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Real Time Monitoring & Controlling Grain Condition Using Raspberry Pi Processor

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ABSTRACT:

Grain storage is plays very important role in the economy and the overall development of the society. In that main thing is quality and safety of grain storage are sub related to the hundreds or millions of society people. Now in India form last decade grains storages problems occurs in rainy season. In the process of grain storage, temperature and humidity are two major factors that can produce direct effect on the grain quality. Therefore, this parameters should maintenance becomes very important issue in front of us. Temperature, humidity must be monitor by real-time system. Due to the seasonality of grain production, the storage of grain is on top priority task it relates to people life. Now, we are still using our old method of storing the crops and because of this grains are spoiling soon. Also, we are unable to maintain the quality of the stored grains. To overcome these problems, the automatic monitoring of the grain storage based on ARM11 which it helps us to improve the levels of grains storage and reduce the grain losses during storage procedure and reduce the labour intensity also. The sensors collect the information from environment, the collected signals through the analog to digital conversions. These conversions are sent to central processing server on computer. The central server displays the values of temperature, humidity and LDR values.

Index-terms:

Raspberry Pi processor, AT89S52 controller, display unit, sensors, motor.

II. INTRODUCTION:

The aim of the work described in this project is to design and implement the granary environmental monitoring system based on ARM11 which can be used in large granaries. This project is used for economical, low power consumption. Grain storage is an important role in the economy and the society.

Due to the seasonality of its production, the storage of grain is the top priority event which relates to people livelihood. In the process of grain storage temperature and humidity are two ecological factors that can produce an effect on the grain quality; the parameters of temperature, humidity must be in lacking errors and real-time monitoring by supervisory systems in large granaries. The automatic monitoring of the grain will help us to improve the operation levels grain storage, reduce the grain losses and reduce the labour intensity.

This project designs an automatic environment monitoring system and control system of the granary combining embedded. Transmission of environment parameters and ARM11 is used to achieve precise control of data controller 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 in time and filters invalid data on the spot. It can be saves a lot of manpower and material resources and improves labour productivity.

This project is to use the technology in a closed environment for forming or agriculture industry to maintain the quality and to increase the productivity. The objective is to use embedded technology in storage procedure to maintain the quality and to increase the productivity. The system is being implemented as technical solution to monitor the current condition and controlling. Sensors are used to collect the environmental information namely temperature, humidity and light intensity.

To overcome these problems, the automatic monitoring of the grain storage based on ARM11 is implemented which helps us to improve the operation levels of grains storage and reduce the grain losses during storage procedure and reduce the labour intensity.

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II. SYSTEM ARCHITECTURE:

2.1 BLOCK DIAGRAM:

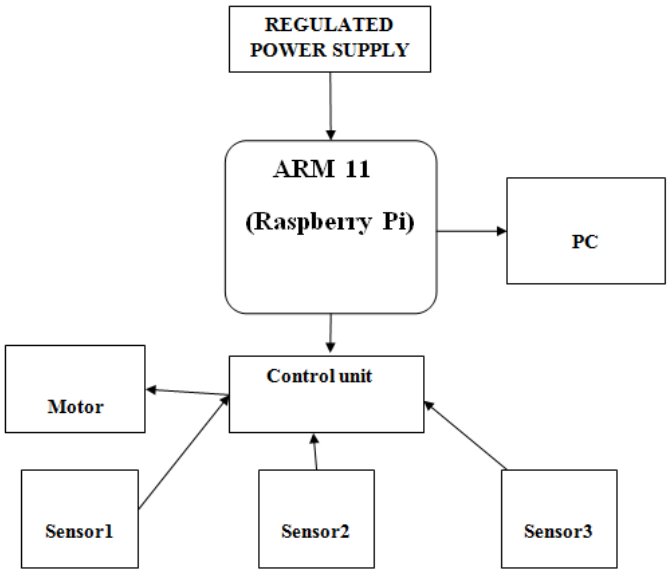

Figure-1: Block Diagram

2.2 EXISTING METHOD:

In the existing method the atmosphere conditions should be monitored continuously like temperature, gas and humidity levels for every certain span of time and according to those conditions we need to check the temperature and moisture levels inside the granary which should be done manually. According to the status that most of granaries can't effectively monitor the temperature, gas and humidity around food of fresh area.

2.3 PROPOSED METHOD:

The proposed method designs a hierarchical topology central monitoring system based on Raspberry Pi processor. In this system, the temperature, gas and humidity of surveyed area can be automatically monitored and controlled. To find the temperature, gas and humidity of the area we use temperature, gas and humidity or moisture sensors which give us the exact values and then it send to the monitor though processor display the values on touch screen then necessary modifications can be done automatically at the same.

III. RELATED WORK:

3.1 RASPBERRY PI PROCESSOR:

The Raspberry Pi board contains a processor and graphics chip, program memory (RAM) and various interfaces and connectors for external devices. Some of these devices are essential, others are optional. It operates in the same way as a standard PC, requiring a keyboard for command entry, a display unit and a power supply. The Raspberry Pi board is a miniature marvel, packing considerable computing power into a footprint no larger than accredit card. It's capable of some amazing things, but there are a few things you're going to need to know before you plunge head-first into the bramble patch.

3.2 AT89S52 CONTROLLER:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the indus-try-standard 80C51 instruction set and pin out.

The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory pro-grammer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes.

The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM con-tents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

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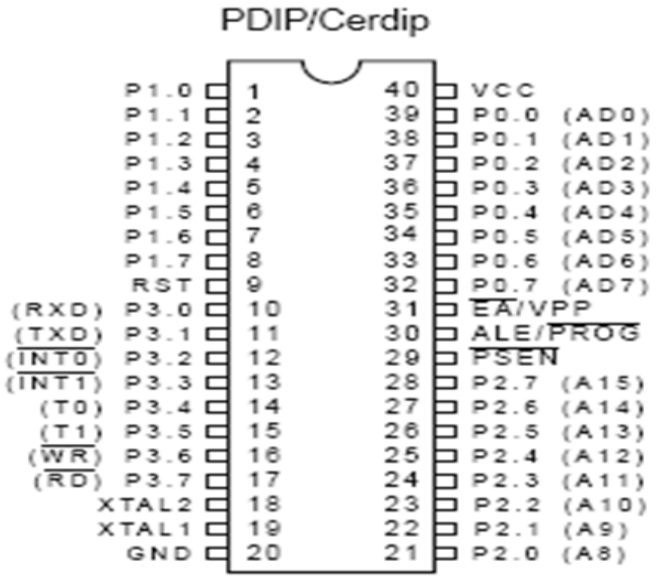

Figure-2: AT89S52 pin diagram

3.3 HUMIDITY SENSOR:

Humidity is a term for the amount of water vapor in the air, and can refer to any one of several measurements of humidity. Formally, humid air is not "moist air" but a mixture of water vapor and other constituents of air, and humidity is defined in terms of the water content of this mixture, called the Absolute humidity. In everyday usage, it commonly refers to relative humidity, expressed as a percent in weather forecasts and on household humidistats; it is so called because it measures the current absolute humidity relative to the maximum. Specific humidity is a ratio of the water vapor content of the mixture to the total air content (on a mass basis). The water vapor content of the mixture can be measured either as mass per volume or as a partial pressure, depending on the usage. In meteorology, humidity indicates the likelihood of precipitation, dew, or fog. High relative humidity reduces the effectiveness of sweating in cooling the body by reducing the rate of evaporation of moisture from the skin. This effect is calculated in a heat index table, used during summer weather.

3.4 SMOKE SENSOR:

MQ2 flammable gas and smoke sensor detects the concentrations of combustible gas in the air and outputs its reading as an analog voltage. The sensor can measure concentrations of flammable gas of 300 to 10,000 ppm. The sensor can operate at temperatures from -20 to 50°C and consumes less than 150 mA.

Connecting five volts across the heating (H) pins keeps the sensor hot enough to function correctly. Connecting five volts at either the A or B pins causes the sensor to emit an analog voltage on the other pins. A resistive load between the output pins and ground sets the sensitivity of the detector. Please note that the picture in the datasheet for the top configuration is wrong. Both configurations have the same pin out consistent with the bottom configuration. The resistive load should be calibrated for your particular application using the equations in the datasheet, but a good starting value for the resistor is 20kΩ.

Figure-3: Smoke Sensor

3.5 TEMPERATURE SENSOR (LM35):

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in oC). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also possess low self heating and does not cause more than 0.1 oC temperature rise in still air. The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in response to every oC rise/fall in ambient temperature, i.e., its scale factor is 0.01V/ oC.

Figure-4: Temperature Sensor

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IV.RESULTS:

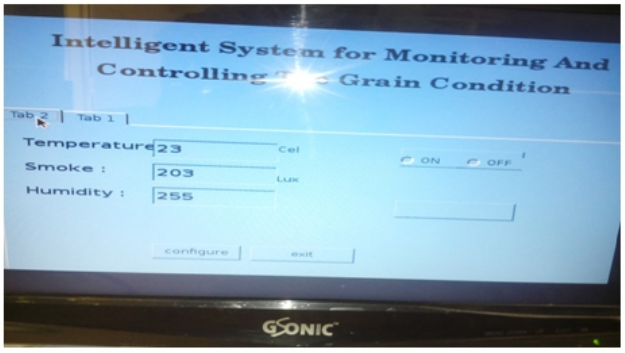

Figure-5: simulation output

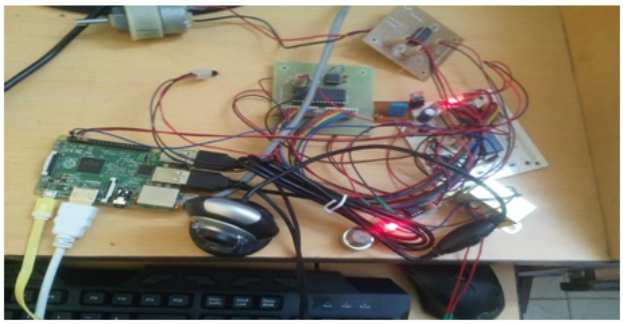

Figure-6: Hardware implementation

VI. FUTURE SCOPE :

This project will be the very useful for our Indian government to store the grains in shade, by using this concept we can take care of our grains that we are storing many years in warehouse. Also we can keep their quality as it is.

VI. CONCLUSION:

This project work aimed at designing the environment and controlling system with good performance, clear structure and good scalability. Our project is based on Raspberry Pi and sensor technology. In this microcontroller network is used to transferring data, it can guarantee the data collected transmitted to user, real-time at environmental timely and make right decisions. The system not only save the energy consumption but also reduce the labor intensity and material resources. Applying embedded technology to the rapid deployment system of the incident detection of emergency food storage without complicated connections. It enhances the system flexibility, small size, low cost and good effective.

This embedded monitoring system has predominant ability in flexibility and reliability that it can adapt to the complex environment in large granaries.

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