Energy storage options for environment monitoring Wireless Sensor Networks in rural Africa

ABSTRACT

▸ This paper explores various traditional and emerging battery technologies available for deployments of automated environment monitoring devices using Wireless Sensor Networks (WSNs) in Africa and the considerations designers must take into account when implementing these systems.

▸ Environment-monitoring applications of WSNs are focusing more on reducing power consumption and optimizing data transmission and less on the constraints that their applications and deployment environments put on the energy storage device. We describe the various properties of energy storage devices and,

▸ for each, we highlight the requirements to be met for environment monitoring applications, especially in remote areas in Africa.

▸ We evaluate the performance of some of these energy storage options against the requirements using three use cases. We indicate the technologies that have shown reliability for each use case

CONTD...

- Thetechnique corresponds to the simulation before test concept:a fault dictionary is generated by collecting the coefficients ofwavelet transformation for fault-free and faulty conditions as thepreprocessing of output signals.

- Classificator is based onk-nearestneighbors method (k-NN) and association rule mining algorithm.

- The fault diagnostic technique was trained and tested using dataobtained after simulation of fault-free and faulty behavior of theanalog filter.

- In result the accuracy in classifying faulty conditionsand fault coverage have consisted of more than 99,09% andmore than 99,08% correspondingly.

- The proposed technique iscompletely automated and can be extended.

EXISTING SYSTEM

▸ Nowadays, manufacturing of analog and mixed-signal in-tegrated circuits are developed very actively.

▸ Testing andfault diagnostics for such kind of integrated circuits (IC) areessentially more complex in comparison with digital IC dueto the following features:

▸ Continuous character of analogsignals processing;

▸ Nonlinearity and complex functionaldependence between the input and output signals;

▸ Influenceof component tolerance on the value of output signals;

▸ High sensitivity of output functions to the deviation of internalcomponent parameters and external environmental parameters;

▸ The lack of effective models for defects and faults for analog circuits, etc.

CONTD...

- Traditionally, diagnostics of analog circuits are implemented using which here on will be referred as Fault Dictionary (FD), each row of which contains the upper and lower boundaries of the range of possible values for controlled parameters in different test nodes for all considered states of the circuit,

- i.e.fault-free and faulty states containing different kinds of faults.

- Fault detection occurs during the output response measurement of the circuit-under-test (CUT) and sequential comparison value is obtained within the boundaries in FD rows.

- The condition of the CUT is diagnosed when the measured value lays in the boundary range of the corresponding row in FD.

PROPOSED SYSTEM

- The technique to construct the generalization fault dictionary based on artificial neural network taking into account the component tolerances and using the association rule mining as the preprocessing of a big volume of overlapped data which is proposed in the paper.

- Proposed technique reduces complexity of fault detection due to associative mode of operation as well as decreases the high size of the FD thanks to implementation of the FD as artificial neural network with fixed architecture for different number of considered faults.

- Algorithms which are used in this technique are parallel and ready to run on the clusters.

HARDWARE REQUIREMENTS

- Processor   -   Pentium –III
- Speed   -   1.1 Ghz
- RAM   -   256 MB(min)
- Hard Disk   -   20 GB
- Floppy Drive   -   1.44 MB
- Key Board   -   Standard Windows Keyboard
- Mouse   -   Two or Three Button Mouse
- Monitor   -   SVGA

SOFTWARE REQUIREMENTS

- Operating System : Windows 8
- Front End : Java /DOTNET
- Database : Mysql /HEIDISQL

MICANS INFOTECH

CONCLUSION

- This paper has given a literature and experience-based analysis of factors that must be considered when selecting batteries in Environment Monitoring wireless Sensor Networks,

- more so in rural African environments. We have shown that engineers   must always consider the electrochemical and physical properties of the energy storage options as well as the

- geographical and human constraints that deployment environments impose on their selection.

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