A low cost reconfigurable wireless sensor Node for coastal monitoring using Programmable system on chip (PSOC)

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Abstract: **The hardware reconfiguration is an important property of PSoC that allows the programming of different configurations in the same design, which are in less time, and change them while the device is running. The aim of this review paper is to explore the programmable process is introducing new technology use with PSoC. The sensor node communication is growing very rapidly now days, the basic architecture of wireless sensor node for coastal monitoring is used here to system design. Among natural environments with particular scientific interest, there are the coastlines in front of cities whose industrial activities impact on these coastal areas management of biodiversity. Zig Bee is used as RF wireless communication media which covers wide range with minimum power dissipation. Thus, the monitoring of physical parameters has a central importance in the sustainable. For that, a low cost wireless sensor node is being developed in order to deploy nodes over the coastline for measuring physical parameters, providing a large coverage area of study.**

Keyword – **PSoC , Node, Zig Bee**

Figure 1.Sensor node architecture for coastal monitoring[1]

I INTRODUCTION

PSoC is the user friendly system, anyone can operate it very easily. Here system design is programmable, so we reconfigure pin connections or completely change the block function if necessary. This is a review paper is to explore the programmable process is introducing new technology use with PSoC. The monitoring of physical parameters in natural habitats is a typical application for assessing the risks of

worsening the ecosystem. For that, a low cost wireless sensor network is being developed in order to deploy nodes over the   coastline for measuring physical parameters, providing a large coverage area of study.
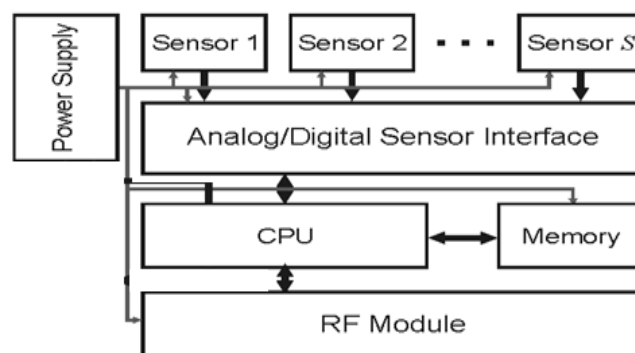
In this the node architecture based on reconfigurable mixed signals array called PSOC (Programmable System on Chip) from Cypress is presented [1].The use of these devices allow to easily interface with sensors and communication devices by using a single chip and, on the other hand, to reprogram the hardware while the system is running allowing to perform different functions or being Sensor networks have found widespread use in a variety of applications such as structure monitoring, environment monitoring, home automation monitoring, military operations etc. Commercially available sensor nodes are often used to design and deploy sensor networks [

II RELATED WORK

The method suggested by De Marziani, Alcoleas, Colombo, Costa, Pujana, Colombo, Aparicio, Alvarez, Jimenez, Urena , Hernandez, for the low cost reconfigurable sensor network for coastal monitoring. The hardware reconfiguration is an important property of PSoC that allows the

programming of different configurations in the same design, which are mutually exclusive in time, and then dynamically change them while the device is running [1]

The work presented by Rakhee Mohiddin, Manoj Kumar, Shashi Kumar Palakurty, Surabhi Bothra, Sai Phaneendra P, M.B. Srinivas Birla Institute of Technology and Science-Pilani, Hyderabad Campus, Hyderabad, India Narayana Pidugu, Karthikeyan Mahalingam Cypress Semiconductor Technology (India) Pvt. Ltd., Bangalore, India Patrick Kane Cypress Semiconductor Corporation, San Jose, California, USA on Building a Sensor Network with PSoC, the resulting designs are inexpensive and compact, but at a price: You have to select a processor that has the features you need. Depending on the microcontroller family, PSOC (1, 3 or 5) have 4–16 digital blocks and 3–12 analog programmable blocks [2]

The proceeding of "Sensor Networks: Evolution, Opportunities, and Challenges," by Chee-yee Chong, member, IEEE and Srikanta P. K Kumar, senior member, IEEE, this work presents the node hardware architecture for a wireless sensor node designed for monitoring physical parameters. This performs the conditioning of sensor signals and their processing Additionally, the interface with RF module is implemented in the same integrated circuit The sensor nodes send the data collected to a central system by means of low cost RF modules based on Zigbee standard [3]

Thus, an easily deployment of several nodes can be obtained which provides a wide coverage area of the coast under ZigBee is a typical RF wireless communication technology widely used in a wireless sensor node.

III SCOPE

PSoC system is the user friendly system, each one operated it very easily. Here system design of any application done in minimum time. On chip analog blocks are present which is programmable, so we reconfigure pin connections ,or completely change the block function if necessary.

Implementation of high power Zigbee based wireless sensor node for coastal monitoring system offer a low power consumption with high reliability. The use of high power wireless sensor node is suitable for activity in industries involving large area monitoring such as manufacturing, constructing, mining, shipping etc. The operation range test shows that a successfully data communication can be achieved at long a distance between the central unit and the remote node by using the Xbee Pro Modules[1]

III METHODOLOGY

The basic architecture of wireless sensor node for coastal monitoring is present, the system is designed based on the following features: all nodes are similar in their architecture and functionality, its architecture is modular and can be modified or improved in a simple and remote way; easily transportable; low-power consumption for minimal maintenance; and finally, every node capable of transmitting the data collected to a central system directly or working cooperatively with the rest ones[1].

This methodology consists of basic steps:

1. Determine the required functionality for the work
2. Determine what user modules are necessary to realize the required functionality.
3. Determine the analog and digital blocks resources that each user configuration uses.
4. Optimize miscellaneous settings – the interfacing of analog , digital device and ZigBee is the main requirement of this work.
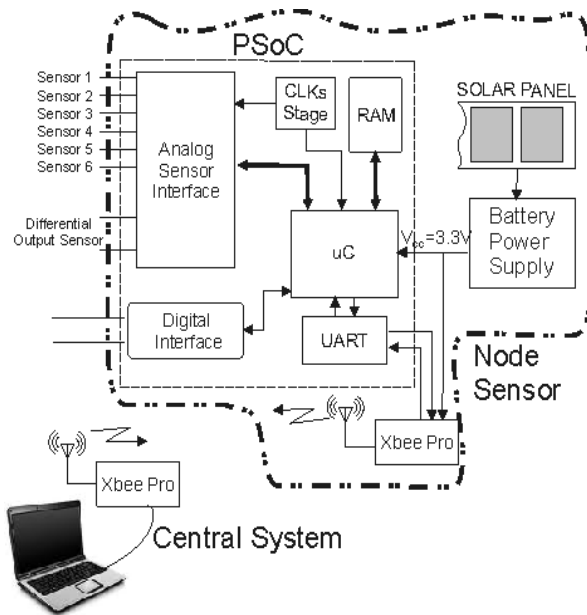
a. The analog sensor interface has been designed to measure single-ended sensor outputs

b. Digital sensor interface the PSoC circuit allows to implement an I2C bus to collect the data from different sensors and devices

c. ZigBee is a typical RF wireless communication technology widely used in WSN and based on the IEEE 802.15.4 standard.

The architecture of every node is depicted in Fig.1. It consists of a signal conditioning stage for typical sensors used in coastal monitoring where operations (Temperature, conductance, total dissolved salts) where operations of amplification, filtering and digitalization are performed and also hardware support for digital sensors or communications modules is implemented.

a) Sensor Node based on PSoC Devices -

According to the requirements of the wireless sensor node for coastal monitoring under development, the hardware node is based on a PSOC chip . This performs the conditioning of sensor signals and their processing. Additionally, the interface with RF module is implemented in the same integrated circuit. The sensor conditioning stage has been designed in order to obtain a flexible data acquisition stage to connect analog and digital sensors.[1]

b) Analog Sensor Interface-

The analog sensor interface has been designed to measure single-ended sensor outputs (e.g. sea surface temperature and sea temperature at different depths). In order to select the corresponding single sensor output, an 8-input analog multiplexer has been implemented in the PSOC, controlled by the 8 bit microcontroller core (M8C).

c) Radio Frequency Communication Modules-

Zig Bee is a typical RF wireless communication technology widely used in wireless sensor node and based on the IEEE 802.15.4 standard. These devices have excellent advantages in terms of flexibility, low-cost, low-power consumption, high data rate (up to 250kbps), high fault tolerance and a long range transmission, which make attractive their use in large scale wireless sensor networks for coastal monitoring [3]

IV CONCLUSIONS

The experiment will shows the use of reconfigurable analog-digital systems from PSoC can reduce cost and design time in data acquisition systems for monitoring physical variables. This device replaces the traditional components of a MCU based system by a low cost single-chip with programmable components. The use of this reconfigurable mixed array allows the dynamic reconfiguration of hardware while the system is running and gives the ability to change in a remote way. The operation range test shows that a successfully data communication can be achieved at long a distance between the central unit and the remote node by using the Xbee Pro Modules[1]. The developed architecture has a suitable flexibility and allows a large coverage area that can be easily adjusted by means of the rapid deployment of low cost nodes[1]

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