Solar Powered LED Latrine Lighting System with Motion Sensors

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Solution Overview

The proposed solution is a cutting-edge solar-powered smart lighting system with motion sensors that offer **energy-efficient** and **cost-effective** outdoor lighting. The system integrates solar panels, battery storage, motion sensors, smart controls, wireless connectivity, and a durable weather-resistant design. A solar-powered smart lighting system with motion sensors combines solar energy harvesting and motion detection to control outdoor lighting, automatically saving energy and reducing costs. Solar panels capture sunlight, charging batteries for nighttime use. Motion sensors trigger lights to turn on when movement is detected, and smart controls adjust the brightness based on activity. It's **eco-friendly, cost-effective,** and **enhances safety**. **Low maintenance** and **easy installation** make it popular for outdoor spaces.

Detailed description of proposed solution

The Solar-Powered LED Latrine Lighting System is an innovative and eco-friendly solution designed to address the lighting needs in refugee camps and off-grid locations. This system incorporates photovoltaic solar panels installed on latrine rooftops, which harness sunlight and convert it into electricity. The energy is stored in a battery bank, allowing the LED lights to automatically illuminate the latrine cubicles during nighttime hours. With adjustable lighting levels, users can control the brightness, providing a comfortable environment while avoiding excessive glare.

This self-sustaining system offers numerous advantages, starting with its renewable energy source. By relying on solar power, the system reduces reliance on non-renewable energy sources, leading to lower operational costs and a reduced carbon footprint. Its independence from the power grid ensures uninterrupted lighting, even in remote areas or during power outages. Additionally, the theft-resistant design and robust, weatherproof components make it suitable for harsh environmental conditions.

Improved lighting also enhances safety and security, particularly during nighttime visits, promoting a sense of comfort for users. The Solar-Powered LED Latrine Lighting System

not only meets cost constraints but also aligns with the goal of creating user-friendly and environmentally conscious solutions for humanitarian settings.

As a optional case additional sensor (voice recognition/normal switch) can also be used by removing the pre existing device. And solder voice recognition senior with PIR sensor.

Please share how the proposed solution meets stated Requirements and Acceptance Criteria.

The proposed Solar-Powered LED Latrine Lighting System meets the stated requirements and acceptance criteria in the following ways:

1. Lighting for at least 12 hours: The system utilizes solar panels and battery storage to ensure the LED lights can provide illumination for at least 12 hours continuously, meeting the requirement for extended lighting duration.
2. Plug-and-play and low maintenance: The system is designed to be user-friendly and straightforward to install, making it easy to set up in various latrine designs. Additionally, the use of solar power reduces the need for frequent maintenance, ensuring low upkeep requirements.
3. Renewable and independent energy source: The system's primary energy source is solar power, a renewable and independent source of energy. This meets the requirement for sustainability and reduced reliance on non-renewable energy sources.
4. Theft-resistant and robust: By securing the solar panels and battery bank in locked enclosures, the system becomes theft-resistant, preventing unauthorized access or tampering. The robust, weatherproof design ensures its durability in challenging environmental conditions.
5. Flexible in terms of latrine design: The system's plug-and-play nature and adaptability make it suitable for various latrine designs, offering flexibility to accommodate different camp layouts and user needs.
6. Meets cost constraints: While the initial setup cost may be higher, the system's long-term cost-effectiveness stems from its utilization of free solar energy, minimal maintenance requirements, and reduced reliance on expensive fuel sources.
7. Adjustable lighting levels: The inclusion of dimmable and adjustable LED lights allows users to control the brightness, addressing the need for comfortable lighting levels and avoiding excessive glare.
8. Power-saving features: The intelligent light control system, coupled with LED technology, ensures efficient power usage, minimizing energy wastage and meeting the acceptance criteria for power-saving features.

By fulfilling these requirements and acceptance criteria, the Solar-Powered LED Latrine Lighting System offers an effective, sustainable, and user-friendly lighting solution for latrines in refugee camps. It enhances safety, accessibility, and comfort while promoting environmental responsibility and cost-effectiveness in humanitarian settings.

What area of the latrine does this solution apply to?
Lighting

How does the solution impact lighting, locking, alerting or other innovative improvement or integration propositions?
The Solar-Powered LED Latrine Lighting System is a groundbreaking solution that addresses critical lighting needs in refugee camps and off-grid locations. Harnessing solar energy during the day, the system stores power in batteries, enabling automatic and adjustable LED illumination at night. This eco-friendly approach enhances accessibility, safety, and comfort for latrine users, particularly during nighttime visits. With its energy-efficient LED lights, the system optimizes brightness while minimizing power consumption, ensuring sustainability and cost-effectiveness. The adjustable lighting feature allows users to control brightness levels, avoiding discomfort from excessive glare.

Moreover, the system's independence from the power grid ensures reliable lighting even in areas with limited electricity access or frequent outages. Its robust, weatherproof design and theft-resistant enclosures guarantee durability and continuous operation in challenging environments.

Overall, the Solar-Powered LED Latrine Lighting System presents an innovative and impactful solution, improving latrine experiences and promoting a greener, user-centric approach to humanitarian lighting.

What is the estimated cost for this solution?
$8.5 - $15

How can this be retrofitted to existing latrines? If it can't, please state your use case.
Given the budget constraint of $20, creating a complete solar-powered dimmable LED lighting system with all the essential components would be challenging. Constructing from scratch increases the overall budget and becomes too tedious to install. So we can adopt to the existing market to overcome those challenges and modify accordingly to implement the changes.

Materials Needed:

Method 1:

Solar Outdoor Flood Light, 6500K 56 LEDs Dusk to Dawn Motion Sensor Light with 16.5ft Cable, IP65 Waterproof Wall Security Light with Separated Solar Panel, for Indoor, Outside, Yard, Garden: $8.5/piece (in pack of 4) and $10 - $15 (in pack of 1) found online.

Method 2:

Building from scratch sum up to $15-20

1. Dimmable LED Light Bulb: $5
    - Purchase a dimmable LED light bulb separately. Ensure that it is compatible with the solar garden light or can be easily modified to fit.
2. Solar panel : $10- $15
3. Motion Sensor (optional): $1 - $5
    - You can find inexpensive PIR motion sensors online if you want to include a motion sensor to activate the light.
4. Tools: Screwdriver, wire stripper/cutter (if needed).

Steps to Assemble:

1. Disassemble the Solar Garden Light:
    - Open up the solar garden light carefully, separating the solar panel, battery, and LED light.
2. Modify the LED Light:
    - If the LED light is not dimmable, you can modify it to be dimmable using a DIY method like partially covering the LED with translucent material to reduce brightness.
3. Connect the Dimmable LED Light:
    - Connect the dimmable LED light to the existing wires of the solar garden light. You may need wire connectors or soldering to secure the connections.
4. Add Motion Sensor (Optional):
    - If you wish to include a motion sensor, connect it in line with the LED light so that it can control when the light turns on and off based on motion detection.
5. Reassemble the Solar Garden Light:
    - Once all the modifications are done, reassemble the solar garden light carefully.
6. Test the System:
    - Place the solar-powered dimmable LED light in a sunny spot to charge during the day. Test the dimming feature and, if included, the motion sensor's functionality.

How will this solution be maintained?
The Solar-Powered LED Latrine Lighting System requires maintenance of solar panel cleaning as major. Whereas, battery, and LED light replacement may need after 2-3 years depending upon the condition. Trained personnel to conduct inspections and troubleshoot issues for reliable and sustainable lighting. Involving camp communities and partnering with experienced organizations ensures effective maintenance and continuous operation.

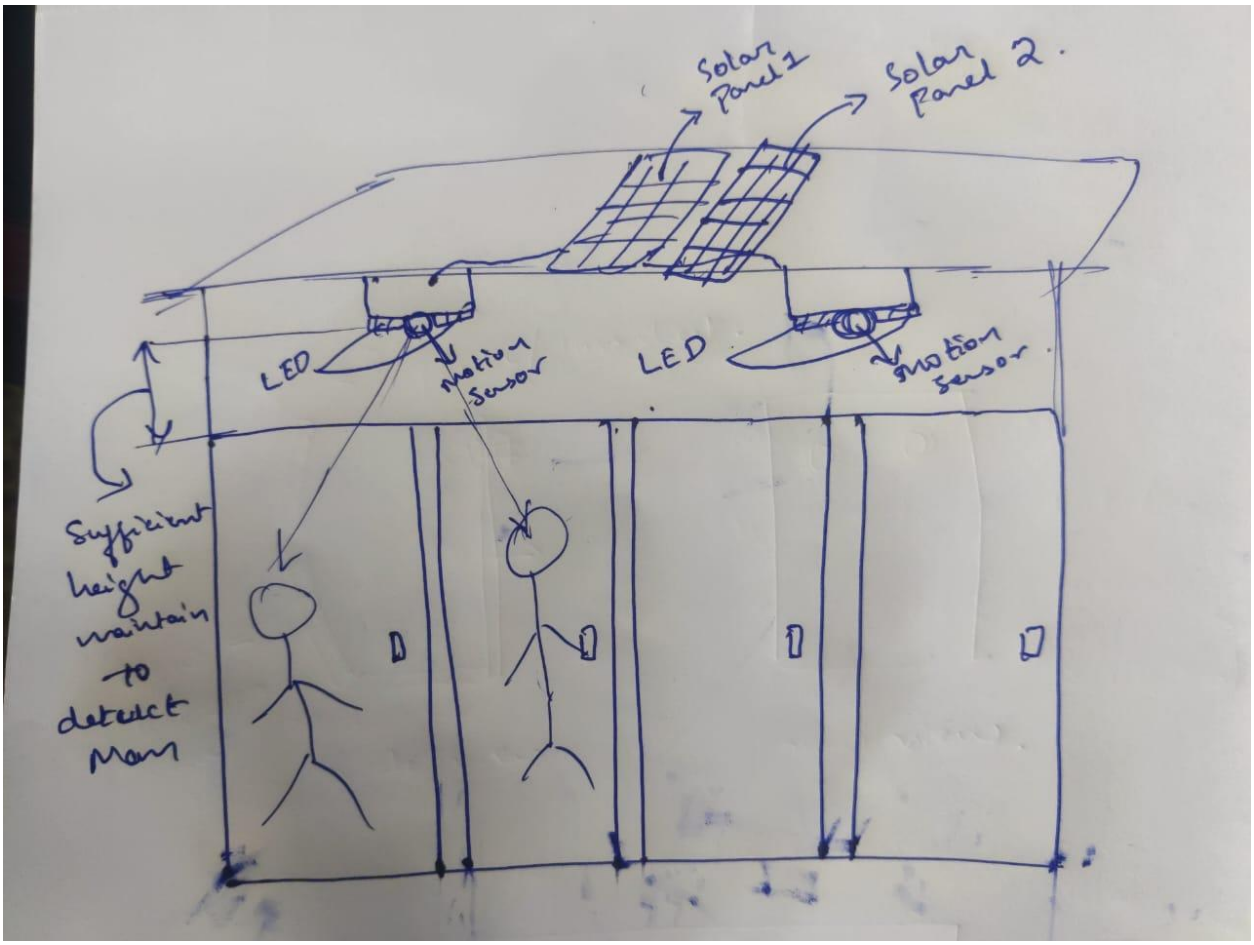
Please share the innovative highlights of your proposed solution.
The Solar-Powered LED Latrine Lighting System is innovative, with renewable solar energy, automatic LED activation, and adjustable brightness. It operates independently, resists theft, and withstands harsh conditions. This user-centric solution enhances safety, accessibility, and sustainability in humanitarian settings.

The proposed solution also encourages the modification of existing device connections with voice recognition sensors (just by making some noise) and normal switches as an alternative means if the sensor mistaken for as camera by the user. The refugee camp must provide basic awareness to make proper use of the solution.

The business side can be improved further with collaboration with supplier on bulk order.

Are you interested in potential further collaboration?
Yes

ATTACHMENTS



LOTMOS Solar Outdoor Lights with Separate Solar Panel, IP65 Waterproof Motion Sensor Outdoor Lights with 16.4 FT Cable, 3 Modes Solar Lights Outdoor for Patio Wall Garden Shed Garage Yard Fence Door

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4.5 ★★★★½ 522 ratings

Amazon's Choice in Patio Wall Light Fixture by LOTMOS

Price: $35.99

Available at a lower price from other sellers that may not offer free Prime shipping.

Eligible for Return, Refund or Replacement within 30 days of receipt

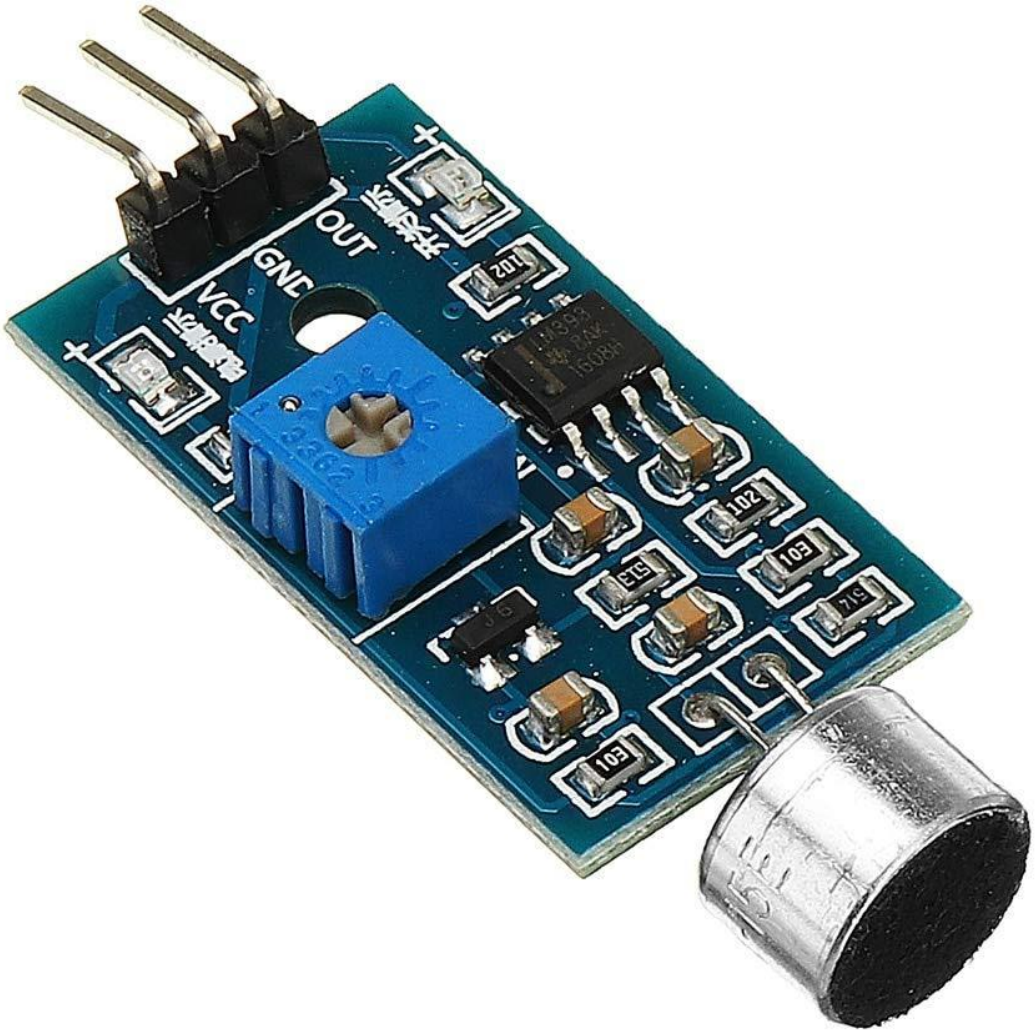
Size: **FOUR PACK**

FOUR PACK	ONE PACK	TWO PACK
$35.99	$11.99	$24.99

Brand	LOTMOS
Color	Black
Material	Plastic
Style	Traditional
Light fixture form	Wall

About this item

- 【2023 Newest Motion Sensor Outdoor Lights】2023 newest solar outdoor lights, which is more versatile than traditional solar lights, and the outdoor lights' solar panel is made of the latest polycrystalline silicon raw material,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