

# POWER MANAGEMENT OF THE RECONFIGURABLE PHOTOVOLTAIC ENERGY SYSTEMS

**Ilija RADOVANOVIĆ**

School of Electrical Engineering - University of Belgrade, Innovation center of School of Electrical Engineering in Belgrade, Serbia

**Radivoje ĐURIĆ**

School of Electrical Engineering - University of Belgrade



# OUTLINE

- Introduction
- Power Management
- FOG concept
- Implementation
- Conclusion



# INTRODUCTION

- Solar PV has emerged as one of the most promising renewable sources considering its modularity, environmental impact, operational cost and availability
- The energy demand despite its rising is inconstant and depends of different factors
- Main challenges related to distributed generation, energy storage and demand side management still remain
- Implementation of power management of the off-grid photovoltaic system with time-aware processing requirements

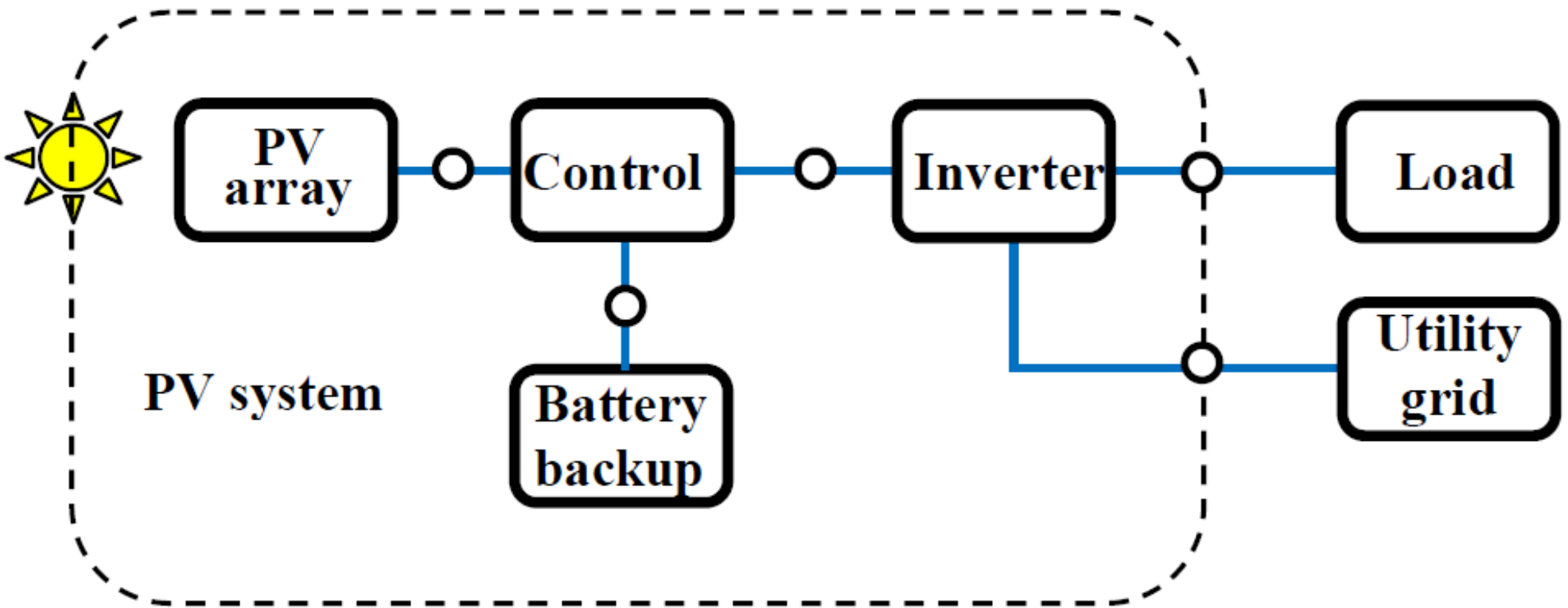


# POWER MANAGEMENT

- PV systems need to be managed continuously creating the state where the power demand on them always matches the power they can optimally produce at any time
- Dynamically reconfiguration of the PV array is crucial for the system efficiency
- Method of supplying the power, the active/sleep technique used in energy harvesting systems and Fractional voltage maximum power point tracking (FVMPPT) algorithm



# POWER MANAGEMENT

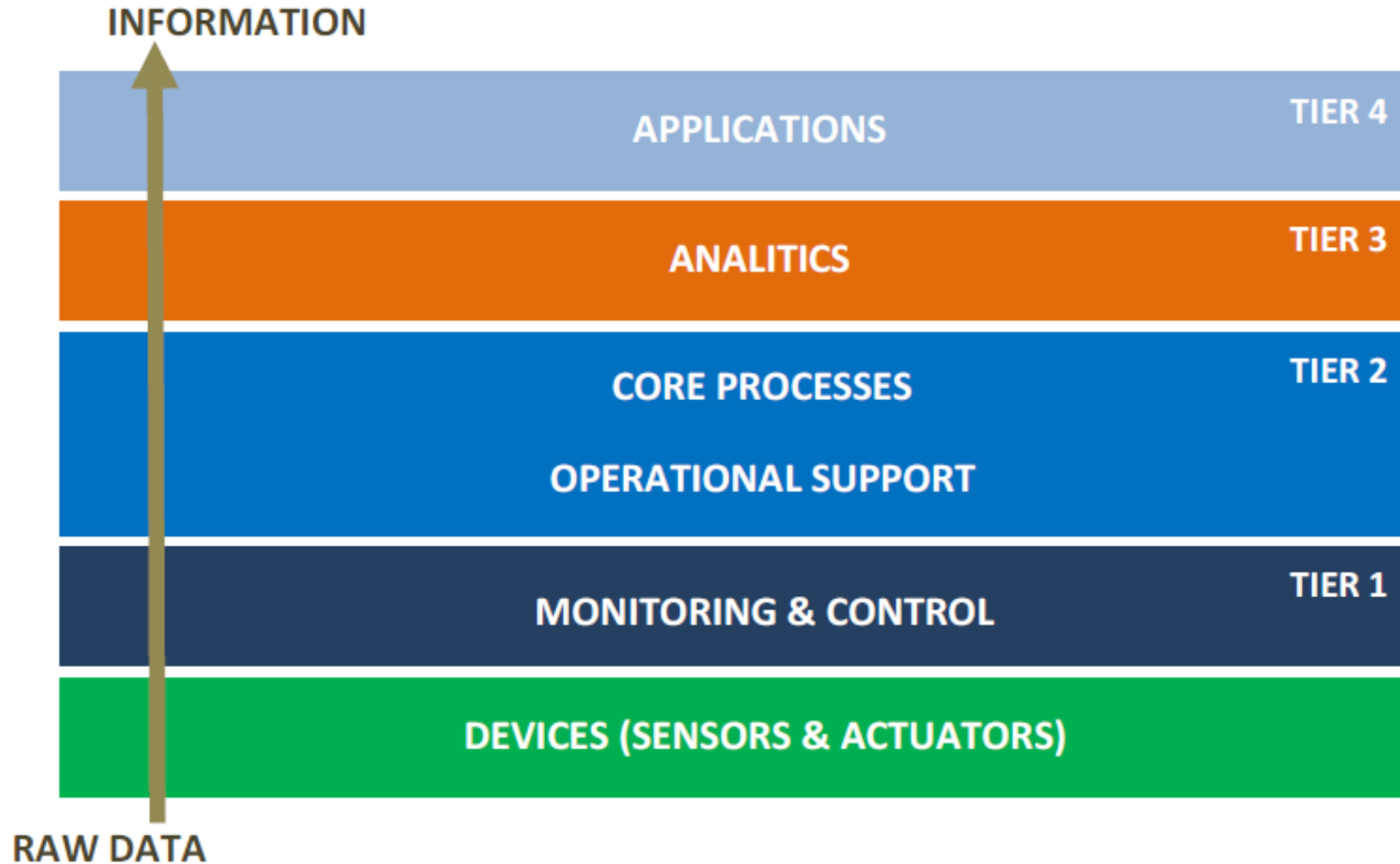


# FOG CONCEPT

- Physical deployment is organized according to tiered architecture
- Particular node functionalities vary based on its role and position in N-tiered fog architecture
- End-to-end device communication is performed through service agents using the configurable middleware components in the form of micro services
- Inter-node communication provides horizontal integration of the distributed application



# IMPLEMENTATION



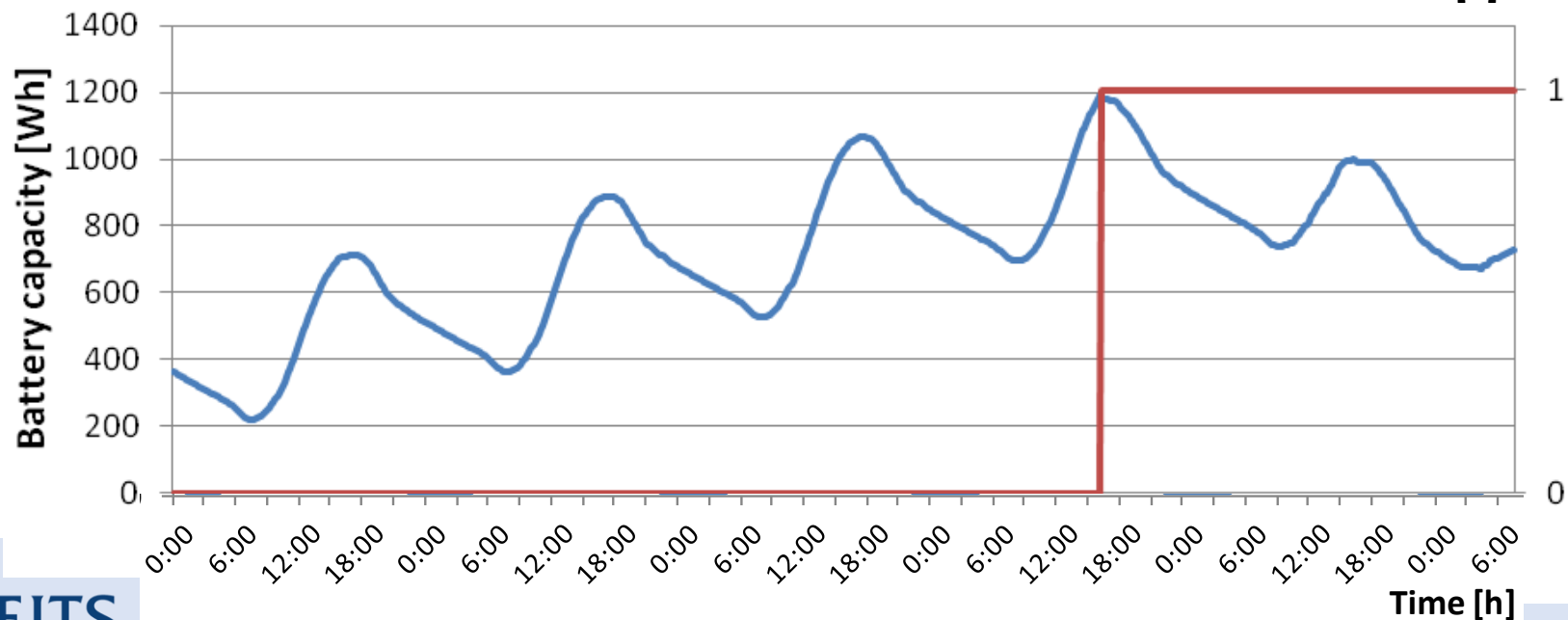
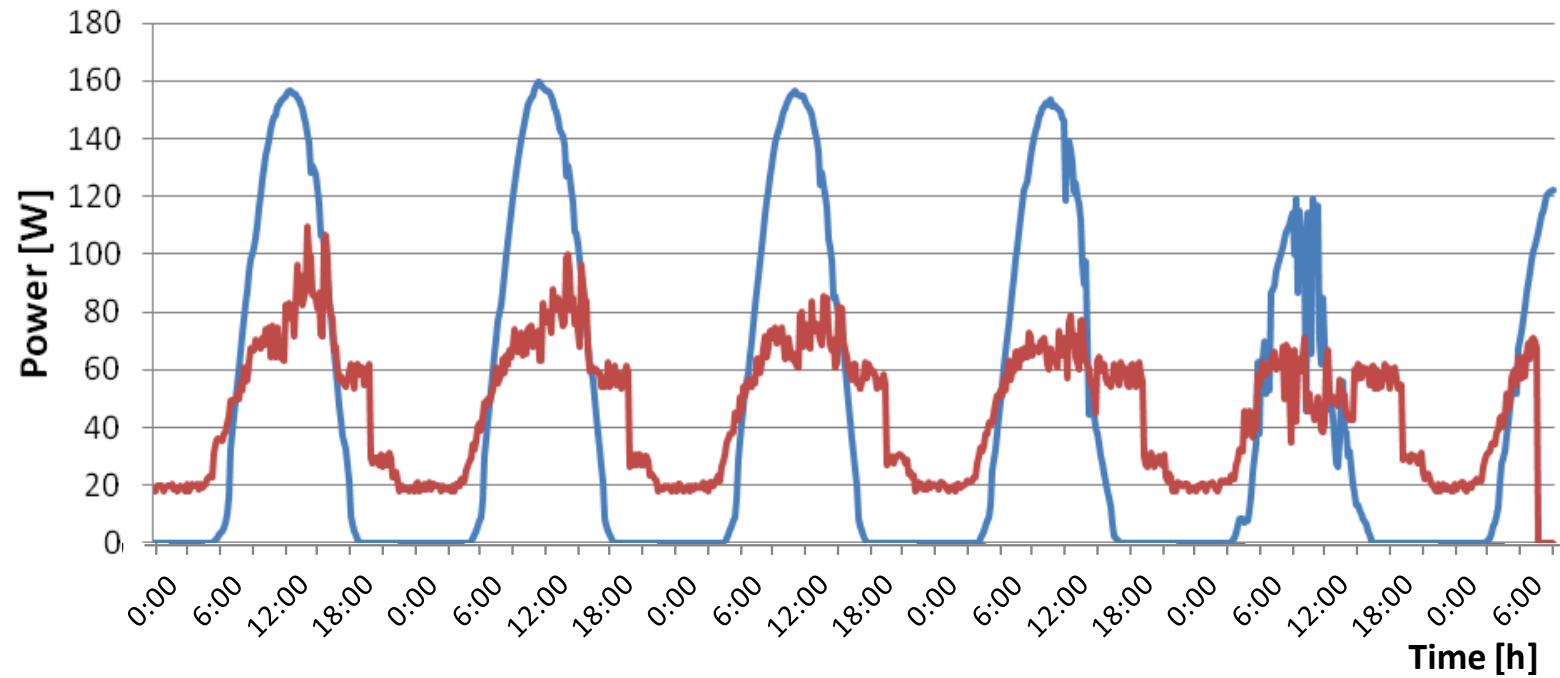
# RESULTS

- System with high solar PV generation and average inconstant load during the 5-day period in summer time
- It is necessary to keep the balance of the system and to protect the battery operation
- The sensors and actuators are placed at the points of interest through the system





# RESULTS



# CONCLUSION

- The reconfiguration of the PV array improves PV power management, contributes to the systems flexibility, maintenance and extension of the life span
- Brings the unnecessary balance in the system, either when it is needed to maximize power efficiency or when the system needs to operate in the low-generation
- Fog computing infrastructure enables the further integration of locally generated information and knowledge



**Thank you for  
your attention!!!**

