

Environment Monitoring and Device Control Using Embedded Wireless Sensor Network (WSN)



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Abstract:

For the most part many plants require water dependably. From the earliest starting point of the seed additionally a few plants needs water so we need to keep up the water constantly for such kind of plants. And furthermore we will evaluate the temperature and stickiness in the field. On the off chance that any unusual conditions happen in field then consequently the controller will send a SMS to the proprietor through GSM and in the meantime it will send that information to ranchers additionally through ZIG - BEE. The straightforward execution here makes this framework to alarm the ranchers. The strategy of this task is to embed a dirt dampness sensor at the underlying foundations of the wet plants. Our undertaking won't have any effect while water is up to the check. At whatever point water isn't adequate it naturally gives a signal sound. Agriculturist needs to turn on the engine through remote innovation as ZIG - BEE. Projects are created utilizing Embedded C, gathered utilizing KEIL apparatus. LPC2000 Flash utility programming is utilized to dump the code into microcontroller.

This proposed explore work would be actualized utilizing inserted framework outline procedure, which incorporates installed equipment and firmware plan modules. This venture would be done with Low cost 32

bit LPC2148 Micro controller, PCB Design Software Tools and industry driven Embedded EDA Tool unit and Embedded 'C' Programming Language.

Keywords: *LPC2148 (ARM7), ZIGBEE Module, GSM module, GAS Detector, LDR Sensor, water level sensor, Buzzer, light, Fan, Motor, KEIL4 IDE tool.*

1. INTRODUCTION

Our work concentrates on the advancement of a model to be utilized as a part of a remote sensor arrange (WSN) which additionally coordinates DALI convention. Since DALI is a settled standard and it has been embraced by major electronic stabilizer's providers it is anything but difficult to discover DALI consistent gadgets.

Notwithstanding it is intended for lighting control, DALI has likewise been adjusted to different applications, for example, engine or fan controllers, closeness alerts, etc. adapting the standard to a WSN permits incorporating DALI gadgets as a piece of the WSN, growing the customary DALI transport and expelling wires , which brings about a diminishment of establishment costs [1], [5].

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LPC2148 microcontroller load up in light of a 16-bit/32-bit ARM7TDMI-S CPU with constant copying and implanted follow bolster, that join microcontrollers with installed rapid blaze memory running from 32 KB to 512 KB. A 128-piece wide memory interface and one of a kind quickening agent design empower 32-bit code execution at the most extreme clock rate. For basic code estimate applications, the option 16-bit Thumb mode lessens code by over 30% with insignificant execution punishment. The importance of LPC is Low Power Low Cost microcontroller. This is 32 bit microcontroller produced by Philips semiconductors (NXP). Because of their little size and low power utilization, LPC2148 is perfect for applications where scaling down is a key prerequisite, for example, get to control and purpose of-offer [4].

3.2. ZIGBEE Technology

ZigBee modules feature a UART interface, which allows any microcontroller or microprocessor to immediately use the services of the Zigbee protocol. All a Zigbee hardware designer has to do in this is ensure that the host’s serial port logic levels are compatible with the XBee’s 2.8- to 3.4-V logic levels. The logic level conversion can be performed using either a standard MAX-232 is directly connected to the XBee UART. Tarang modules are designed with low to medium transmit power and for high reliability wireless networks. The modules require minimal power and provide reliable delivery of data between devices. The interfaces provided with the module help to directly fit into many industrial applications [6].

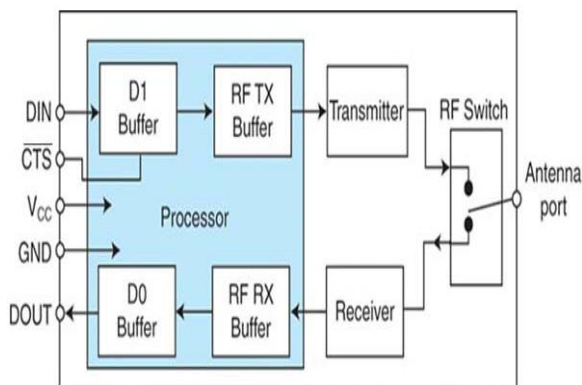


Fig 3. ZIGBEE data flow Block Diagram

3.3 MCU (AT89S52):

The AT89S52 is a low-control, elite CMOS 8-bit microcontroller with 8K bytes of in-framework programmable Flash memory. The Atmel AT89S52 is an intense microcontroller gives favorable circumstances like high adaptability and financially savvy answer for some installed control applications. The AT89S52 gives the accompanying standard highlights: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog clock, two information pointers, three 16-bit clock/counters, a six-vector two-level interfere with design, a full duplex serial port, on-chip oscillator, and clock hardware. Likewise, the AT89S52 is outlined with static rationale for operation down to zero recurrence and backings two programming selectable power sparing modes one is sit out of gear and other is control sparing mode

GSM MODULE



Figure 3: GSM Modem

GSM supports voice calls and data transfer speeds of up to 9.6 kbit/s, together with the transmission of SMS (Short Message Service). GSM operates in the 900MHz and 1.8GHz bands in Europe and the 1.9GHz and 850MHz bands in the US. The 850MHz band is also used for GSM and 3G in Australia, Canada and many South American countries. By having harmonized spectrum across most of the globe, GSM’s international roaming capability allows users to access the same services when travelling abroad as at home. This gives consumers seamless and same number connectivity in more than 218 countries. Terrestrial GSM networks now cover more than 80% of the world’s population. GSM satellite roaming has also extended service access to areas where terrestrial coverage is not available [5].

MCP3208:

The Microchip Technology Inc. MCP3204/3208 devices are successive approximation 12-bit Analog to-Digital (A/D) Converters with on-board sample and hold circuitry. The MCP3204 is programmable to provide two pseudo-differential input pairs or four single ended inputs. The MCP3208 is programmable to provide four pseudo-differential input pairs or eight single ended inputs. Differential Nonlinearity (DNL) is specified at ± 1 LSB, while Integral Nonlinearity (INL) is offered in ± 1 LSB (MCP3204/3208-B) and ± 2 LSB (MCP3204/3208-C) versions. Communication with the devices is accomplished using a simple serial interface compatible with the SPI protocol. The devices are capable of conversion rates of up to 100 ksp/s. The MCP3204/3208 devices operate over a broad voltage range (2.7V - 5.5V). Low current design permits operation with typical standby and active currents of only 500 nA and 320 μ A, respectively. The MCP3204 is offered in 14-pin PDIP, 150 mil SOIC and TSSOP packages. The MCP3208 is offered in 16-pin PDIP and SOIC packages [5], [7].

3.4 GAS SENSOR

Gas detectors can be used to detect flammable and toxic gases, oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in fire fighting.

Gas leak detection is the process of identifying potentially hazardous gas leaks by sensors. These sensors usually employ an audible alarm to alert people when a dangerous gas has been detected. Common sensors include infrared point sensors, ultrasonic sensors, electrochemical gas sensors, and semiconductor sensors. More recently, infrared imaging sensors have come into use. All of these sensors are used for a wide range of applications and can be found in industrial plants, refineries, waste-water treatment facilities, vehicles, and homes.



Figure 5: GAS sensor

TEMPERATURE SENSOR (LM35):

The environmental parameters (temperature, humidity and light) are important aspects for deciding whether equipment such as (fans, electric heaters or lamps) should be switched on or off in a wireless monitoring network used for energy management in the home. The following sensors are used in the present setup. The sensor nodes used in the ZigBee WSN have a temperature sensor (TMP 36) [25] operating in the range of -20°C to +125°C. The output voltage out of this sensor varies 1°C for every 10mV with 500mV offset voltage. The light sensor used was LDR [6].

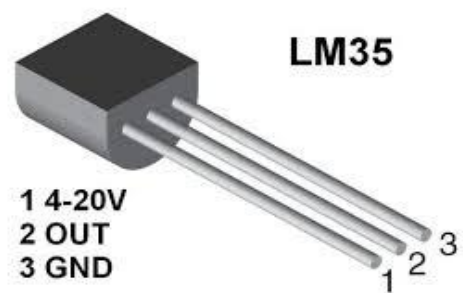


Figure 4: Temperature sensor

LDR:

A photograph resistor or light ward resistor or cadmium sulfide (CdS) cell is a resistor whose protection diminishes with expanding episode light force. It can likewise be referenced as a photoconductor. A photograph resistor is made of a high protection semiconductor. On the off chance that light falling on the gadget is of sufficiently high recurrence, photons consumed by the semiconductor give bound electrons enough vitality to bounce into the conduction band. The subsequent free electron (and its opening accomplice) directs power, in this manner bringing down protection.

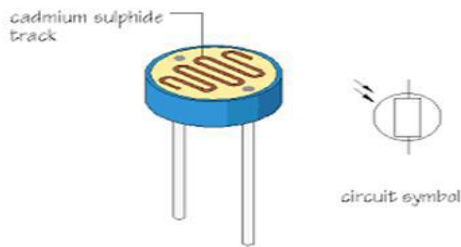


Fig .LDR sensor

IV EXPERIMENTAL RESULTS

The developed system is tested by installing the Smart sensing units and setting up a ZigBee based WSN agriculture filed. Interconnecting ZigBee network. Integrated system was continuously used and generated real-time graphical representation of the sensing information. Fig. 6(a,b,c) shows the type # 1 sensing unit information in real-time. Measurements related to temperature, light intensity, Gas leakage detection and water level indication are shown in Fig. , system of the sensor entities has been reflected for better remote utilization and controlling through an effective wireless communication.



Figure 7: Transmitter section

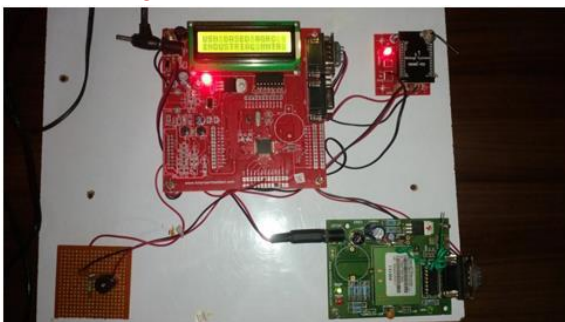


Fig 2. Receiver section

VI.CONCLUSION

Another remote administration framework for structures lighting computerization has been introduced. With the

utilization of remote sensor systems we might expand introductory limit of 64 gadgets to a number sufficiently huge to be utilized as a part of genuine situations, for example, local locations and vast structures without extra interests in various circle. The control through the PAN organizer of the remote sensor arranges likewise empowers an incorporated control framework. The utilization of gadgets with remote sensor arrange permits a half-duplex correspondence which can give numerous parameters about the lighting and light status, this is exceptionally valuable for sparing vitality and upkeep purposes, as it can recognize any single light blame permitting a prescient support and gathering substitution or timetable power utilizations rules empowering the coordination of then lighting framework in home and structures into Smart Grid approaches.

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