

Design and Development of Wireless Sensor Prototype



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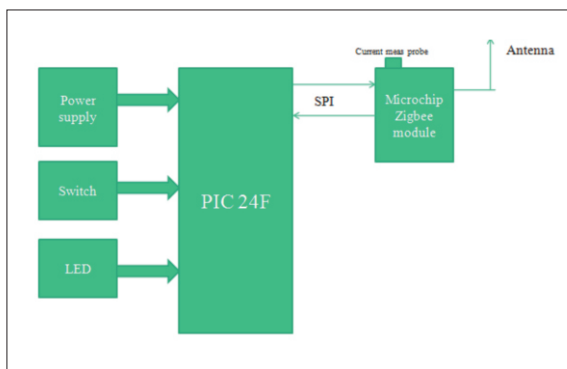
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Abstract:

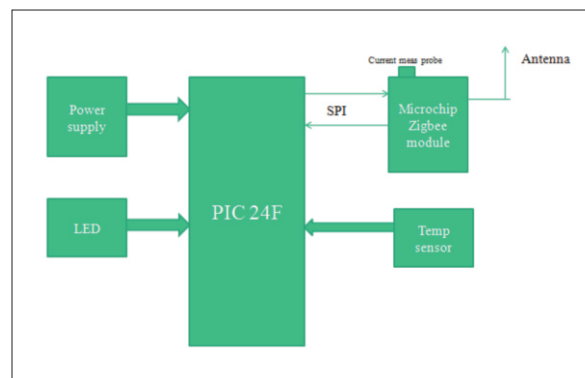
Wireless sensor networks combine sensing, computation and communication into a network of devices connected through advanced mesh networking protocols. The power of wireless sensor networks lies in the ability to be deployed in large numbers, assembled and configured. They are useful in a range of applications, from real-time monitoring of environmental conditions to monitoring of the health of structures or equipment. The challenging design requirements for a sensor node are low power consumption for its operation leading to very long battery life and low cost.

In this project, a wireless prototype sensor network node with an integrated temperature sensor and Zigbee stack is designed and developed. The node can operate as Fully Functional (FFD) or Reduced Functional Device (RFD). The available basic Zigbee stack is modified to incorporate the functionality to control the transmitter power in multiple steps. In addition, a tree routing protocol is added to the stack for routing data in the sensor network. An FFD acting as a sink can request the temperature from any of the RFDs. The request and reply are routed by executing the tree routing protocol rooted at the sink.

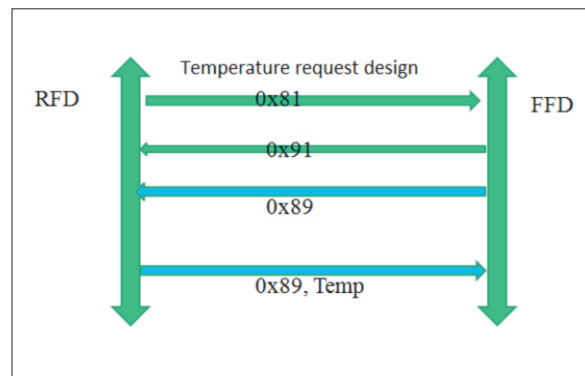
The designed sensor node with the enhanced Zigbee stack is ported on a wireless prototype board and the functionality successfully tested. The enhanced Zigbee stack can be ported on low end microcontrollers reducing the system cost and enhanced battery life. RFD residual battery energy message to report battery status to coordinator can be added to the stack for enabling energy-aware routing.



FFD block diagram



RFD block diagram



Stack design