Terminology Overview

During the 2023-2024 project cycle, new features were implemented that required major changes to both project structure and terminology.

- **Pattern:** An algorithm that controls LED light output for a portion of the LED strip.
- **Strip:** The entire LED strip.
- **History:** Data generated from the previous pattern iteration that will be used to generate the next pattern iteration.
- **Config Data:** Data related to the state of the system.
- **Strip Data:** Configuration data that affects all currently-running patterns. Contains multiple instances of Pattern Data within it.
- **Pattern Data:** Configuration data that affects a single running pattern.
- **Save Slot:** A spot in non volatile storage (NVS) that can store a single strip data instance.

The Nanolux project has many code structures named after the terminology they represent. For example, in the storage.h file, there are 3 structs named "Config_Data," "Strip_Data," and "Pattern_Data."

```
typedef struct{

  uint8_t idx = 0;
  uint8_t brightness = 255;
  uint8_t smoothing = 0;

} Pattern_Data;

typedef struct{

  uint8_t alpha = 0;
  uint8_t noise_thresh = 0;
  uint8_t mode = 0;
  uint8_t pattern_count = 1;
  Pattern_Data pattern[NUM_PATTERN_TYPES];

} Strip_Data;

typedef struct{

  uint8_t length = 60;
  uint8_t loop_ms = 40;
  uint8_t debug_mode = 0;
  bool init = true;

} Config_Data;
```

As seen in the above code snippet, Strip_Data contains multiple instances of Pattern_Data. This process is to enable easy LED strip saving and loading, as the only structure that needs to be explicitly transferred to NVS is the running instance of Strip_Data.

Nanolux also uses a "Pattern History" structure to store the previous state of the LED strip. This structure holds the buffer used by that pattern along with variables used in calculation, such as the mass and position of a virtual spring. This structure is located in patterns.h.

Each currently running pattern on the strip has an accompanying Pattern History object. The relationship between a Pattern History object and a Pattern Data object is purely associative: the only piece of information that links them is a common array index.

Nanolux also uses libraries or features of the micro controller that could use additional definition.

- **ESP32:** An Arduino-compatible microcontroller with built-in WiFi and Bluetooth.
- **NVS:** Stands for "non-volatile storage." NVS is persistent memory built into the ESP32 itself that persists through power cycles.
- **FastLED:** An Arduino-compatible library capable of outputting to an LED strip. Contains many useful functions, such as blend().