



AN ADAPTIVE INDUSTRIAL AUTOMATION APPLICATION DESIGN USING ASIC

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ABSTRACT:

In recent years, the world is mainly focusing on industrial development due to the massive growth in the number of industries in urban and sub-urban areas the productivity and people working in the industries are increased rapidly. At the other hand the security systems are not maintained exactly per the rules and regulations. Now a day the accidents in the industries are raising day by day but the industries are also not concentrating the safety precautions needed. In industries two factors are very hypothetical Temperature and Gas Monitoring. Always we can't guarantee a person will be monitoring all this values using PC's or some other aids. As well as microcontroller oriented security systems came but they are also not much efficient as a pure hardware IC. So, to avoid these kind problems we propose a new technique for future ASIC application using FPGA in this paper. Here we are mainly Employing GSM Communication, Temperature and Gas Sensors for Automation of the Industries.

Keywords:- *FPGA, ASIC, Industrial Automation, GSM, Temperature Sensor, Gas Monitoring.*

1. INTRODUCTION:

The objective of this paper is to research a value effective resolution which will offer dominant of commercial appliances remotely. The motivation was to facilitate the users to automatize their Industrials having universal access. The system is SMS based mostly and uses wireless technology. this technique provides ideal resolution to the issues sweet-faced by Industrial house owners in everyday life. GSM module may be a bridge to blame for enabling/ disabling of SMS capability.

The system is wireless thus a lot of acceptable and cost-efficient. The system is capable enough to relinquish feedback to user concerning the condition of the economic appliance in line with the user's wants and necessities. the economic appliances observance and system with a reasonable price was thought to be designed that ought to be mobile providing remote access to the appliances. the convenience of preparation is thanks to wireless mode of communication. GSM technology provides the profit that the system is accessible in remote areas in addition. A image of the controller is enforced, and also the experiment results show that the FPGA will simply and flexibly management the economic appliances

A process unit that was FPGA and a communication module that used GSM module or telephone. the benefit of readying is as a result of wireless mode of communication. GSM technology provides

the profit that the system is accessible in remote areas in addition.

The low price remote watching system may be enforced mistreatment programmable logic devices(PLDs). PLDs permit quick development of prototypes and therefore the style of advanced hardware system mistreatment FPGA. The system contains low price elements simply obtainable that cuts down the system price.

The technology and processes related to producing have undergone a serious amendment throughout the

last few decades: for having the ability to contend in today's economy, the time-to-market needs to be reduced whereas at an equivalent time, production with top quality standards is needed. whereas these aspects are true for product in nearly any domain, the notable ones are automotive and aerospace, having a high rate of production involving operations like cutting, shaping, molding, welding, polishing and assembly operations and in the large processing industries such as chemical industries, where time- or process critical and hazardous operations are involved. Thus, the demand for high-production rate coupled with strict-quality norms can be achieved with less and less direct human interaction and an increasing degree of automation.

The basic elements involved are sensing, processing, monitoring and inferring for controlling the state of the system being observed, the sensors to sense the change in the system, a medium to

convey the measured parameters and finally making available the acquired information to control in real time. Automation when implemented provides for early detection of failures and correction, thus minimizes the down-time and losses while increasing productivity and profitability. This eventually also leads to reduction in wear and tear of the production system, thereby increasing its life time.

One common problem of today's settings is the static setup. The integration of further sensors to enhance the monitoring quality is very tedious and labor-intensive.

Several reasons might exist why one would like to add sensors:

- (i) to enhance the quality of production and data acquisition,
- (ii) to temporarily satisfy specific higher monitoring requirements of

To simplify the integration of new sensors, this paper suggests the following two approaches: using wireless communication technology to reduce the required effort for physical integration and a model-driven development process to reduce the required effort for implementation.

I. Proposed FPGA Based Architecture

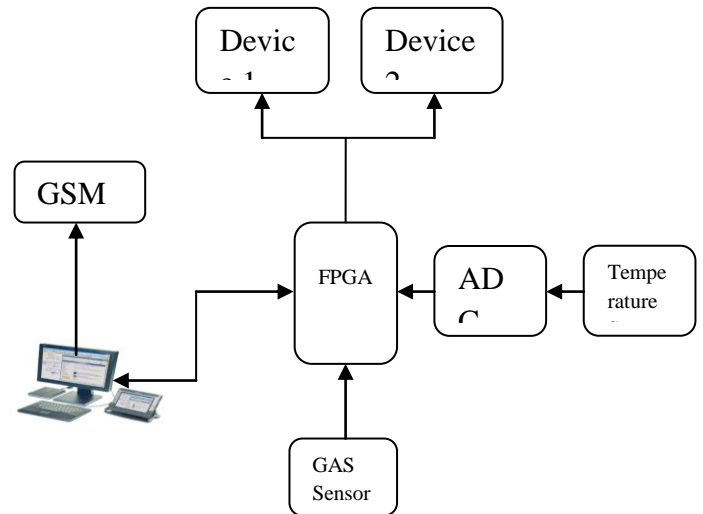


Figure 1: Block Diagram of our Proposed Design

In the block diagram we are using the temperature sensor LM35 and for the conversion of analog values into digital values we are using ADC0809 after that we are using the Gas Sensor version as MQ-2 for the monitoring of the suspicious gases. The values of gas and temperature are going to be continuously monitored by the FPGA. The FPGA is connected to the PC for monitoring purpose and two devices are connected to the FPGA for the purpose of controlling. The device we can change it to a Exhaust fan or a Motor pump or any device according to our needs. The implementation of this paper is done using SPARTAN 3AN FPGA XC3S50AN IC. The details of all the modules are listed one by one below.

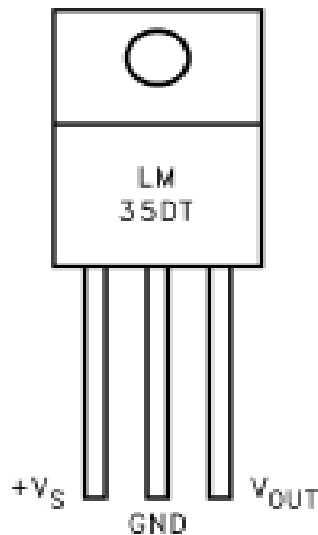
A. *Temperature sensor*

Figure 2: Temperature sensor LM35

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of $\pm 1/4^\circ\text{C}$ at room temperature and $\pm 3/4^\circ\text{C}$ over a full -55 to $+150^\circ\text{C}$ temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only $60\ \mu\text{A}$ from its supply, it has very low

self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to $+150^\circ\text{C}$ temperature range, while the LM35C is rated for a -40° to $+110^\circ\text{C}$ range (-10° with improved accuracy). The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package.

E)GSM communication

A GSM electronic equipment could be a wireless electronic equipment that works with a GSM wireless network. A wireless electronic equipment behaves sort of a dial-up electronic equipment. the most distinction between them is that a dial-up electronic equipment sends and receives information through a hard and fast phone line whereas a wireless electronic equipment sends and receives information through radio waves.

A GSM electronic equipment is AN external device or a computer Card / PCMCIA Card. Typically, AN external GSM electronic equipment is connected to a pc through a serial cable or a USB cable. A GSM electronic equipment within the variety of a computer Card / PCMCIA Card is intended to be used with a laptop personal computer. It ought to be inserted into one among the computer Card / PCMCIA Card slots of a laptop personal computer. sort of a GSM transportable, a GSM electronic equipment needs a SIM card from a wireless carrier so as to work.

As mentioned in earlier sections of this SMS tutorial, computers use AT commands to manage modems. each GSM modems and dial-up modems support a standard set of ordinary AT commands. you'll be able to use a GSM electronic equipment rather like a dial-up electronic equipment.

additionally to the quality AT commands, GSM modems support AN extended set of AT commands. These extended AT commands are outlined within the GSM standards. With the extended AT commands, you'll be able to do things like:

- Reading, writing and deleting SMS messages.
- Sending SMS messages.
- Monitoring the signal strength.
- Monitoring the charging status and charge level of the battery.
- Reading, writing and searching phone book entries.

The number of SMS messages that can be processed by a GSM modem per minute is very low -- only about six to ten SMS messages per minute

F) GAS Sensor

A gas sensing element could be a device that detects the presence of varied gases inside a section, typically as a part of a security system. therefore {this kind} of kit is employed to notice a gas leak and interface with a bearing system so a method may be mechanically clean up. A gas detector may also sound associate alarm to operators within the space wherever the leak is happening, giving them the chance to go away the realm. this sort of device is very important as a result of there are several gases which will be harmful to organic life, like humans or animals.

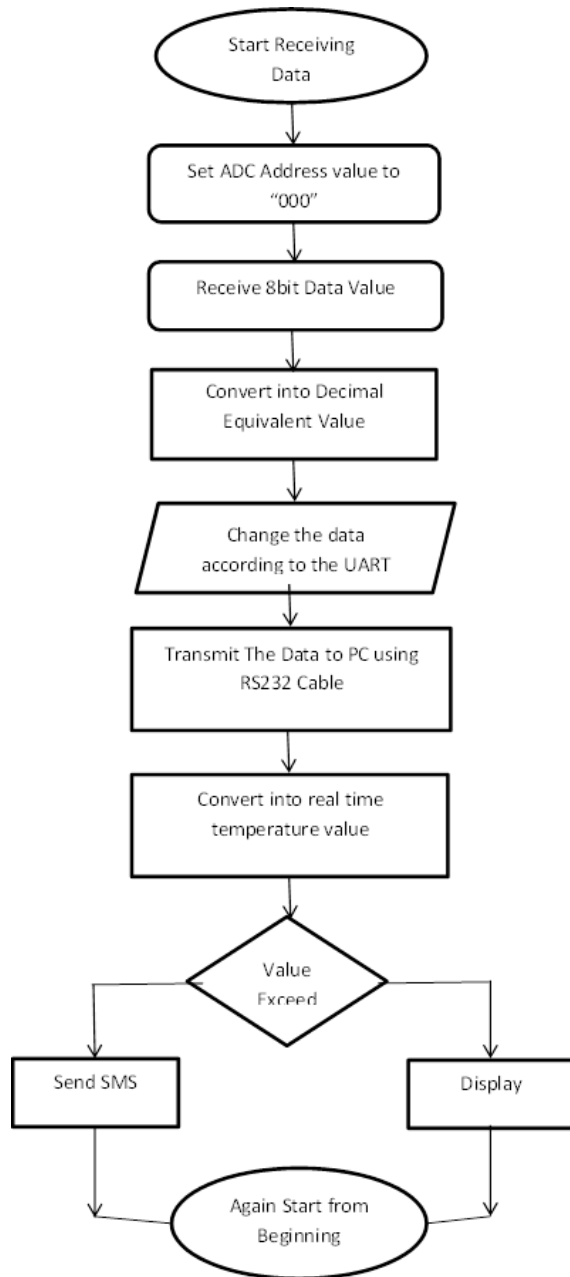
Gas noticeors may be wont to detect flammable, ignitable and harmful gases, and oxygen depletion. this sort of device is employed wide in business and might be found in a very sort of locations like on oil

rigs, to watch manufacture processes and rising technologies like electrical phenomenon. they'll even be utilized in firefighting.

The MQ6 could be a simple-to-use liquefied crude gas (LPG) sensing element. It may be utilized in gas run detection instrumentation in client and business applications, this sensing element is appropriate for detection LPG, iso-butane, propane, LNG. Avoid the noise of alcohol, change of state fumes and roll of tobacco smoke. The sensitivity may be adjusted by the potentiometer.

They are utilized in gas run detection equipments in family and business, are appropriate for detection of LPG, iso-butane, propane, LNG, avoid the noise of alcohol and change of state fumes and roll of tobacco smoke. **Schematic of GAS Sensor**

One smoke detector is not enough! There should be smoke detectors on every level of your Industry and near sensitive areas. This means the basement and the attic, too, if it is used as a living space. If you work with the industry door closed, be sure to install a detector inside your industry, too, as smoke and poisonous gases are blocked by a closed door. A smoke detector needs to be installed in a smoker's industry, whether the occupant works with the door open or not.

G) Flow chart**CONCLUSION**

In this time, model biotelemetry system is being implemented into working solution. Nevertheless, there is Space for improvements in both concept and implementation details of this system. Model biotelemetry system is currently designed for indoor use by one patient only. More nearby instances of inner part of model bio telemetric system managed by single outer part of system are possible, but there exists one to one mapping between patient and ZigBee network. Future improvements may include support for outdoor operation with communication implemented using 3G mobile technology and patient's tracking by GPS system. With advancements in low-power high-density FPGA solutions, FPGA programmable system on chip technology seems to be promising for purpose of this bio telemetric system

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