs:\*\*

\*\*Advise-H2.1\*\*

- \*\*System Architecture Advice:\*\* Detailed advice on integrating low-power wireless communication modules to enhance system capabilities without significant power consumption increases.

\*\*Advise-H2.2\*\*

- \*\*System Linking Advice:\*\* Recommendations on creating a mesh network of sensors to ensure seamless communication across the installation.

#### How it Works

\*\*Analysis-H2.4\*\*

- \*\*Acceptance Testing:\*\* The installation is considered fully functional when it can autonomously manage energy use, react to environmental inputs without human oversight, and maintain continuous operation during park hours.

#### Manage & Control

\*\*Manage&Control-H2.1\*\*

- \*\*Performance Assessment:\*\* Post-event analysis to measure system stability, energy usage, and visitor engagement metrics to determine success and areas for improvement.

This outline aims to guide the development and documentation of your interactive installation, ensuring that every aspect is aligned with the objectives and provides a clear path from concept to realization. Adjustments and more detailed technical descriptions can be added as the project evolves.

**Specifications**

. HC-SR04 Ultrasonic Sensor

Power Consumption: Typically operates at 5V and draws around 15 mA during operation.

Interaction Distance: Capable of measuring distances from 2 cm to 400 cm with an accuracy of approximately 3 mm.

2. RGB LED Module

Power Consumption: Each color (Red, Green, Blue) of the LED can draw up to about 20 mA. If all colors are mixed to white, the total current can reach up to 60 mA.

Interaction: Does not measure distance; used for visual feedback based on sensor input.

3. SG90 Servo Motor

Power Consumption: Under no load, the servo motor typically draws around 10 mA at 5V but can spike up to 250 mA when moving under load.

Interaction: Used for physical movements, can be controlled to move to various angles depending on the input from the Arduino.

4. Piezo Buzzer

Power Consumption: Typically draws about 20 mA when active at 5V.

Interaction: Produces sound when activated, typically does not consume power when inactive.

5. Capacitive Touch Sensor

Power Consumption: Very low, generally less than 10 mA when active.

Interaction Distance: Direct contact or very close proximity (few millimeters) is needed to trigger interaction.

6. RFID Reader (MFRC522)

Power Consumption: Typically draws around 26 mA during card reading operations.

Interaction Distance: Can read RFID tags typically within 0-60 mm depending on the tag and environmental conditions.

General Analysis

Power Efficiency: All components are relatively low power, but considerations should be made for the cumulative effect in your design, especially if operating from a battery or solar power.

Distance Measurement: The primary distance measuring component is the HC-SR04 ultrasonic sensor, which has a broad range suitable for most interactive installations.

Visual Feedback: RGB LEDs offer flexible color mixing which allows for a variety of visual feedback options depending on the programming.

Physical Interaction: The servo motor provides physical motion, which can be visually dramatic and attract attention.

Auditory Feedback: The piezo buzzer can be used for simple sound notifications or alarms.