

PARS - Photovoltaics for Agricultural Automation and Robotics – Idea Background

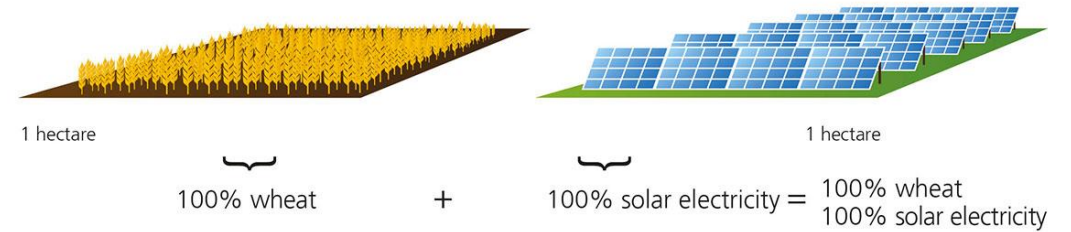
Technical Problems can occur related to:

- Need for dual land use due to land scarcity
- Demand for energy in rural areas
- Water scarcity
- Climate change
- Land degradation
- Addressing issues in energy transition (from fossil fuels to renewable)

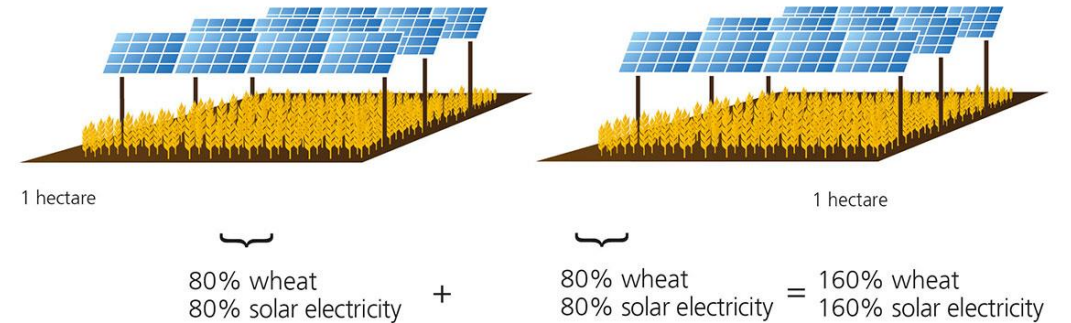
Societal problems are required to be taken care of for:

- Food security
- Rural development
- Economic viability
- Environmental impact
- Community resilience
- Crops health and well-being

Separate Land Use on 2 Hectare Cropland



Combined Land Use on 2 Hectare Cropland: Efficiency increases over 60%



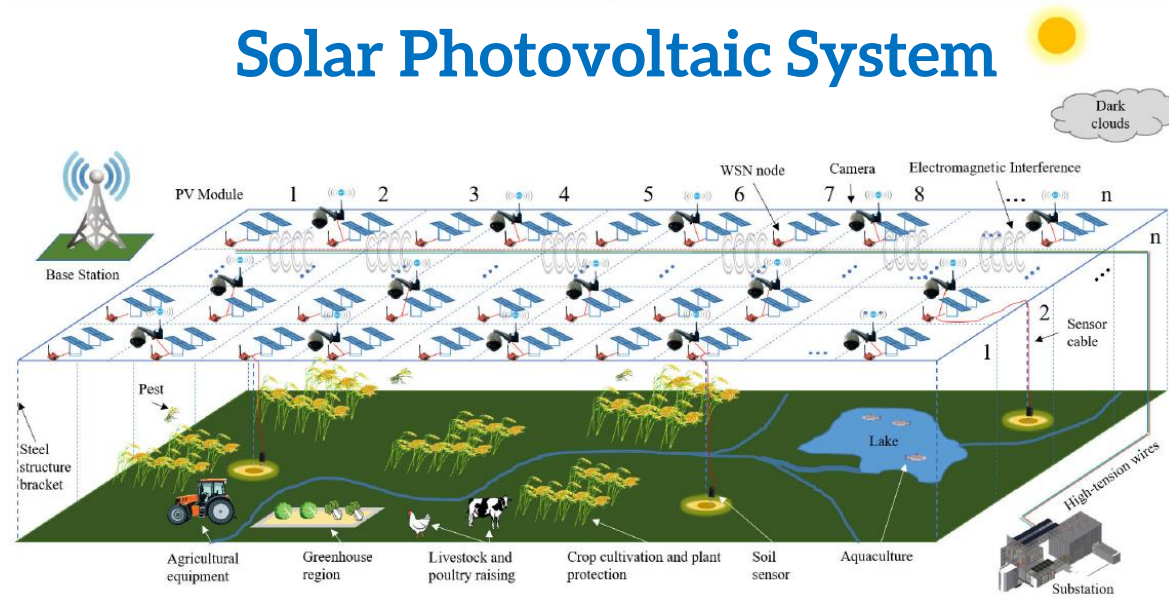
PARS - Photovoltaics for Agricultural Automation and Robotics – Solution Offering



Agrioltaics for penumbra plants

Dual Land Use - Enable farmers to utilize the same land for both electricity generation and agricultural production, optimizing land use and maximizing economic returns.

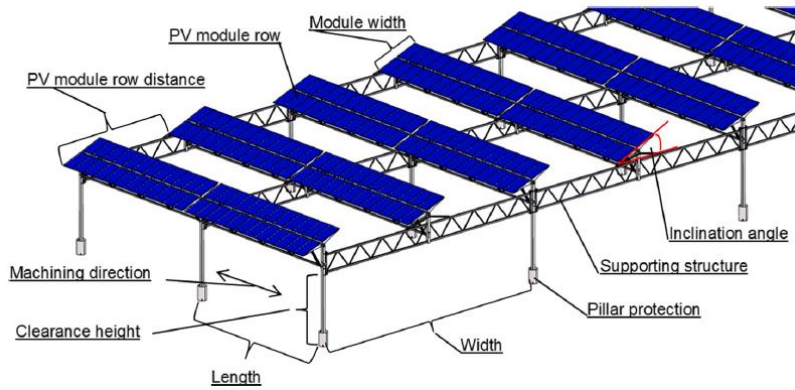
Combine Agricultural Production & Solar Photovoltaic System



Photovoltaic Agricultural Internet of Things (PAIoT)

Enhance agricultural efficiency, productivity, and sustainability by using real-time data and automation, transfer of renewable power to agricultural robots, equipment and computing devices used in farming.

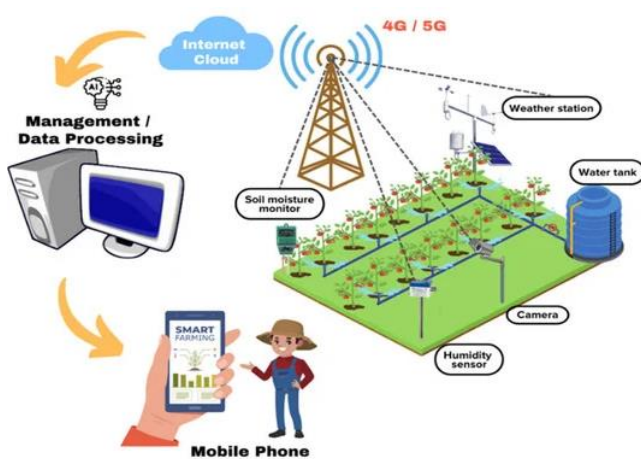
PARS - Photovoltaics for Agricultural Automation and Robotics – Expected Output



Agrivoltaics for penumbra plants

- **Effective dissemination of dual land-use systems (AVS)** - Propose framework to minimize the cost, time, and resources used on the construction of solar PV farms
- **Crop spectral library** - Construction of a crop spectral library for crop classification and growth status monitoring
- **Optimal Plant growth & crop yield** - Aspects of penumbra plants' development and health and crop performance as yield, which refers to the quantity of harvested produce per unit area
- **Optimal Photosynthesis & Transpiration** - Physiological activities related to carbon dioxide uptake (photosynthesis) and water loss (transpiration)

Photovoltaic Agricultural Internet of Things (PAIoT)



- Supply PV power to sensor nodes, actuators, robotics and unmanned aerial vehicles for farming
- Provide high resolution multimedia sensing
- Computing at edge
- Flexible sensor node deployment
- Solar powered on farm charging stations
- Design battery-powered electric vehicle charged by a solar PV array

PARS - P^hotovoltaics for **A**gricultural Automation and **R**obotic**S**

Missing Expertise

- Renewable Energy Engineering
- Agricultural Engineering
- Robotics and Automation
- IoT and Sensor Integration
- Data Science and Analytics
- Energy Storage
- Climate Control and Microclimate Management
- Remote Sensing and GIS
- Biotechnology and Crop Science
- Environmental Engineering

What is the impact?

- Energy Cost Savings
- Enhanced Agricultural Productivity
- Multiple Harvests and Extended Seasons
- Mitigation of Climate Risks
- Collaboration and Partnerships
- Resilience and Adaptation

What is the Innovation?

- Enhanced Crop Productivity
- Optimal Microclimate
- Reduced Water Usage
- Extended Growing Seasons
- Shade Management
- Mitigation of Climate Stress
- PAIoT - Photovoltaic Internet of Things

PARS - Photovoltaics for **A**gricultural Automation and **R**obotic**S – Contact**



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