



# Controlled Lamp Saver

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# Goal of the Project

- To reduce the energy usage
- Hands off use of lamp
- Measure and manage the safety of the air quality
- Offer a solution to reduce energy consumption and functionality



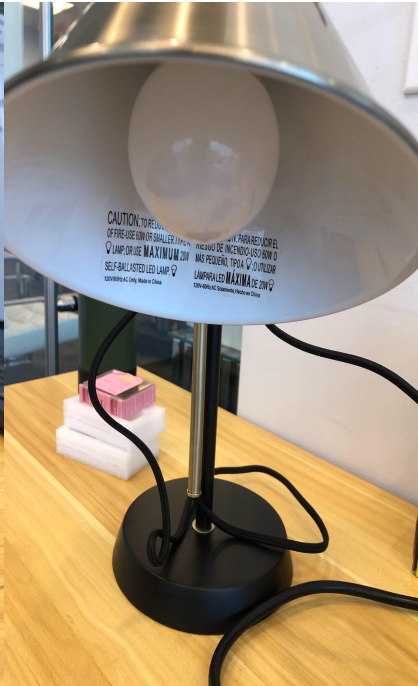


# Materials/Applications

- Adafruit Reverse TFT ESP32-S2
- BME680 sensor
- PIR Motion Sensor
- IoT Relay
- Jump Wires
- Lamp
- Wattmeter
- MU Editor/Circuit Python
- HTML website
- Google Realtime Database

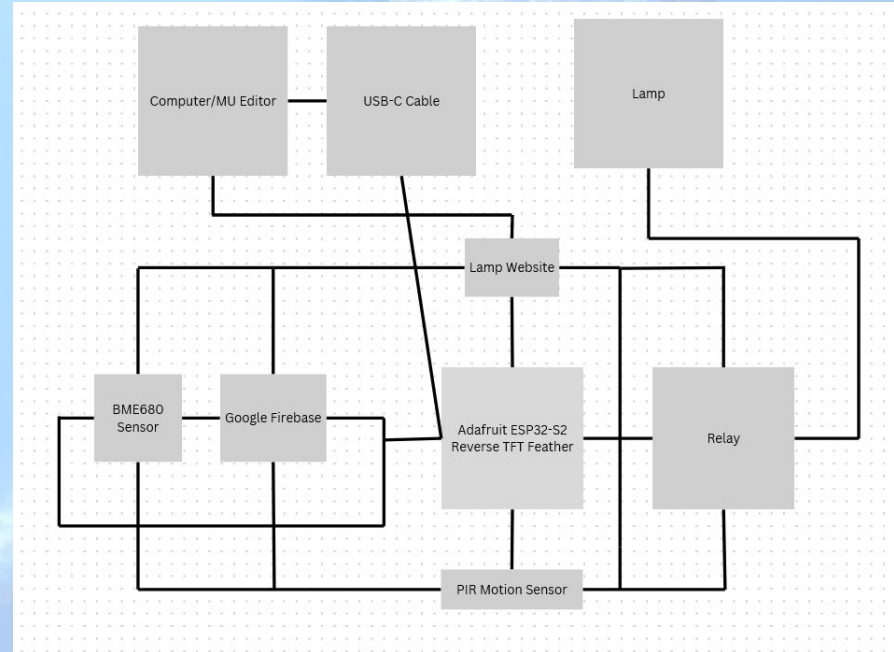


## Setup



# Diagram

- Run through MU Editor (CircuitPython) and HTML (Javascript)
- Connections to ESP32 and laptop to power devices
- Lamp connected to the relay
- Communications through Google Realtime Database





# HTML



# Code

# JS

- Switching state of the relay

- Motion sensor

- Website

- Receiving sensor data

- Temperature

- Humidity

- Gas

- Pressure

```
relaystate = None  
while True:
```

```
    temperature = bme680.temperature  
    temperature = temperature - 6  
    gas = bme680.gas  
    humidity = bme680.relative_humidity  
    pressure = bme680.pressure  
    pir_value = pir.value
```

```
# Fetch relay state from Firebase  
response = requests.get(relay_state_path)  
relay_state = response.json()  
print(relay_state)
```

```
relay.value = relay_state  
print("relay state is now: ", relay.value)
```

```
if pir_value and not relay_locked and not relay_state:  
    led.value = True  
    if not motion_detected:  
        print('Motion detected!')  
        relay.value = not relay.value # Update relay based on fetched relay state  
        motion_detected = True  
        motion_label.text = "Motion Detected!"
```

```
print("\nTemperature: %0.1f C" % temperature)  
print("Gas: %d ohm" % gas)  
print("Humidity: %0.1f %" % humidity)  
print("Pressure: %0.3f hPa" % pressure)
```

```
data = {  
    'temperature': temperature,  
    'gas': gas,  
    'humidity': humidity,  
    'pressure': pressure  
}
```

# HTML

# JS



# Code

- Getting button clicks from the website to activate the lamp
- Stylizing the website
- Seeing the sensor information

```
const app = initializeApp(firebaseConfig);
const analytics = getAnalytics(app);

// Get a reference to the database service
const database = getDatabase();

// Function to send data to Firebase
function sendData(state) {
  console.log("Button clicked. State:", state);
  set(ref(database, 'relay_state'), state);

  // Update the light based on the state
  const light = document.getElementById("light");
  if (state) {
    light.classList.add("on"); // Turn on the light
    alert("Relay turned on!");
  } else {
    light.classList.remove("on"); // Turn off the light
    alert("Relay turned off!");
  }
}

// Bind event handlers to buttons
document.getElementById("turnOnButton").addEventListener("click", function() {
  sendData(true);
});

document.getElementById("turnOffButton").addEventListener("click", function() {
  sendData(false);
});
</script>
```



# Website

- User interface for the light controller
- Option to see the data displayed
- Turn on button
- Turn off button
- Connected to Firebase to establish communication

## Lamp Control

Temperature



Turn On

Turn Off

## Lamp Control

Temperature



Turn On

Turn Off

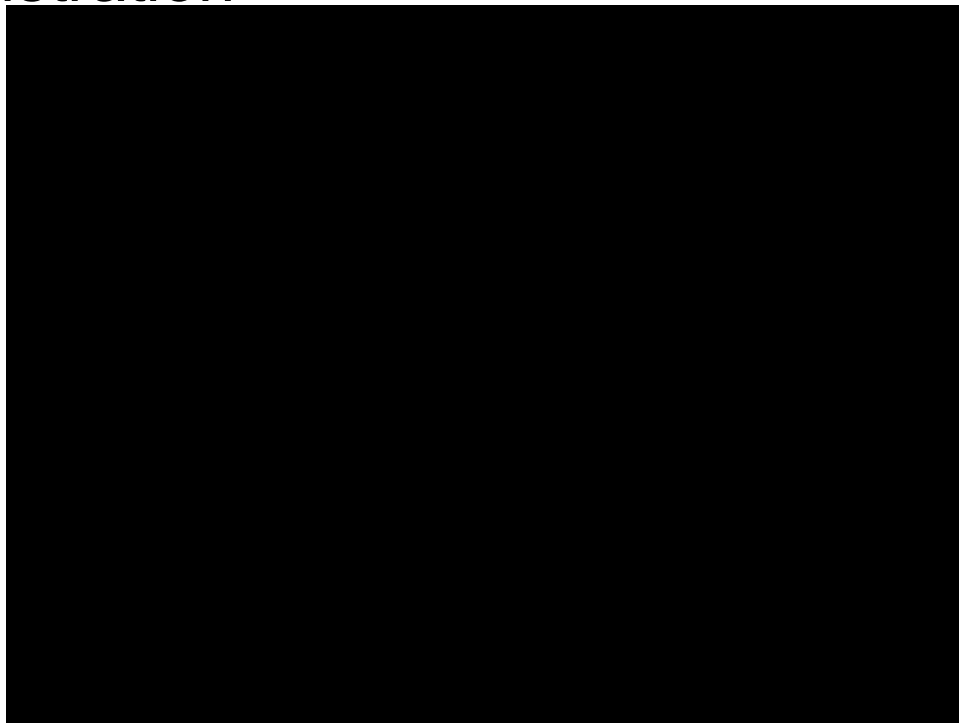


# Results

- Reduction in energy being used over time
- Increase in air quality with method
- Lowered room temperatures
- Working sensors and buttons



# Video Demonstration





# Final Discussion

- Successfully measured sensor data
- Compared energy saving methods
- Communication between website and relay
- Motion sensor working along with website



# Improvements

- Using facial recognition (opencv)
- Using device to also dim the light
- More accurate sensor
- Publish and finalize to app store



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The background is a complex, abstract composition. It features a dense network of glowing, translucent lines in shades of green and blue. These lines are both straight and curved, creating a web-like structure that fills the frame. Interspersed among these lines are several small, stylized blue shapes that resemble butterflies or delicate flowers, positioned at various points. The overall effect is one of dynamic energy and intricate detail, set against a solid black background.

Thank You