**Project Idea: LED Pattern Game with FreeRTOS on ESP32**

This project utilizes FreeRTOS on the ESP32 and integrates with the Blynk app to create an interactive memory-based game. Players replicate LED light sequences using virtual buttons in the app. FreeRTOS will manage multitasking for LED control, user input handling, and LCD updates.

**Description**

**Components:**

* ESP32, breadboard, 4 different-colored LEDs, resistors (220, 4.7K, 10K), LCD, Blynk app with 4 virtual buttons.

**Blynk App Features:**

* **Start Game Button:** Initiates the game and resets all variables (score, level, mistakes) to their default values.
* **Four LED Buttons:** Used to replicate the LED sequences during gameplay.

**Game Flow:**

1. The game begins when the start button is pressed.
2. At each level, a random LED pattern is generated.
3. The pattern length increases as the player progresses:
   1. Level 1: 3 LEDs,
   2. Level 2: 4 LEDs,
   3. Level 3: 5 LEDs,
   4. Etc 🡺 up to level 20: 22 LEDs.
4. Players replicate the sequence by pressing the corresponding buttons in the Blynk app.
5. The game consists of a predefined number of levels, culminating in a win if all levels are completed.

**Game Rules:**

* The sequence is displayed on the LEDs, accompanied by prompts on the LCD (e.g., "Watch closely!" and "Repeat the sequence").
* Players have a limited number of trials to replicate the sequence correctly.
* A mistake counter tracks errors, ending the game if a preset limit is reached.

**Score Tracking:**

* Scores increase based on consecutive correct inputs.
* The LCD displays the current score and mistake count.

**Sequence Example:**

* The player hits the start button on the mobile app.
* The following pattern is displayed on the leds:
  + Led 1 ON then OFF, Led 1 ON then OFF, Led 3 ON then OFF
* The player is requested to enter the sequence he/she just witnessed using the push buttons on the mobile app. If the sequence entered by the player matches the sequence that just occurred on the LEDs, the player has completed successfully the current level and is moved to a bigger challenge by adding 1 extra Led lighting to the new sequence. Example:
  + Led 1 ON then OFF, Led 3 ON then OFF, Led 3 ON then OFF, Led 1 ON then OFF.
* Of course as the game involves more Led lighting (as the level becomes more complex), the player will start doing mistakes. Assume the upper limit of game levels is 20 (e.g. 22 Led lighting ON and then OFF). After reaching level 20, the player is requested if he/she wants to play a new sequence round (starting from level 1 up to level 20).
* At each level, let the user have few trials before either moving the player to the next level or declaring that the user lost the game. Assume the player has a max of 3 trials per game level.