

Energy Harvesting, Storage and Management for Automated Environment Monitoring in the East African Region

Progress Report - August 2018



August Plans

- Submit objective 3 paper to MDPI sensors – final stages. Paper with advisors
- Submit in Draft Thesis – done!
 - 128 pages. 9 chapters.
 - Currently with advisors
- Submit **letter of Intention to Submit** – done
- Re-submitted LIC Self Discharge Paper to PLOS ONE – under protest!

Thesis Structure

- 1. Introduction
 - 1.1 Background and Justification
 - 1.2 Problem Statement
 - 1.3 Research Objectives
 - 1.4 Scope
 - 1.5 Thesis structure
- References

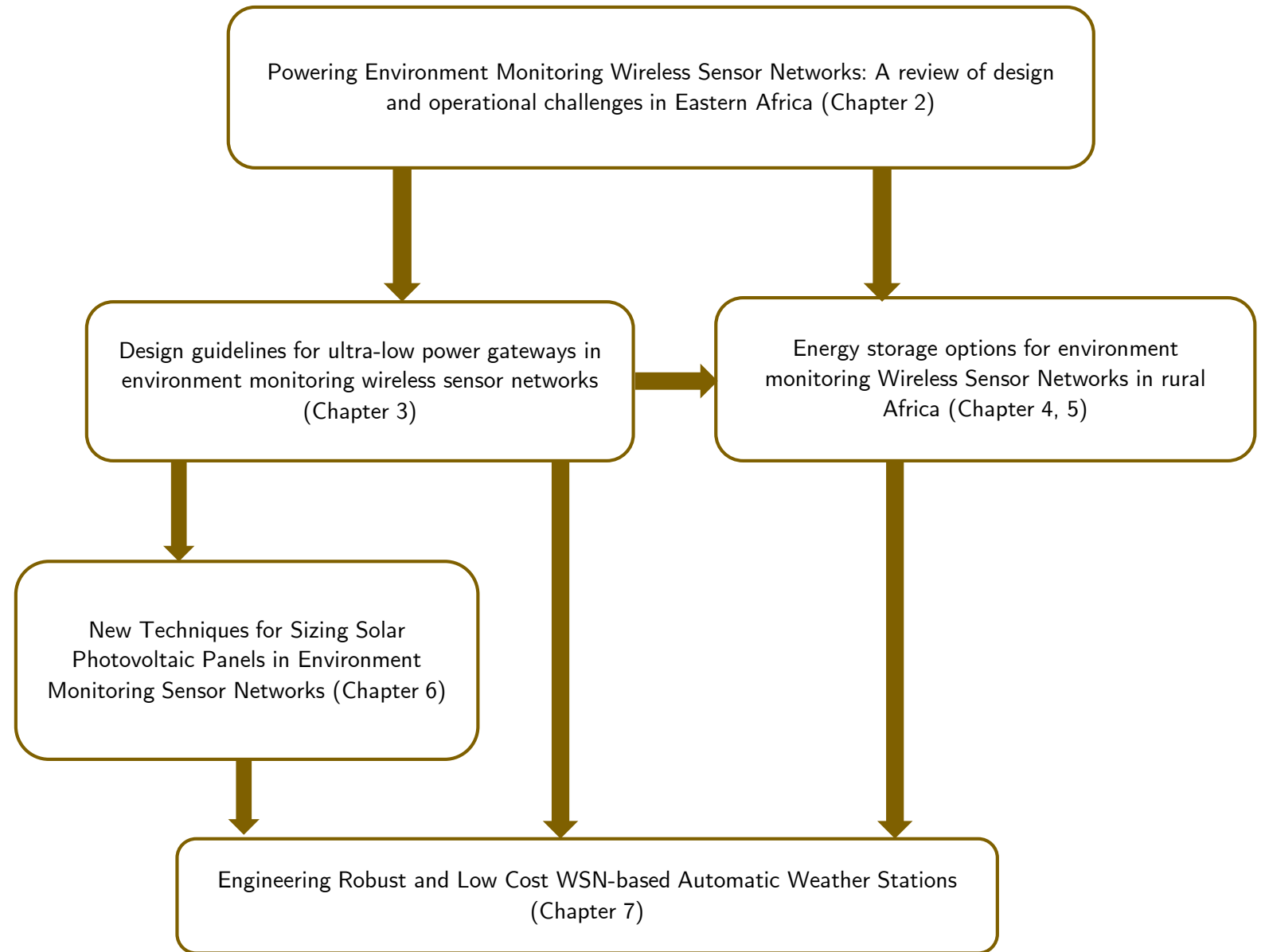


Figure 1.3: Relationship between thesis chapters 2, 3,4,5,6 and 7

Thesis Structure

- 8 General Discussion
- 8.1 Wireless Sensor Networks in Environment Monitoring
- 8.2 Key Issues in Powering Environment Monitoring WSNs
 - 8.2.1 Ultra-low power gateway design and implementation
 - 8.2.2 Parametric energy storage selection in WSNs
 - 8.2.3 Novel sizing strategies for solar energy harvesting units
 - 8.2.4 Local Engineering efforts towards a robust and low cost WSN-based AWS
- 8.3 Implications of the study in design and operation of Environment Monitoring WSNs
- References
- CHAPTER NINE
- 9. Study Conclusions and Recommendations
 - 9.1 General Conclusions
 - 9.2 Recommendations
 - 9.2.1 General Recommendations
 - 9.2.2 Recommendations for further research
 - 9.2.3 Recommendations for Policy

Research objectives

1. review the design and operational challenges of wireless sensor networks in the region
2. design a low-power gateway with core functionality for environment monitoring WSNs
3. propose optimal electrochemical energy storage technologies for different components and deployment scenarios of WSNs
4. investigate alternative techniques of sizing solar energy harvesting units for environment monitoring WSNs
5. to perform a comparative cost analysis of the proposed designs and techniques with conventional WSN deployments

September Plans

- Submit Paper on Objective 4 to MDPI
- Submit revised thesis?
- Deploy at least one station
- Test new gateway firmware
 - Reduced power even further from 15mA to 6mA