**PROJECT REPORT**

ON

“LOW POWER DATA ACQUISITION SYSTEM”

Submitted in partial fulfilment of the requirements for the award of degree of

**BACHELOR OF ENGINEERING**

IN

**ELECTRONICS AND COMMUNICATION ENGINEERING**



**VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM**

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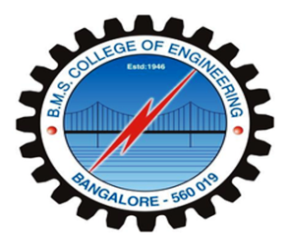
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**Low Power Data Acquisition System**

**Domain of work:**

Embedded System

**Specific area of interest:**

Creating a Low Power & efficient Data Acquisition system

Introduction:

Our planet is progressively marching towards a serious electric energy crisis, owing to an escalating desire of electric energy becoming greater than its supply. We have always failed to accept that the energy we make use of each day is restricted, yet taking it for granted. Coal, petroleum, electric power, even water has inadequate availability. Nevertheless, we have not taken sufficient precautions to handle a possible energy crisis. Another main concern has been the lifespan of guided media and its loopholes to intercept and eavesdrop.

Agricultural sector has maintained a dominant position on economy and as a natural supply for the country. Understanding the effects of heat and humidity, rain and erosion is the need of the day. Given the recent technological improvements the world has seen, failing to make use of it would be a sin on mankind. Here comes the need for a systematic hold on monitor of the data. As with the increase in technological innovations, so is the increase in required source power. An open minded effort would be to keep an eye on these available values from a remote location, interfacing a spot-on display, along with minimal power as possible.

**Statement of Problem:**

“No **‘Data Acquisition System’** at a remote area is perfect unless it works at a considerably low power & extended battery life at least for a duration of year and more.”

**Case study:**

Agriculture uses 85% of available fresh water resources worldwide and this percentage will continue to be dominant in water consumption because of population growth and increased food demand. There is an urgent need to create strategies based on science and technology for sustainable use of water, including technical, agronomic, managerial and institutional improvements. For every 18 months the demand for electric based requirements increases two-fold.

The proposed project has been our brain child on such a low power DAS. We have proudly maintained a check on power requirement the without degrading the quality of it. This low power data acquisition system can be used in farm fields for acquiring the values of temperature and humidity using sensors

**Proposed solution:**

As a sensible world resident, we begin by investigating alternative power solutions and advancement in technology, for example solar, wind electric energy and LDOs respectively. Utilizing these alternative energy solutions in as a whole is comparatively realistic and cheap to modern day units. Technical solutions, previously accomplished using Analog circuitry, have been converted into data acquisition systems that translate Analog input signals into digital information and process the binary data. DAS with a **‘Sleep mode’** feature is probable.

**Block Diagram:**

Solar Panel

Charger Unit

Display

Zigbee

GPRS

Battery

Regulator

Micro Controller

GPS

Sensors

**Coding Software/Tools**:

* Eagle layout editor 6.4.0
* HyperTerminal
* mbed Online Compiler/keil
* Mbed cortex-M0

**Execution steps:**

* The design consists of six sensors, controller, display, multiplexer, GPRS module, solar cell, regulator and a battery.
* To begin with, the sensors sense the environmental parameters from the remote agricultural field at regular intervals.
* The acquired data is stored in a fixed memory.
* Momentarily the data is displayed as well.
* A GPRS module is integrated, which aids in casting the processed data to the server unit.
* The remotely acquired data can be logged in worldwide by a specific user with his corresponding USER ID and PASSWORD.

**Implementations & Innovations:**

* DAS finds itself integrated with **‘Irrigation systems’** currently being deployed.
* DAS lends a hand in **‘Building Management’** by locating the home modules.
* Addition of a **‘GPS’** (Global Positioning System) unit helps in providing weather forecasts for the respective co-ordinates.
* Addition of a **‘Zigbee’** Connectivity helps in communicating with other similar modules.

**Researched Papers:**

* ‘[Automated Irrigation System Using a Wireless Sensor Network and GPRS Module](http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=6582678&queryText%3Dautomated+irrigation+system+using+a+wireless+sensor+network+and+gprs+module)’

By - [Gutierrez, J.](http://ieeexplore.ieee.org/search/searchresult.jsp?searchWithin=p_Authors:.QT.Gutierrez,%20J..QT.&newsearch=true), [Villa-Medina, J.F.](http://ieeexplore.ieee.org/search/searchresult.jsp?searchWithin=p_Authors:.QT.Villa-Medina,%20J.F..QT.&newsearch=true), [Nieto-Garibay, A.](http://ieeexplore.ieee.org/search/searchresult.jsp?searchWithin=p_Authors:.QT.Nieto-Garibay,%20A..QT.&newsearch=true), [Porta-Gandara M.A.](http://ieeexplore.ieee.org/search/searchresult.jsp?searchWithin=p_Authors:.QT.Porta-Gandara,%20M.A..QT.&newsearch=true)

* Knowledge on the design mainly consisting of wireless sensor network and wireless information unit that’s based on Zigbee technology and is realized using GPRS module and concentrated on low power consumption.
* Knowledge on achieving low power consumption using PIC.
* Knowledge on sensor network powered by solar panel with rechargeable battery that works for a longer time.
* Knowledge on UART interface with microcontroller that can accept the data with a speed of 115.2kbps from GPRS module.
* ‘Smart Orchid Soil Moisture Monitoring System Based on Wireless Communication Technology’

By- Ye Na & Liu Junfeng.

* Insight on the system cored with a Low-Power Microprocessor ‘MSP430f149 MCU’ which employs smaller radiations to the environment and human body.
* Insight on achieving a wide range of influence on soil moisture and intelligent control of data in a fixed memory.
* Insight on achieving a 24hr uninterrupted monitoring.
* Insight on serial non-volatile data memory chip for storage and display device, that is based on I2C bus, inturn using multifunctional memory chip of the ferroelectric technology which contains RTC.
* ‘The optimizing design and application of a new wireless Low-power universal data acquisition system’

By­- Yan-fei ai1, yu-jie hao1, jian-ping li1.

* Perspective on breakthrough of traditional network communication by employing multi interface design consisting of Zigbee terminal, Zigbee router, Zigbee coordinator.
* Perspective on similar interface device connectivity with TI's chip TUSB3410 & integrated CS8900 Ethernet chip to support Ethernet interface to realize Ethernet communications; realizing serial port connectivity with PC.
* Perspective on optimization of data communication by avoiding data conflicts using hexagon method.