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Intelligent System for Monitoring and Controlling of Grain Condition Based on Raspberry PI

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Abstract

An intelligent system for monitoring and controlling of the grain condition is designed. The system is based on embedded BCM2836 controller. The grain environment information such as temperature, humidity, Co2, and fire concentration is monitored by our controller. The levels of the grain condition are predicted based on the sensor network. The project focused on the hardware circuit design of the grain condition intelligent monitoring system. This project describes the design and testing of a group of sensors and communication systems based on GSM technology.

Key word: ***temperature sensor,humidity sensor,and Co2 sensor,Fire sensore***

Existing system

In this project we are using ARDUINO as heart of entire system, humidity sensor and Temperature sensor to detect the temperature and humidity at at farm. LDR is given to detect day and night mode. CO sensor to know the dangerous gas around. All these data will be displayed on LCD and the same values are being sent to the PC using Zigbee communication. But this can be implemented within shorter ranges only using Zigbee.

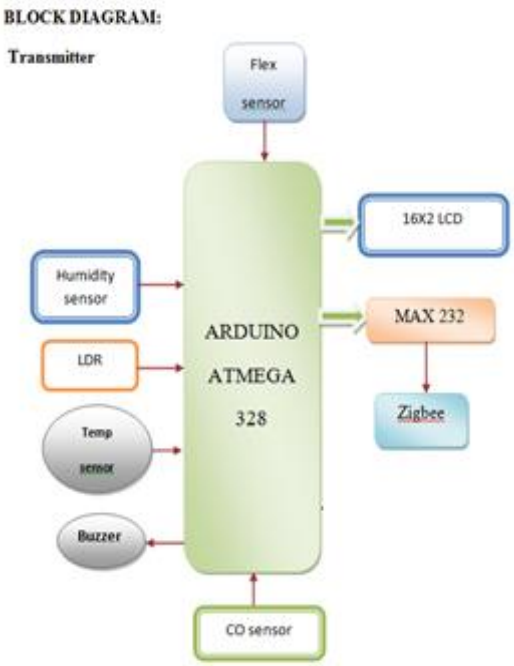

Fig.1.1Existing system of the block diagram

Drawback: Zigbee can be implemented within shorter distance.

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Proposed system

The sensor system allows data to be sent to a remote location using GSM modem connected to the controller. The sensor systems have successfully gathered data from a variety of sensors including temperature, humidity, CO2 and fire sensors. The input and output functions status will be displayed on LCD. Any abnormal condition sensed by any one of the sensor will be understood by our controller and then it will send an SMS immediately to authorized mobile number. So that the owner can take necessary measures immediately. The **Raspberry Pi** is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation . The Raspberry Pi has a Broadcom BCM2836 system on a chip. It does not include a built-in hard disk or solid-state drive, but Uses an SD card for booting and long-term storage.

BLOCK DIAGRAM AND DESCRIPTION

Block Diagram:

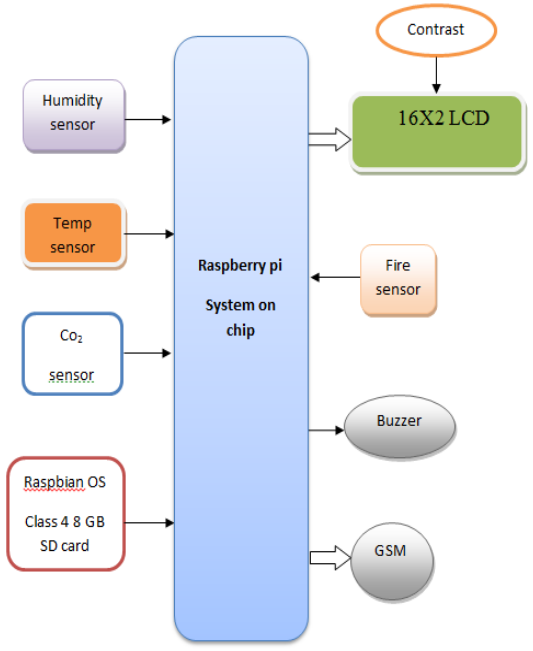

Fig.1.2.block diagram and description

RASPBERRY-PI

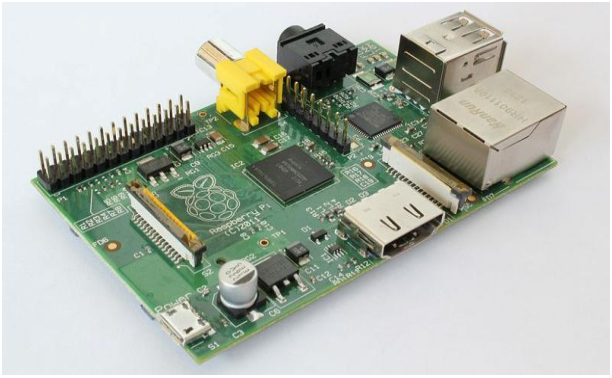

Fig.1.3.RASPBERRY-PI

The Raspberry Pi has a Broadcom BCM2836 system on a chip (SoC), which includes and a quad-core Cortex-A7 cluster. The Cortex-A7 MP Core processor is a high-performance, low-power processor that implements the ARMv7-A architecture. The Cortex-A7 MP Core processor has one to four processors in a single multiprocessor device with a L1 cache subsystem, an optional integrated GIC, and an optional L2 cache controller.

The Raspberry Pi foundation has finally released an upgraded version of the Raspberry Pi. Raspberry Pi 2 model B features much of the same ports and form factor as Raspberry Pi Model B+, by replaces Broadcom BCM2835 ARM11 processor @ 700 MHz with a much faster Broadcom BCM2836 quad core ARMv7 processor @ 900 MHz, and with an upgrade to 1GB RAM.

Basic Hardware of Raspberry-PI

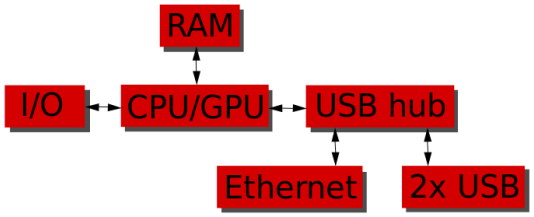

Fig1.4.Basic Hardware of Raspberry-PI

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OS used in Raspberry pi is Linux

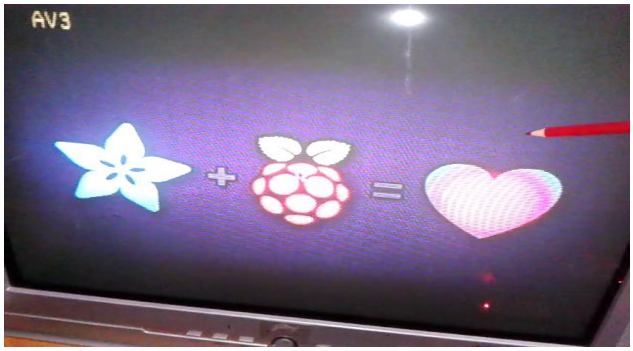

Fig1.5.OS used in Raspberry pi is Linux

Coding will be done in python language

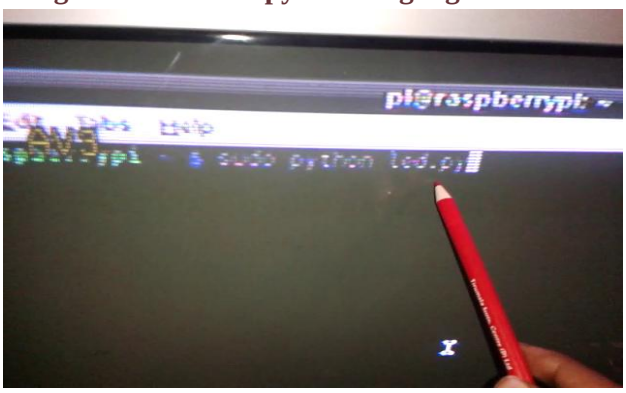

Fig1.6.Coding will be done in python language

Global System for Mobile Communication (GSM)

GSM, which stands for Global System for Mobile communications, reigns (important) as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.

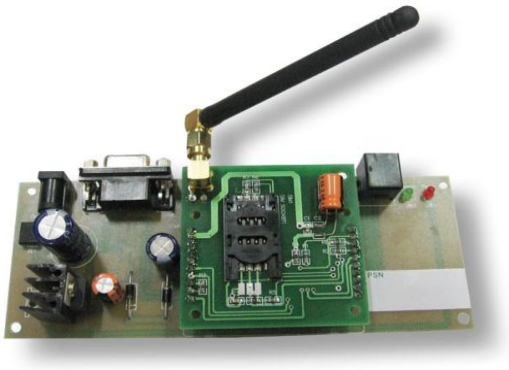

Fig1.7.Global System for Mobile Communication

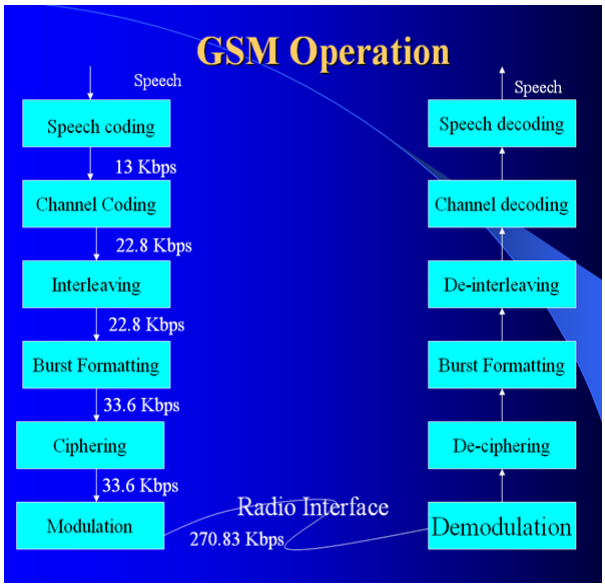

Fig1.8.GSM Operator

Sensors

MOISTURE SENSOR (Dry and Wet sensor)

Fig1.9.moisture sensor

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Soil moisture sensors measure the water content in soil. A soil moisture probe is made up of multiple soil moisture sensors. One common type of soil moisture sensors in commercial use is a Frequency domain sensor such as a capacitance sensor. Another sensor, the neutron moisture gauge, utilize the moderator properties of water for neutrons. Cheaper sensors -often for home use- are based on two electrodes measuring the resistance of the soil. Sometimes this simply consists of two bare (galvanized) wires, but there are also probes with wires embedded in gypsum.

Carbon dioxide sensor

Carbon dioxide sensor or **CO_2 sensor** is an instrument for the measurement of carbon dioxide gas. The most common principles for CO_2 sensors are infrared gas sensors (NDIR) and chemical gas sensors. Measuring carbon dioxide is important in monitoring indoor air quality, the function of the lungs in the form of a capnograph device, and many industrial processes.

FIRE Sensor

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. When used in applications such as industrial furnaces, their role is to provide confirmation that the furnace is properly lit; in these cases they take no direct action beyond notifying the operator or control system.

Fig1.10.FIRE Sensor

LM35

- Calibrated Directly in ° Celsius (Centigrade)
- Linear + 10 mV/°C Scale Factor • 0.5°C Ensured Accuracy (at +25°C) • Rated for Full −55°C to +150°C Range
- Suitable for Remote Applications
- Low Cost Due to Wafer-Level Trimming
- Operates from 4 to 30 V
- Less than 60-µA Current Drain
- Low Self-Heating, 0.08°C in Still Air

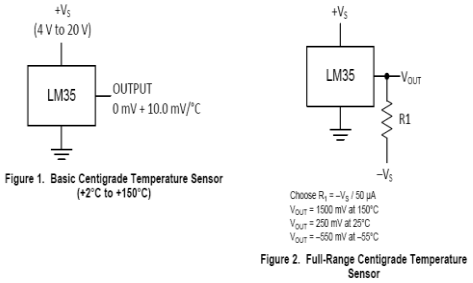

Fig.1.11.LM35

LCD

The data is transferred to present any collected structural data in understandable format. The input and output functions status will be displayed on LCD. There are two main connection options for the RPi display, HDMI (high definition) and Composite (low definition). HD TVs and most LCD Monitors can be connected using a full-size 'male' HDMI cable, and with an inexpensive adaptor if DVI is used. HDMI versions 1.3 and 1.4 are supported, and a version 1.4 cable is recommended. The RPi outputs audio and video via HMDI, but does not support HDMI input.

The raspberry pi primarily uses kernel-based operating system. Raspberry is an unofficial port debian wheezy arm with compilation settings adjusted to produce code that uses "hardware floating point", the "hard float" ABI and will run on the Raspberry Pi. The port is necessary because the official Debian Wheezy armhf ((**ARM hard**

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float) refers to an ARM architecture with the additional floating point hardware vector floating point.

SNOP SHORT

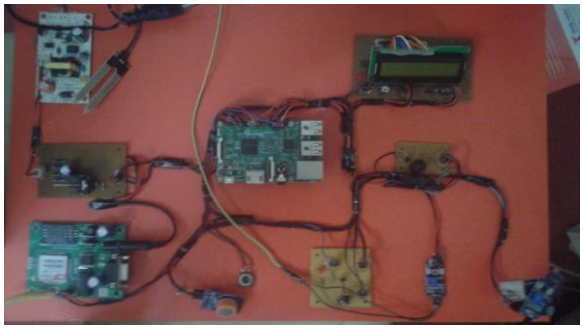

Fig1.12.snop short grain condition

WORKING PROCEDURE

Grain storage is a vital component in the economy and the society. The quality and safety of grain storage are related to the hundreds of millions of people. In the process of grain storage, temperature, humidity, fire and co2 are major ecological factors that can affect the grain quality. Therefore, the parameters of temperature, humidity, fire and co2 must be in accurate and real-time monitoring by supervisory systems in large granaries. The sensors collect the information from environment, the collected signals through the analogy to digital conversions. These conversions are sent to micro controller unit. This micro controller unit is connected to LCD to display the values of temperature, humidity, fire and co2 values and using GSM to achieve the system's remote control, it greatly improves the flexibility and scalability of the warehouse management which sends available data to grain depot manager (Database management) in time and filters invalid data on the spot.

Here in our project we are monitoring sensors like temperature, humidity, fire and co2. For indication purpose buzzer will be ON if, temperature/smoke sensor/ fire/humidity can be detected. The Wireless Sensor Networks appear as a technology, which provides the basis for a broad field of applications, drawing interest in various areas. On the one hand, they appear to allow the next step in computer networks, building large collections of simple objects, exchanging information with respect to their environment or their own state. On the other hand, their ability to sense and communicate without a fixed physical infrastructure makes them an attractive technology to be used for measurement

systems. Although the interest in. Wireless Sensor Network research is increasing, and new concepts and applications are being demonstrated, several Fundamental issues remain unsolved. While many of these issues do not require to be solved for proof-of-concept Designs, they are important issues to be addressed when referring to the long-term operation of these systems. One of these issues is the system's lifetime, which relates to the lifetime of the nodes, upon which the system is composed. This thesis focuses on node lifetime extension based on energy management.

While some constraints and results might hold true from a more general perspective, the main application target involves environmental measurement systems based on Wireless Sensor Networks. Lifetime extension possibilities, which are the result of application characteristics, by (i) reducing energy consumption and (ii) utilizing energy harvesting are to be presented. For energy consumption, we show how precise task scheduling due to node synchronization, combined with methods such as duty cycling and power domains, can optimize the overall energy use. With reference to the energy supply, the focus lies on solar-based solutions with special attention placed on their feasibility at locations with limited solar radiation. Further dimensioning of these systems is addressed. It will be shown, that for the presented application scenarios, near-perpetual node lifetime can be obtained. This is achieved

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by focusing on efficient resource usage and by means of a carefully designed energy supply.

ADVANTAGES

- Highly-flexible
- Fit & Forget System
- No need of human effort
- High security is provided

APPLICATIONS

- Agricultural fields
- Museums
- Home / Office security
- Jeweler shops
- Banks

CONCLUSION

In this project work, we have studied and implemented a complete working model using a Microcontroller. The programming and interfacing of microcontroller has been mastered during the implementation. This work includes the study of **GSM modem using sensors.**

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