

# SINAG

## Monitoring Portal User Manual

For Maintenance Personnel, v1.0



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# About this Manual

This manual is designed to provide a comprehensive guide for maintenance personnels who will manage monitoring portal. The manual is divided into five chapters, each covering different aspects of the system. Here's a brief overview of each chapter:

## **Chapter 1: Introducing Sinag**

This chapter introduces Sinag, the LoRa-based Centralized Monitoring System for Solar Street Lights and explains the features of the system and its benefits.

## **Chapter 2: Using Sinag Monitoring Portal**

In this chapter, users will learn how to use the Sinag Monitoring Portal, which is the main interface for accessing the data collected by the Solar Streetlights monitoring system.

## **Chapter 3: About the Prototype**

This chapter provides information about the schematic diagram of the system illustrating the interconnections between its components.

## **Chapter 4: Troubleshooting**

In this chapter, users will learn how to troubleshoot common issues that may arise with the system.



# About this Manual

## **Chapter 5: Support and Contact Information**

The final chapter provides information that users can use to get help and support for any issues or questions they may have about the system.

By following the steps outlined in this manual, users can effectively monitor and maintain their solar streetlights, ensuring that they operate at their optimal level and provide safe and reliable lighting for communities.



# Chapter 1

## Introducing SINAG: A LoRa-based Centralized Monitoring System for Solar Street Lights

The LoRa-based Centralized Monitoring System for Solar Street Lights, Sinag, is a comprehensive solution for monitoring and managing solar street lights. The system is designed to provide users with real-time data on the performance of their streetlights, enabling them to optimize maintenance schedules and reduce energy costs.

Sinag consists of several components, including sensors, gateways, and a cloud-based monitoring platform. Each streetlight is embedded with a transceiver module and antenna. Gateway is also equipped with a transceiver module and antenna. The gateway will send requests to the end-node connected to the network to send its data. The end-node (street light) receives the request, then starts encoding sensor readings; it will send the data to the gateway prior to the request. The sent data will be processed and stored in the database.

To facilitate communication between the gateways and the end devices (the sensors installed on each solar streetlight), Sinag uses LoRa (Long Range) communication technology. LoRa is a low-power, wide-area networking technology that is ideal for IoT (Internet of Things) applications. It enables devices to communicate over long distances with low power consumption, making it well-suited for use in outdoor environments.

Using Sinag, users can monitor their solar streetlights from anywhere at any time, making it easy to stay on top of maintenance and identify issues before they become major problems. The system also provides detailed analytics and reporting, allowing users to track performance metrics and identify areas for improvement.



# Chapter 1

## Introducing SINAG: A LoRa-based Centralized Monitoring System for Solar Street Lights

Some of the key features of Sinag include:

**Real-time and centralized monitoring:** Users can access data on the performance of their solar streetlights real-time from a single platform, allowing them to promptly address any issues that may arise and make informed decisions about maintenance and repairs. Thus, ensuring the optimal performance of the system.

**Comprehensive reporting:** The system provides detailed analytics and reporting on key performance metrics, making it easy to track progress and identify areas for improvement.

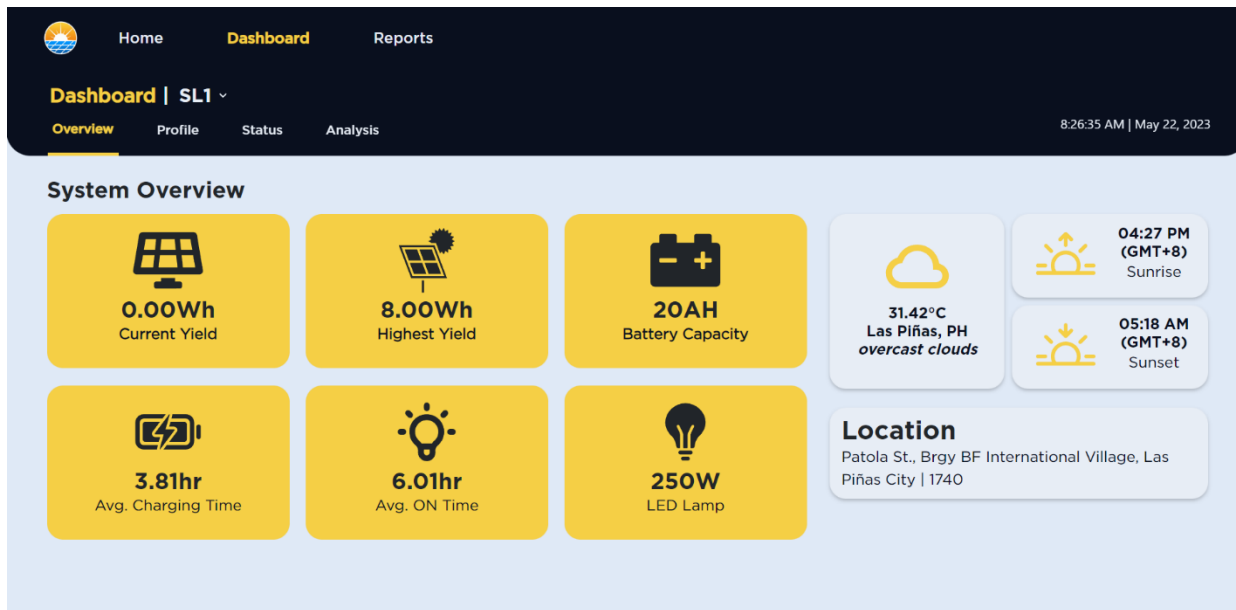
**User-friendly interface:** The Sinag Monitoring Portal is easy to use and navigate, even for users who are not familiar with the technology. **Energy efficiency:** By monitoring the performance of their solar streetlights, users can optimize maintenance schedules and reduce energy costs.

In summary, Sinag is a powerful tool for monitoring and managing solar streetlights. By providing real-time data and comprehensive reporting, the system makes it easy for users to ensure that their streetlights are operating at their optimal level, providing safe and reliable lighting for communities.



# Chapter 2

## Using Sinag Monitoring Portal



Access the Sinag Portal through this link [www.projectsinaag.com](http://www.projectsinaag.com)

**Dashboard Page** provides a comprehensive overview of the system displaying the profile, status, and analysis of each prototype.

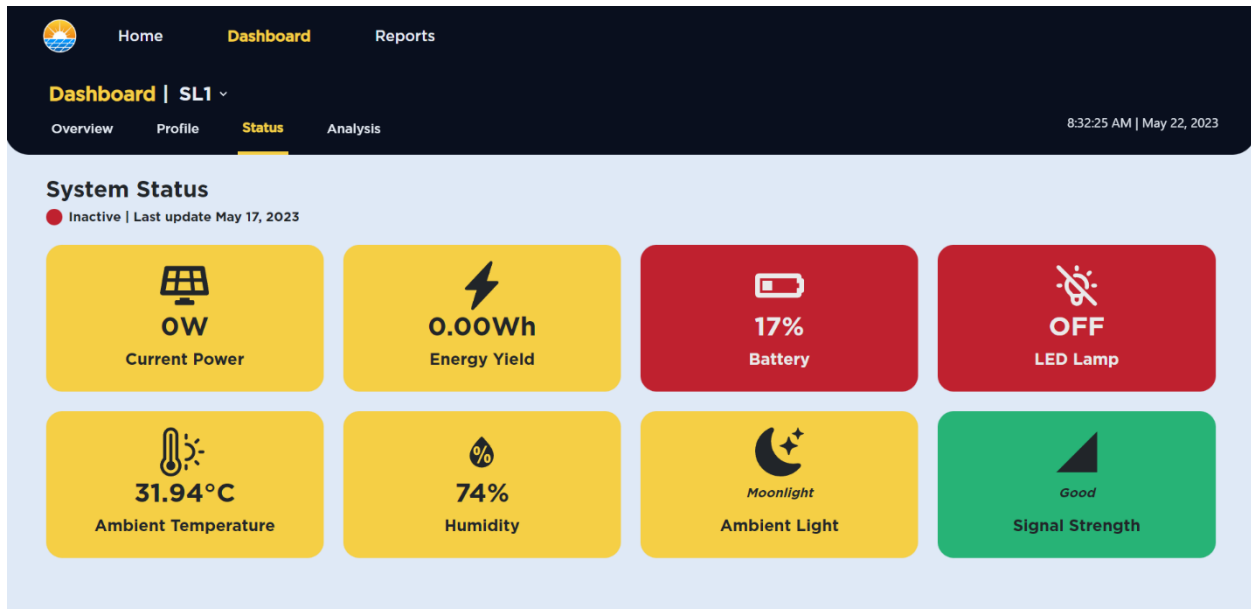
### System Overview

- **Current Yield:** The current energy yield in watt-hours achieved by the solar streetlight system
- **Highest Yield:** The highest recorded energy yield in watt-hours achieved by the solar streetlight system
- **Battery Capacity:** The capacity of the system's battery, measured in ampere-hours
- **Average Charging Time:** The average duration, in hours, required for the battery to fully charge from solar energy
- **Average ON Time:** The average duration, in hours, that the LED lamp of the solar streetlight remains turned on during operation
- **LED Lamp:** The wattage of the LED lamp used in the solar streetlight, indicating its power consumption and brightness level



# Chapter 2

## Using Sinag Monitoring Portal



**System Status** displays real-time information about the system for comprehensive monitoring and evaluation of its performance

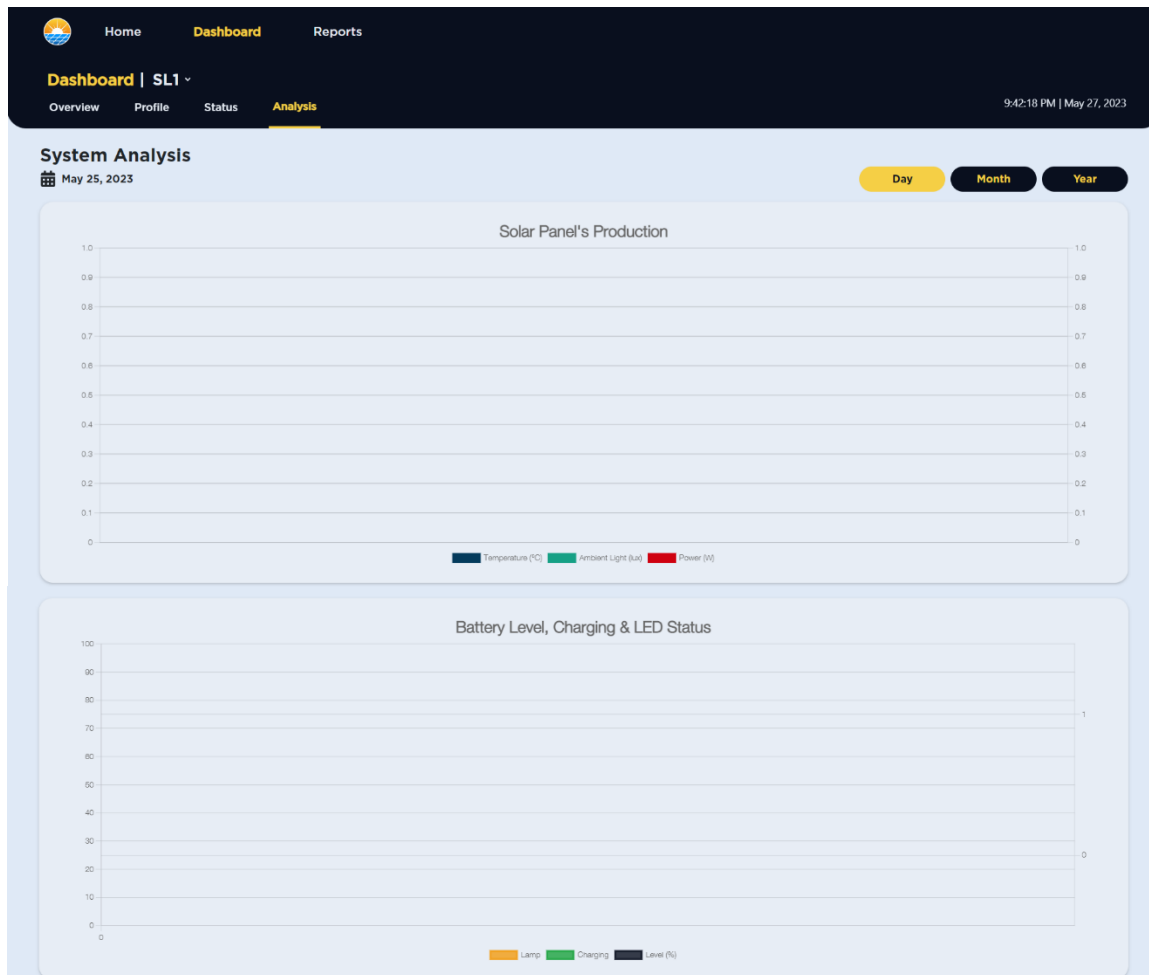
- **Current Power:** The real-time power output of the streetlight, measured in watts
- **Energy Yield:** The accumulated energy yield of the streetlight, represented in watt-hours, indicating the total energy generated
- **Battery:** The current battery level expressed as percentage, reflecting the amount of charge remaining
- **LED Lamp:** The status of the LED lamp, indicating whether it is ON or OFF
- **Ambient Temperature:** The current temperature of the surroundings in degrees Celsius, providing insights into environmental conditions
- **Humidity:** The relative humidity level of the environment expressed as percentage
- **Ambient Light:** An indication of the ambient light conditions, providing information about the surrounding brightness
- **Signal Strength:** The strength of the signal received by the transceiver or gateway





# Chapter 2

## Using Sinag Monitoring Portal



The **System Analysis** section on the Dashboard Page presents graphical representations of key system parameters, including solar panel production (temperature, ambient light, power) and battery level charging, as well as LED status (lamp, charging, level), allowing users to analyze and visualize trends and patterns for informed decision-making and performance optimization.



# Chapter 2

## Using Sinag Monitoring Portal



In the **Reports Page**, users can quickly identify and address common anomalies in the solar streetlight monitoring system, such as **LED lamps remaining switched on during daytime**, **malfunctioning auto switch mode**, **lack of solar panel output during daylight hours**, **rapid battery drainage**, **occurrence of an empty battery during nighttime**, or **LED lamps being turned off during nighttime**, facilitating prompt troubleshooting and necessary corrective actions for optimal system performance and energy efficiency.



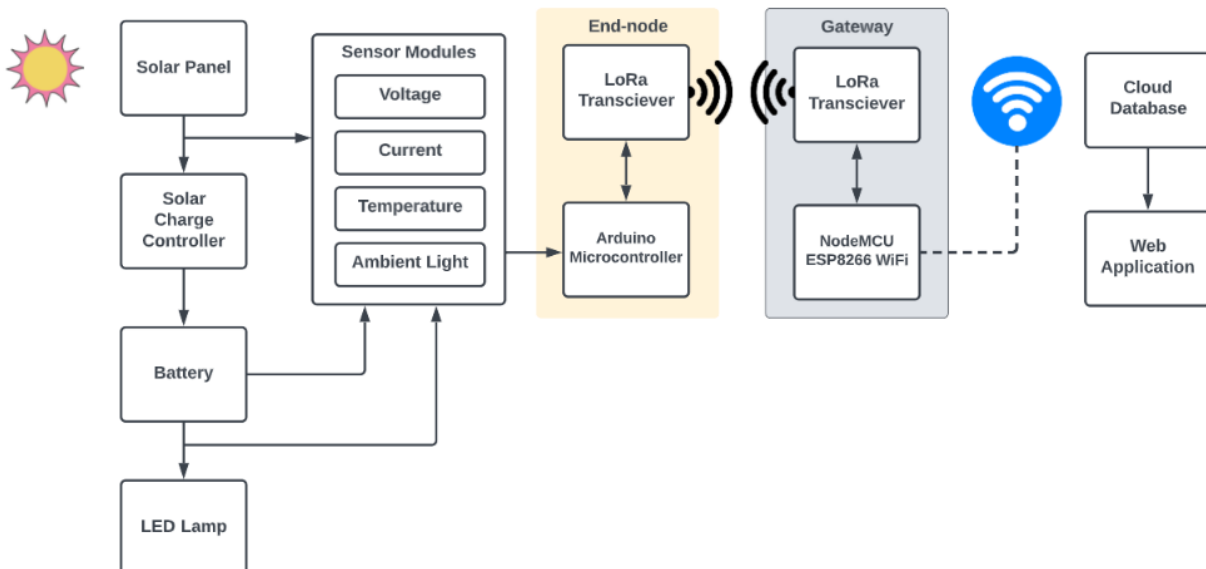
# Chapter 3

## About the Prototype

### Block Diagram

Figure 1 illustrates the proposed system's block diagram, depicting communication between the LoRa end-node, LoRa gateway, and cloud database. The end-node device communicates with the LoRa gateway using a 433 MHz LoRa Radio Frequency (RF) module. The gateway's role is to receive data from the LoRa end-nodes and transmit it to the database via Wi-Fi. A web application is connected to the data repository, enabling real-time data retrieval and analysis for display purposes.

Figure 1



# Chapter 3

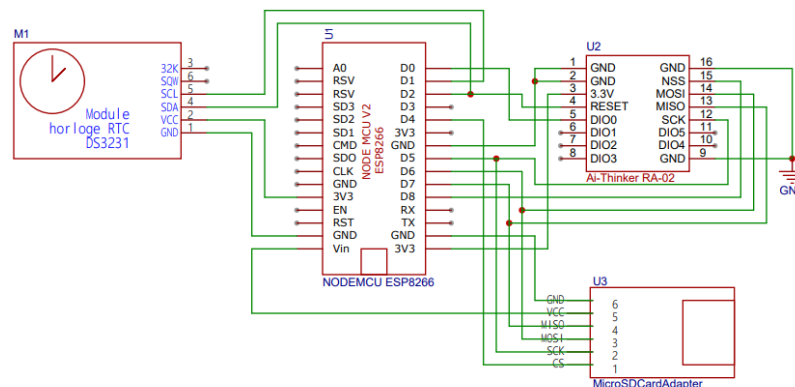
## About the Prototype

### The Gateway

The Figure 2 shows the connection of LoRa and NodeMCU or the gateway. This is a crucial component of the system that facilitates the transmission of data collected from the end devices to the cloud server for storage and processing. Its primary function is to establish communication between the end devices and the cloud server, ensuring seamless data transfer.

Once the gateway is installed and powered on, it establishes a connection with the cloud server by configuring the necessary network settings. Once the gateway is successfully connected, it continuously transmits the collected data to the cloud server at 5-minutes interval.

Figure 2



#### GATEWAY COMPONENTS

Ra-02 RA02 Lora Module SX1278

Antenna 433MHz 6dBi SMA Male

NodeMCU V3 ESP8266 SMA WiFi

Micro SD Card Module

SD Card

DS3231 RTC High Precision Real Time Clock

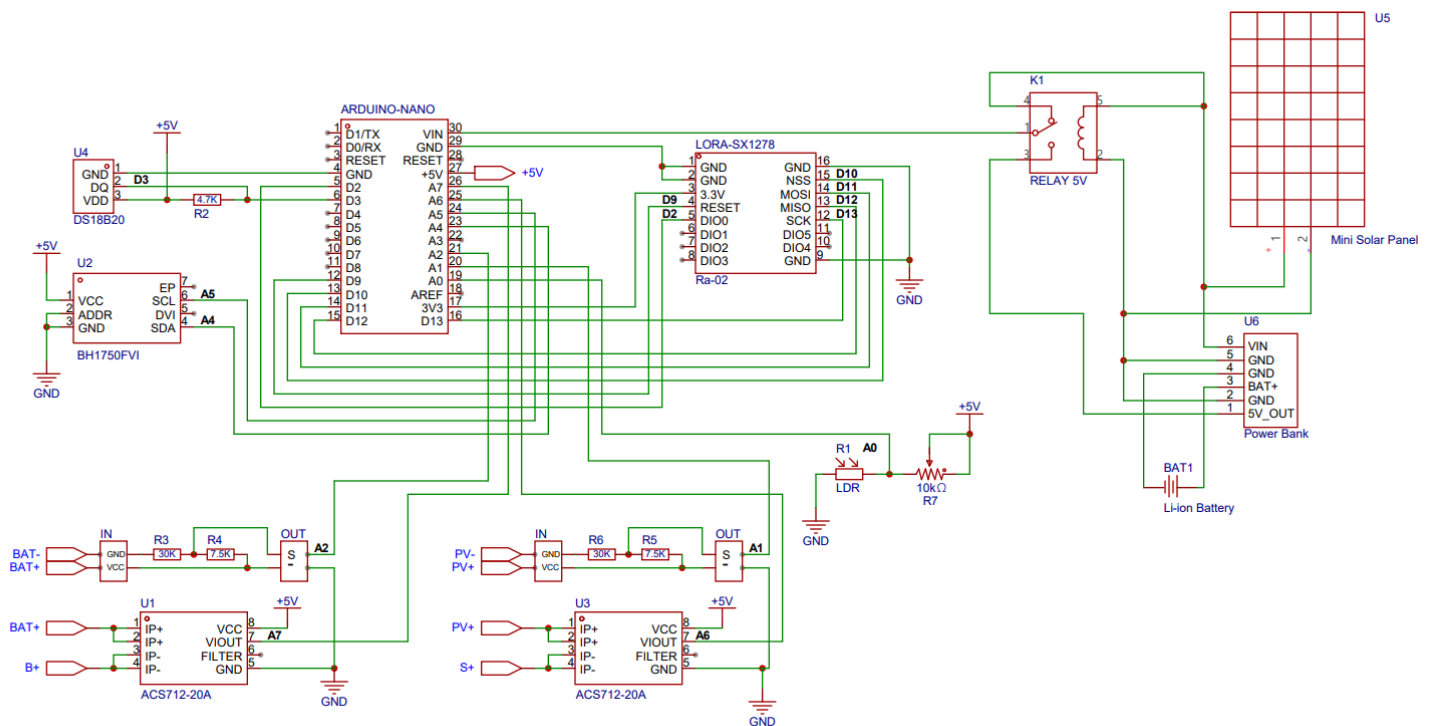


# Chapter 3

## About the Prototype

### The End Device

Figure 3



#### END NODE COMPONENTS

Arduino Nano ATmega328P

Ra-02 RA02 Lora Module SX1278

Antenna 433MHz 6dBi SMA Male

Voltage Detection Sensor Module 25V

Current Sensor ACS712 20A

DS18B20 Temperature Sensor Module

BH1750FVI Light Intensity Module

Mini solar charger

Powerbank 10Ah

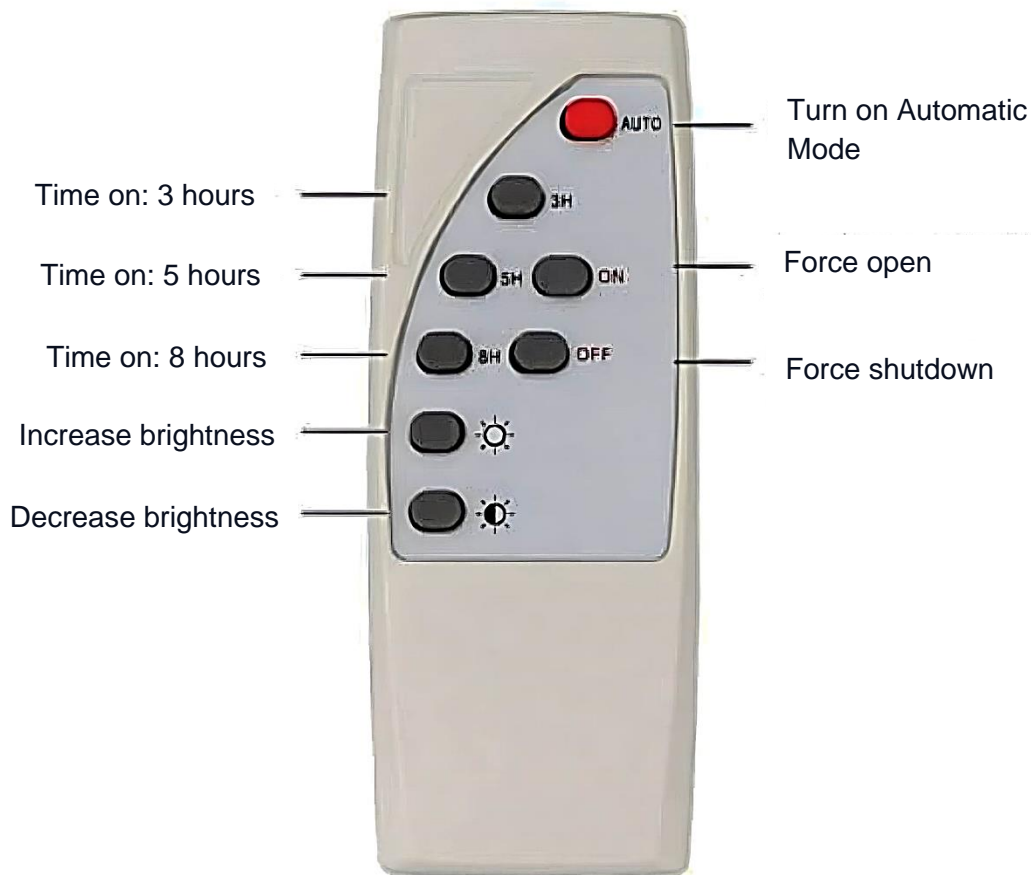
Relay 5V SPDT



# Chapter 3

## About the Prototype

### Sinag Remote Control



# Chapter 4

## Troubleshooting

This troubleshooting section of the user manual provides helpful guidance to address common issues that may arise while using the system. If you encounter any difficulties or observe unexpected behavior, refer to the following troubleshooting steps to diagnose and resolve the problem. Here are some common issues and their corresponding troubleshooting steps:

### **Suggested actions for the 'LED is ON during daytime':**

1. Check solar panel connections: Ensure that the connections between the solar panel and the charge controller are secure and free from damage.
2. Inspect solar panel condition: Check the solar panel for any physical damage, such as cracks or broken cells, that could affect its performance. Replace the panel if necessary.
3. Verify solar panel positioning: Ensure that the solar panel is correctly positioned to receive direct sunlight. Remove any obstructions or shading that may be blocking sunlight.
4. Clean the solar panel: Check for dirt, dust, or debris on the solar panel surface. Clean it gently with a soft cloth or brush to maximize sunlight absorption.
5. Assess environmental factors: Consider external factors such as extreme weather conditions or environmental damage that could impact the solar panel's output. Address any issues accordingly.
6. Evaluate battery health: Assess the condition and capacity of the battery. If the battery is unable to hold a charge properly, it may be causing the LED to turn on during the day.



# Chapter 4

## Troubleshooting

7. Check charge controller settings: Review the settings of the charge controller. Ensure that it is configured correctly for the system's operation.
8. Utilize the remote control: If available, use the remote control to manually turn off the LED during daytime or switch it to the appropriate mode.

### **Suggested actions for the 'Auto switch mode not working':**

1. Check power supply: Verify that the solar panel is receiving adequate sunlight for charging.
2. Inspect connections: Ensure secure connections between the solar panel, battery, and auto switch module.
3. Verify auto switch module functionality: Check if the auto switch module is operational and responding correctly to light conditions.
4. Assess battery health: Evaluate the condition and capacity of the battery. A weak or faulty battery can affect the proper functioning of the auto switch mode.
5. Check timer settings: Verify that the timer settings are accurate and aligned with the desired switching intervals. Incorrect timer settings can prevent the auto switch mode from working as intended.
6. Perform system reset: Reset the solar street light system to address any software or programming issues that may be affecting the auto switch mode.
7. Regular maintenance: Clean the solar panel and inspect for any physical damage or debris that could be obstructing sunlight detection or affecting the auto switch module.





# Chapter 4

## Troubleshooting

8. Consider professional inspection: If the issue persists or if you suspect a hardware fault, it is advisable to engage technicians or contact the manufacturer for further assistance.

### **Suggested actions for the 'Solar panel no output during daytime':**

1. Check panel positioning: Verify that the solar panel is correctly positioned to receive direct sunlight. Ensure there are no obstructions or shading that could be blocking sunlight.
2. Inspect panel connections: Ensure that the connections between the solar panel and the rest of the system are secure and free from damage.
3. Clean the panel: Check for dirt, dust, or debris on the solar panel surface. Clean it gently with a soft cloth or brush to maximize sunlight absorption.
4. Assess panel integrity: Inspect the solar panel for any physical damage or cracks that could affect its performance. Replace the panel if necessary.
5. Verify panel functionality: Test the solar panel's functionality using appropriate equipment to check for any internal faults or malfunctions.
6. Evaluate wiring and connections: Check the wiring and connections between the solar panel and other components, such as the battery and charge controller. Look for any loose or damaged connections.
7. Assess environmental factors: Consider external factors such as extreme weather conditions or environmental damage that could impact the solar panel's output.



# Chapter 4

## Troubleshooting

8. Seek professional assistance: If the issue persists or if there are complex technical problems, consult a professional technician or contact the manufacturer for further guidance.

### **Suggested actions for the 'Battery is drained fast; empty battery at night-time':**

1. Check power supply: Ensure that the solar panel is receiving sufficient sunlight during the day to charge the battery effectively.
2. Assess battery health: Evaluate the condition and capacity of the battery. It may be deteriorating or unable to hold a charge. Consider replacing the battery if it is old or damaged.
3. Verify power consumption: Examine the power consumption of the LED lights and other components to identify any excessive or abnormal energy usage. Replace any inefficient components if necessary.
4. Inspect connections: Ensure that the connections between the solar panel, battery, and other components are secure and functioning properly to prevent energy loss. Fix any loose or faulty connections.
5. Evaluate lighting schedule: Review the timing and duration of the LED lights. Adjust the schedule if it is unnecessarily long or if the lights are operating when not required. Optimize the lighting schedule for energy efficiency.
6. Check for external factors: Look for any factors that may be draining the battery, such as parasitic loads or unauthorized power usage. Address any unauthorized power consumption or remove any unnecessary loads.



# Chapter 4

## Troubleshooting

7. Conduct a system reset: Reset the solar street light system to address any software or programming issues that could contribute to excessive battery drainage. This can help resolve any anomalies or errors.

8. Consider battery replacement: If the battery is old, damaged, or no longer performing optimally, replacing it with a new and reliable battery may be necessary to ensure proper functioning of the solar street light.

### **Suggested actions for the 'LED is OFF during nighttime':**

1. Check power supply: Ensure that the solar panel is receiving adequate sunlight during the day to charge the battery. If the battery is not being charged properly, it may result in insufficient power supply during the night.

2. Inspect connections: Verify the integrity of the connections between the solar panel, battery, and LED lights. Loose or faulty connections can disrupt the flow of power and cause the LED to remain off.

3. Assess battery health: Evaluate the condition of the battery. Over time, batteries can deteriorate and lose their capacity to hold a charge. If the battery is faulty or nearing the end of its lifespan, it may not provide enough power to illuminate the LED at night.

4. Check remote control settings: Ensure that the remote control is set to the desired mode, such as "Auto" mode for automatic operation during night-time.

5. Adjust timer settings: If your remote control has timer settings (e.g., 3 hours, 5 hours, 8 hours), ensure that the timer is set appropriately to match the required lighting duration during night-time.



# Chapter 4

## Troubleshooting

6. Replace batteries: If the remote control operates on batteries, check and replace them if necessary to ensure proper functioning.
7. Perform regular maintenance: Clean the solar panels, inspect, and clean the LED lights, and check for any physical damage or debris that may be obstructing the system.
8. Consider professional inspection: If the issue persists or if you are unable to resolve the problem, contact a professional technician or the manufacturer's support team for further assistance.



# Chapter 5

## Support and Contact Information

If you have tried the troubleshooting steps provided in this manual and are still encountering difficulties with the system, please reach out to our support team for further assistance. You can contact us via email at **sinagproject2023@gmail.com**. Our support team is committed to addressing your concerns and providing the necessary guidance to resolve any issues you may be facing.

When contacting our support team, please provide the following information:

- A detailed description of the problem or issue you are experiencing
- Any relevant error messages or indicators you have observed
- Any specific steps you have already taken to troubleshoot the problem

We value your feedback and strive to provide the best possible support to ensure your satisfaction as a beneficiary of our system.

Please note that our support team may require additional information or request remote assistance to diagnose and resolve the issue effectively. We appreciate your cooperation and patience throughout the support process.

Thank you for being a valued beneficiary of our system. We are committed to assisting you and ensuring that you can fully utilize and benefit from our technology.



**THANK  
YOU**

