



# Powering Tomorrow: Renewable Microgrids for Rural Advancement

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# When Darkness Becomes a Daily Routine :

"Imagine a small village where evenings arrive earlier than they should—not because the sun sets faster, but because electricity disappears. Children try to study under dim lantern light. Mothers finish cooking before dusk to save kerosene. And families wait in the dark, hoping the power will return."

"Now picture the same village again... but this time, every house has a steady, clean source of electricity. Lights stay on even during grid failures. Small shops can run longer. Students can study anytime. And the entire community becomes energy independent."

"This transformation is possible not through large power plants, but through something as small and community-focused as a Renewable Energy Microgrid."





# The Crisis of Energy Poverty:

Across the globe, over 800 million people still lack access to reliable electricity, with a disproportionate number residing in rural communities.

The Problem: Lack of consistent, affordable energy hinders development.

- Who is Affected: Remote villages, agricultural communities, and small businesses are left behind.
- Why It Matters: No electricity means no modern healthcare, limited education, stunted economic growth, and continued cycles of poverty.





# Voices from the Field: Understanding the Need

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"During harvest, without electricity, we lose half our crops because we can't refrigerate them."

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“

"My children can only study until the sun sets. After that, it's darkness and missed opportunities."

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- Key Observations: Communities rely on expensive, polluting, and unreliable energy sources like diesel generators or kerosene lamps.
- Pain Points: High costs, health hazards, environmental damage, and limited productivity.





# Our Solution: The Renewable Microgrid

Introducing an innovative, modular renewable microgrid designed specifically for rural environments.

## Features

Integrated solar panels, robust battery storage, and smart energy management system.

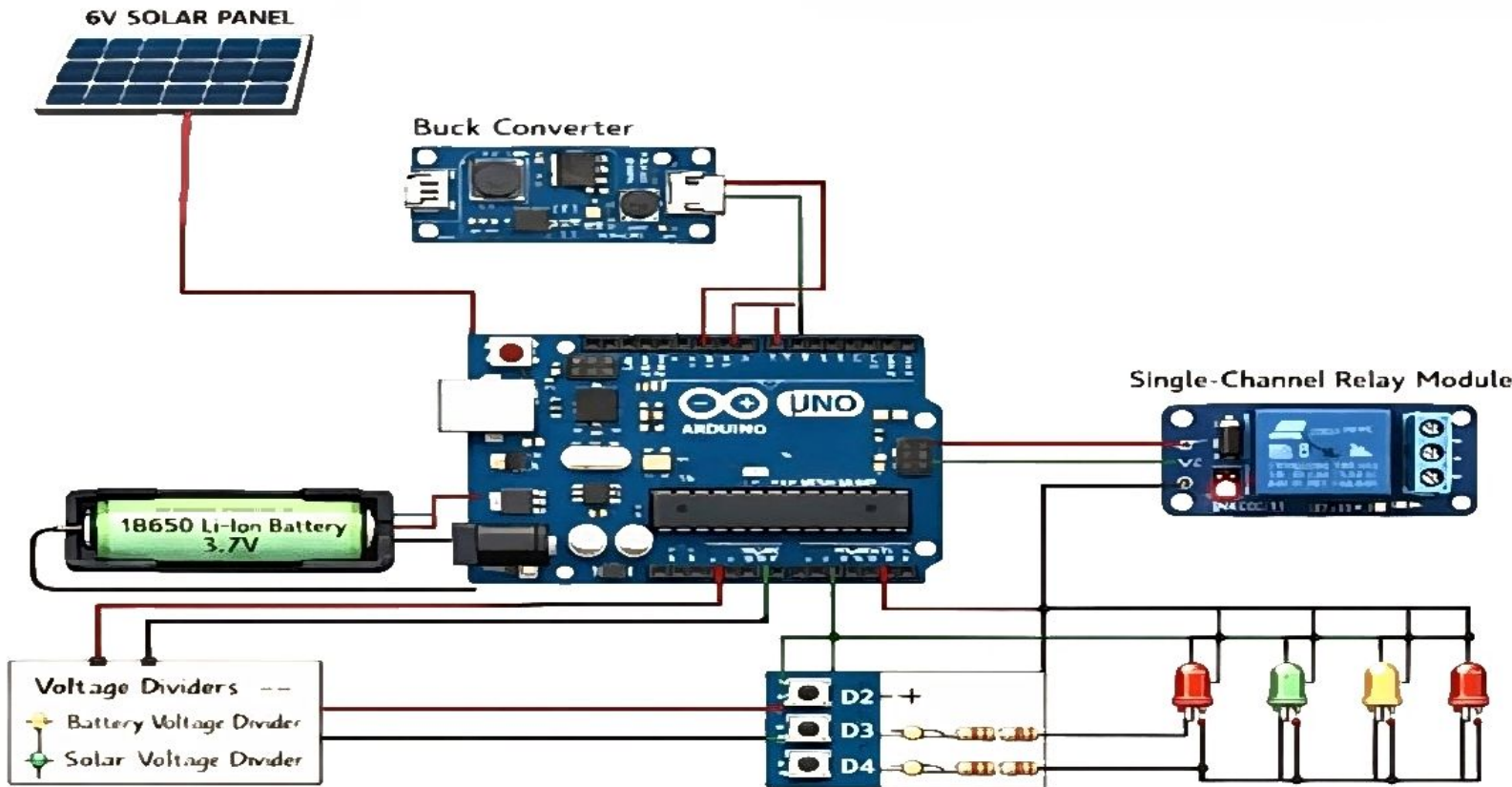
## Functionality

Provides 24/7 clean power for homes, schools, clinics, and small businesses.

## Novelty

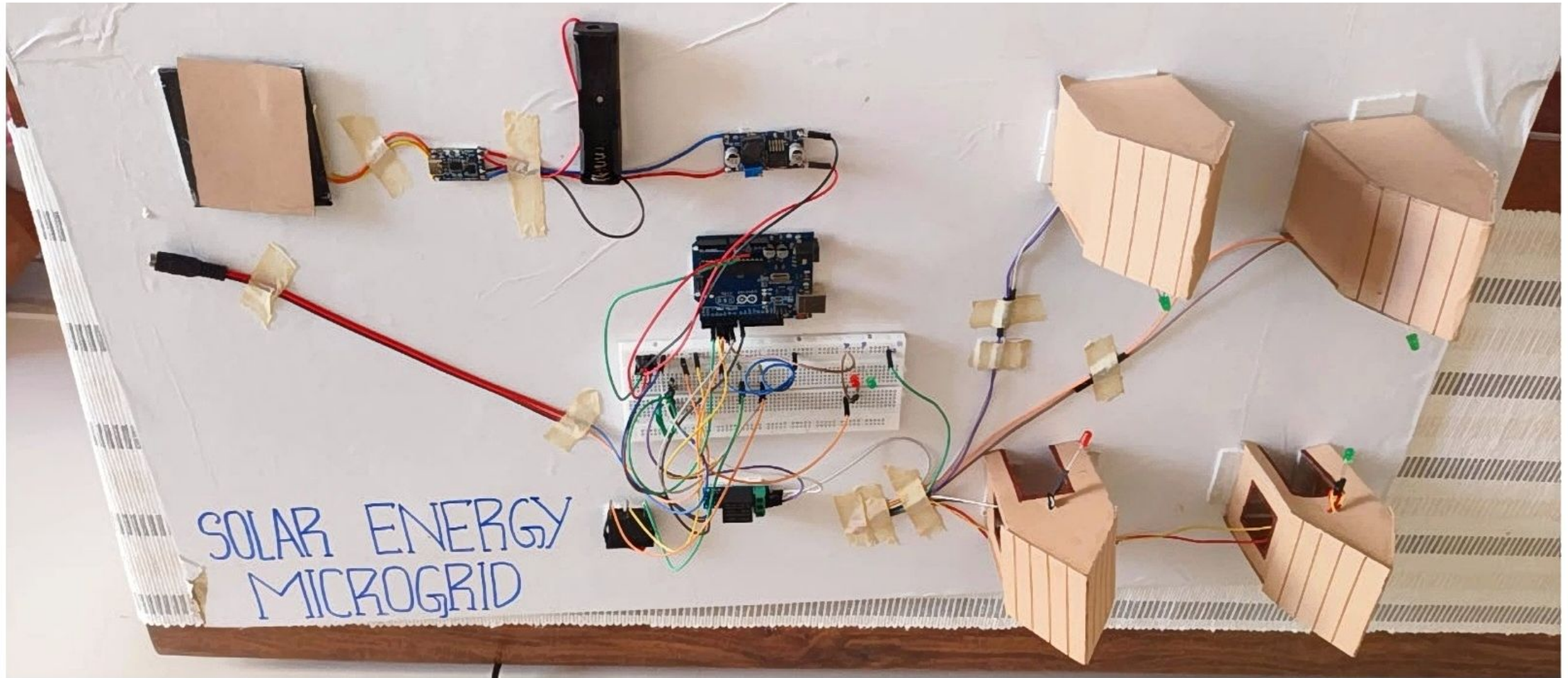
Our design costs low , can reuse old batteries/solar panels to reduce e-waste, easy for villagers to maintain without skilled technicians , provides reliable power for lighting , phone charging, and basic needs.

Circuit diagram





# SYSTEM DESIGN



# Transformative Impact & Global Goals



## Social & Environmental Impact

- Improved health outcomes
- Enhanced educational opportunities
- Reduced carbon emissions
- Economic empowerment

Our microgrid solution directly contributes to several United Nations Sustainable Development Goals (SDGs):



SDG 7: Affordable and Clean Energy



SDG 4: Quality Education



SDG 3: Good Health and Well-being



SDG 8: Decent Work and Economic Growth



# Scaling for a Brighter Future

01

## Future Roadmap

plan and survey and design accordingly test and improve it for small houses and then expand to the whole village and train locals and maintain it.

02

## Operational Model

solar panels generate energy ,batteries store the power .Trained locals takes care of cleaning the panels,checking the battery, and fixing small issues.

03

## Scalability

A renewable microgrid can start small supplying power to few houses and later be expanded by adding more solar panels, batteries. As the village grow, the system can grow too without needing a new grid connection. This makes it flexible and sustainable for future needs.



# Implementation requirements and support system



## Tools and support Required:

- **Solar panels:** main source of clean energy.
- **Arduino:** it monitors the current and voltage throughout the system.
- **Battery storage:** stores power for night /cloudy times.
- **Charge Controller:** protects batteries and controls charging.
- our design requires technical guidance , economic help , community participation , and basic maintenance training.
- Government subsidies and funding , awareness programs how to use energy efficiently.

Together, we can transform lives, one village at a time.



# Sustainability:

The microgrid uses clean energy sources like solar, which reduces pollution, and dependence on diesel generators. It provides long-term , reliable power with a low maintenance cost and support a greener environment. This ensures continuous energy availability for many years.





# A Sustainable Future, Together

By investing in renewable microgrids, we're not just providing electricity—we're igniting progress, empowering futures, and building a more equitable world.







# THANKYOU



## Empowering Communities, One Microgrid at a Time

"The greatest good you can do for another is not just to share your riches but to reveal to him his own."

- Benjamin Disraeli

Our vision is simple: to bring sustainable energy to every rural doorstep, unlocking potential and fostering self-reliance.