PLAN DE PRUEBAS PROYECTO RTOS “INVERNADERO MGA”

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Pruebas de Lectura de Sensores

1. **Lectura normal:**
   - Se simula condiciones ambientales normales.
   - Se verifica que los mensajes en el monitor serial muestren valores dentro de rangos esperados.
   - Confirma que el timestamp se imprime correctamente.

```
[03/28/2025 16:26:50] Temperature: 23.80 °C
[03/28/2000 16:26:50] Humidity: 0.00 %
[03/28/2025 16:26:52] Light: 541.00
[03/28/2025 16:26:52] Humidity: 0.00 %
[03/28/2025 16:26:52] Temperature: 23.80 °C
[03/28/2025 16:26:54] Light: 541.00
[03/28/2025 16:26:54] Humidity: 84.40 %
[03/28/2025 16:26:54] Temperature: 23.80 °C
[03/28/2025 16:26:56] Light: 541.00
[ALERTA] Umbral superado: LED y Buzzer ACTIVADOS
```

2. **Fallo en la lectura:**

- Se provoca manualmente un error en el sensor se desconecta el DHT22
- Se observa que se imprima el mensaje de error correspondiente en el monitor serial.

```
[03/28/2025 16:31:43] Light: 437.00
[03/28/2025 16:31:43] [ERROR] Fallo en lectura de humedad.
[03/28/2025 16:31:43] [ERROR] Fallo en lectura de temperatura.
[03/28/2025 16:31:45] Light: 445.00
[03/28/2025 16:31:45] [ERROR] Fallo en lectura de temperatura.
[03/28/2025 16:31:45] [ERROR] Fallo en lectura de humedad.
[03/28/2025 16:31:47] Light: 447.00
[03/28/2025 16:31:47] [ERROR] Fallo en lectura de humedad.
[03/28/2025 16:31:47] [ERROR] Fallo en lectura de temperatura.
[03/28/2025 16:31:49] Light: 448.00
[03/28/2025 16:31:49] [ERROR] Fallo en lectura de temperatura.
[03/28/2025 16:31:49] [ERROR] Fallo en lectura de humedad.
[03/28/2025 16:31:51] Light: 447.00
[03/28/2025 16:31:51] [ERROR] Fallo en lectura de humedad.
[03/28/2025 16:31:51] [ERROR] Fallo en lectura de temperatura.
[03/28/2025 16:31:53] Light: 444.00
Preparando para Deep Sleep...
```

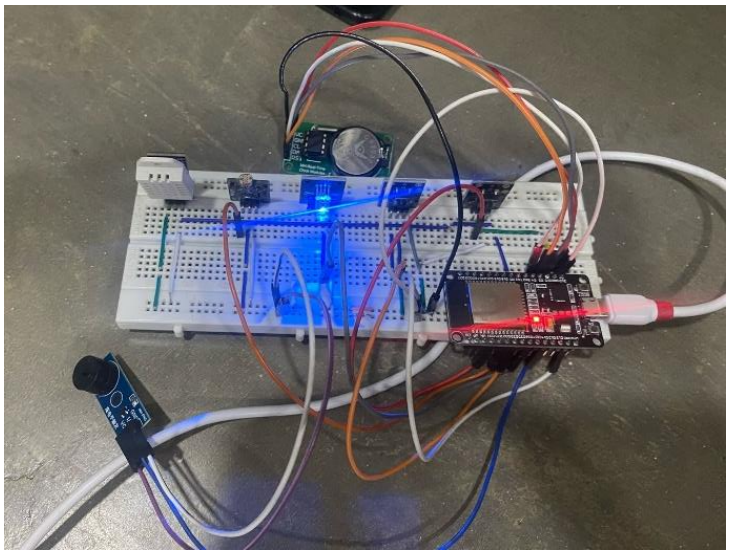
Pruebas de Alarma (LED y Buzzer)

3. **Activación por umbral:**
   - Se simula condiciones en las que la temperatura, humedad o luz superen sus respectivos umbrales.

```
// UMBRALES
#define TEMP_THRESHOLD   26
#define HUM_THRESHOLD    80
#define LIGHT_THRESHOLD  700
```

   - Se confirma que el LED y el buzzer se enciendan simultáneamente y se imprima el mensaje de alerta.

```
[03/28/2025 16:34:23] Light: 435.00
[03/28/2025 16:34:23] Temperature: 24.40 °C
[03/28/2025 16:34:25] Light: 432.00
[03/28/2025 16:34:25] Humidity: 84.10 %
[03/28/2025 16:34:25] Temperature: 24.60 °C
[03/28/2025 16:34:27] Light: 446.00
[ALERTA] Umbral superado: LED y Buzzer ACTIVADOS
[03/28/2025 16:34:27] Temperature: 0.00 °C
[03/28/2025 16:34:27] Humidity: 83.60 %
[03/28/2025 16:34:29] Light: 445.00
[ALERTA] Umbral superado: LED y Buzzer ACTIVADOS
[03/28/2025 16:34:29] Temperature: 24.70 °C
[03/28/2025 16:34:29] Humidity: 83.10 %
[03/28/2025 16:34:31] Light: 450.00
[ALERTA] Umbral superado: LED y Buzzer ACTIVADOS
```



Pruebas de Botones y Eventos

4. **Evento de botón incremento:**

    - Se presiona el botón de incremento y observa que se incremente el contador.
    - Se Verifica que se imprima el mensaje correspondiente con el timestamp.

5. **Evento de botón decremento:**

    - Se Presiona el botón de decremento y comprueba que se decrementa el contador.
    - Se Verifica la impresión del mensaje correcto en el monitor serial.

```
[03/28/2025 16:41:39] Button INC pressed, counter: 1: 0.00
[03/28/2025 16:41:39] Button INC pressed, counter: 2: 0.00
[ALERTA] Umbral superado: LED y Buzzer ACTIVADOS
[03/28/2025 16:41:40] Humidity: 86.80 %
[03/28/2025 16:41:40] Light: 755.00
[03/28/2025 16:41:40] Temperature: 23.20 °C
[03/28/2025 16:41:40] Button INC pressed, counter: 3: 0.00
[03/28/2025 16:41:40] Button INC pressed, counter: 4: 0.00
[ALERTA] Umbral superado: LED y Buzzer ACTIVADOS
[03/28/2025 16:41:42] Light: 753.00
[03/28/2025 16:41:42] Temperature: 0.00 °C
[03/28/2025 16:41:42] Humidity: 86.70 %
[03/28/2025 16:41:42] Button DEC pressed, counter: 3: 0.00
[03/28/2025 16:41:43] Button DEC pressed, counter: 2: 0.00
[03/28/2025 16:41:43] Button DEC pressed, counter: 1: 0.00
```

Pruebas de Deep Sleep

6. **Activación del Deep Sleep , Despertador por botón y timer:**
    - Se verifica que, tras el mensaje “Preparando para Deep Sleep…”, el sistema entre en modo deep sleep.
    - Se comprueba que el ESP32 despierte correctamente por el timer o al liberar el botón BUTTON_INC, según la configuración.

```
16:44:17.348 -> Preparando para Deep Sleep...
16:44:27.198 -> ets Jul 29 2019 12:21:46
16:44:27.198 ->
16:44:27.198 -> rst:0x5 (DEEPSLEEP_RESET),boot:0x13 (SPI_FAST_FLASH_BOOT)
16:44:27.261 -> configsip: 0, SPIWP:0xee
16:44:27.261 -> clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
16:44:27.261 -> mode:DIO, clock div:1
16:44:27.261 -> load:0x3fff0030,len:4688
16:44:27.261 -> load:0x40078000,len:15516
16:44:27.261 -> load:0x40080400,len:4
16:44:27.261 -> load:0x40080404,len:3196
16:44:27.261 -> entry 0x400805a4
16:44:27.305 -> E (77) esp_core_dump_□^X.K□□s dump data check failed:
16:44:27.305 -> Calculated checksum='98786879'
16:44:27.305 -> Image checksum='ffffffff'
16:44:27.305 -> compiled: Mar 28 202516:20:46
16:44:27.305 -> Wakeup caused by timer
```

```
16:45:57.269 -> Preparando para Deep Sleep...
16:45:59.570 -> ets Jul 29 2019 12:21:46
16:45:59.570 ->
16:45:59.570 -> rst:0x5 (DEEPSLEEP_RESET),boot:0x13 (SPI_FAST_FLASH_BOOT)
16:45:59.604 -> configsip: 0, SPIWP:0xee
16:45:59.604 -> clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
16:45:59.604 -> mode:DIO, clock div:1
16:45:59.604 -> load:0x3fff0030,len:4688
16:45:59.604 -> load:0x40078000,len:15516
16:45:59.604 -> load:0x40080400,len:4
16:45:59.604 -> load:0x40080404,len:3196
16:45:59.604 -> entry 0x400805a4
16:45:59.675 -> E (77) esp_core_dump_□□X.K□□s dump data check failed:
16:45:59.675 -> Calculated checksum='98786879'
16:45:59.675 -> Image checksum='ffffffff'
16:45:59.675 -> compiled: Mar 28 202516:20:46
16:45:59.675 -> Wakeup caused by external signal (ext0)
```