

Self-Configuration And Smart Binding Control On Iot Applications

Tabassum Nazz & Mr Srikar

(M.Tech.)¹ (H.O.D of ECE and Associate Professor)²

¹kshatriya College Of Engineering, chepur, TS, (503224), INDIA

tabassum9488@gamil.com¹ srikardhondi@gmail.com²

Abstract

The rapid development of wireless communication technology facilitates the realization of the Internet of Things (IOT). Self-configuration and smart connection system have become relative important issue in accordance with extensive applications of IOT, and the energy saving concepts. Therefore, this work presents the integration of 'Self-configuration and Wisdom Connection System' with Wireless Sensor Networks (WSN), IOT and ZigBee technology, to actualize self configuration based on a received signal strength indicator Received Signal Strength Indicator (RSSI), lighting auto configuration area, regional allocation, and sub-areas. The proposed 'Self-configuration and Wisdom Connection System' automatically configures different lightings to the same position within in the range -3dBm when the RSSI value varies only slightly. The system is configured to the same lighting site within the experimental environment when the sub-area range set - 3dBm. This study presents a significant contribution to new configuration of objects in IOT, context awareness control, and optimization of network control platform.

Existing system

Internet of Things (IoT) envisions a future in which anything/anyone/any service can be linked by means of appropriate information and communication technologies which will bring technological revolution in the fields of domestics, smart homes, healthcare systems, goods monitoring and logistics.

The system contains two parts. One is transmitter node and another one is receiver part. The

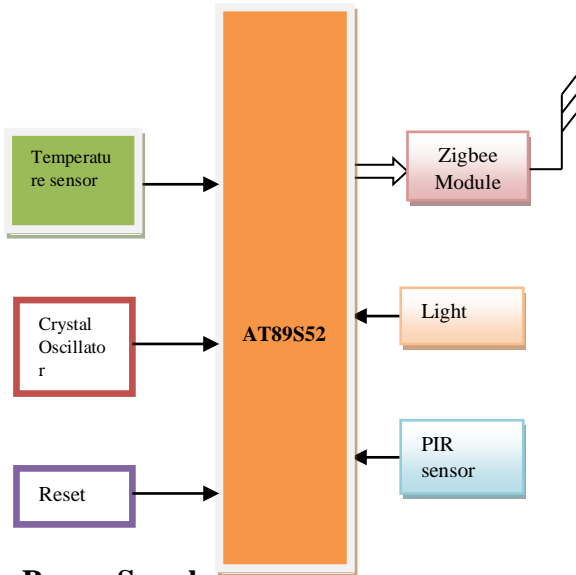
transmitter part consists of weather sensors, microcontroller and ZigBee and the receiver part consist of a LPC2148 interfaced with Zigbee. In this project we deal with monitoring the weather related parameters through wireless Zigbee modules. Here we monitor temperature, day/light and human detector with the help of respective sensors. The data from the sensors are collected by the micro controller and transmitted to the receiver section through wireless medium. The same information is given to the web server using internet through IoT module connected at the receiver end.

In this project we are using AT89S52 & LPC2148 microcontrollers. We interface the microcontroller with zigbee module to monitor the weather station from the remote area. Here the loads are driven as per the reaction of the respective sensors. Light will glow when the LDR sensor is activated. Fan gets on in case of raise in temperature. Buzzer alert will be given in the presence of human in restricted area.

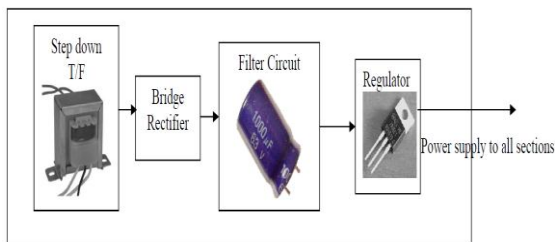
This project uses power supply i.e regulated 5V for modules and microcontroller. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

BLOCK DIAGRAM

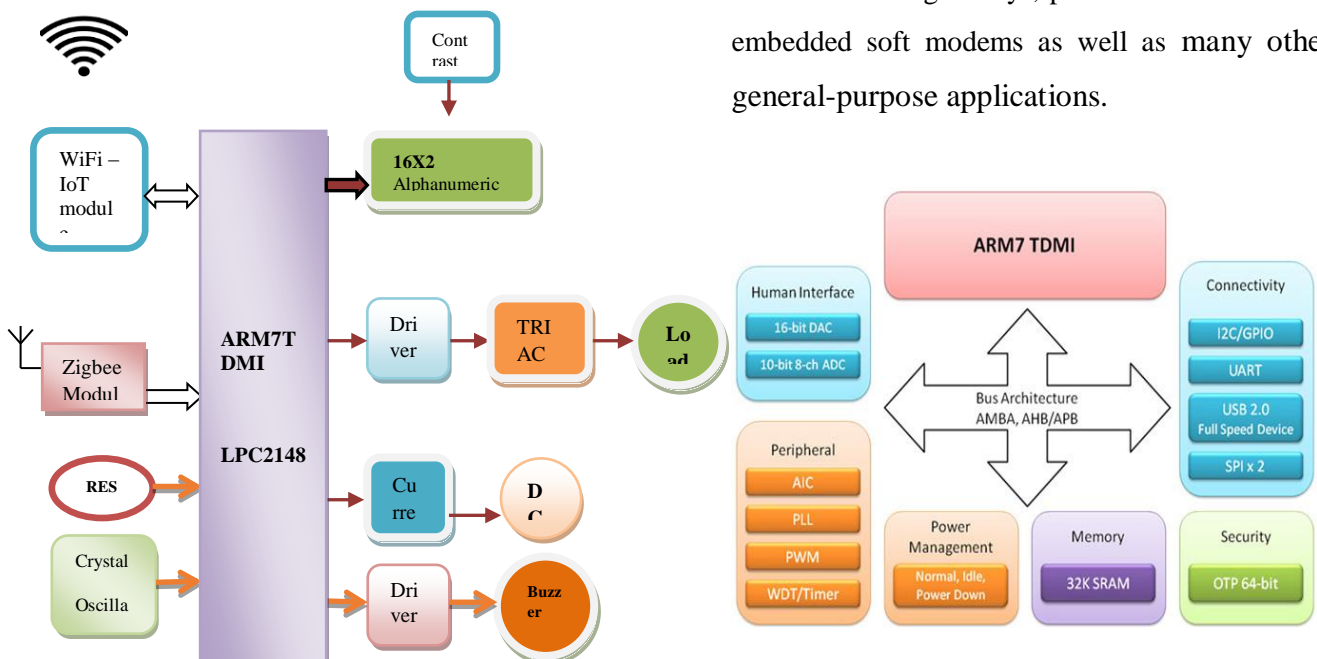
Transmitter Section:



Power Supply:



Receiver Section:

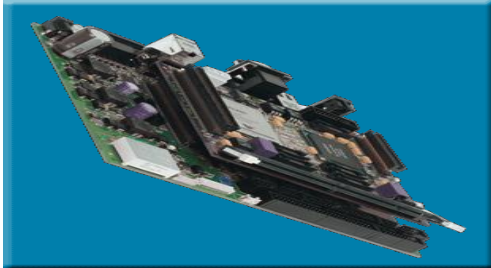


Modules used in this project:

The **LPC2148** are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory.

A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT, PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.

ARMPROCESSOR



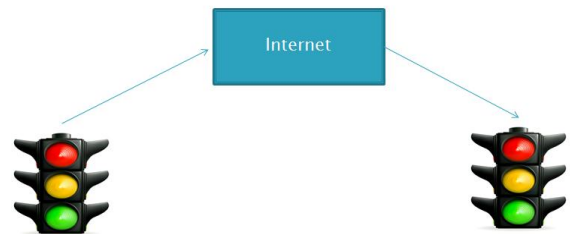
ARM7TDMI Processor Core

- Current low-end ARM core for applications like digital mobile phones
- TDMI
 - T: Thumb, 16-bit compressed instruction set
 - D: on-chip Debug support, enabling the processor to halt in response to a debug request
 - M: enhanced Multiplier, yield a full 64-bit result, high performance
 - I: Embedded ICE hardware
- Von Neumann architecture

INTERNET OF THINGS

Internet is helping people to communicate each other using different applications


Traffic Light Wants to communicate to other traffic light using internet?



Internet of things helps the things to communicate each other using IoT module

ESP8266EX:

- ▶ The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.



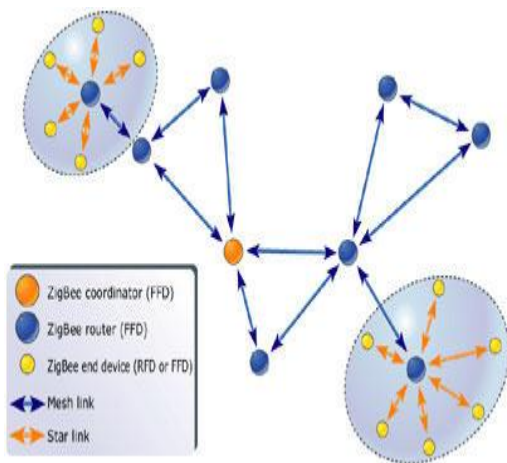
Wi-Fi module

ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. It has integrated cache to improve the performance of the system in such applications. Alternately, serving as a Wi-Fi networking module.

adapter, wireless internet access can be added to any micro controller-based design with simple connectivity (SPI/SDIO or I2C/UART interface).

Zigbee Networks:

Zigbee devices can form networks with Mesh, Star and Generic Mesh topologies among themselves. The network can be expanded as a cluster of smaller networks. A ZigBee network can have three types of nodes: Zigbee Coordinator (ZBC), Zigbee router (ZBR) and Zigbee End Device (ZBE) each having some unique property.

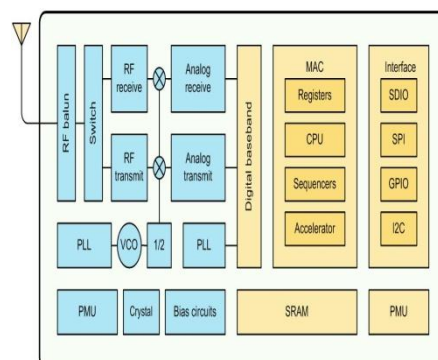


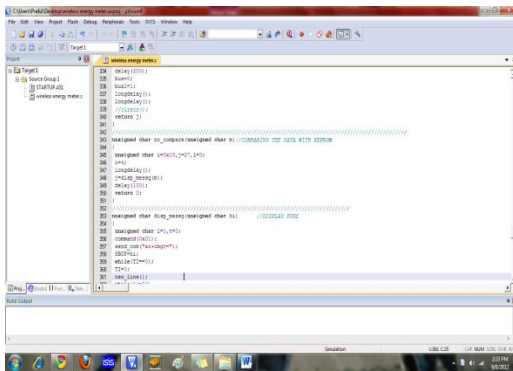
Let us understand Zigbee through a typical usage scenario in a home automation system. There can be only one ZBC in a network, the one that initiates the network in the first place and stores the information about the network. This would be the main control panel or remote control in the living room of each storey. All the devices in the network communicate with this ZBC. It has routing capabilities and acts as a bridge to other networks on other floors. A ZBR is an optional component used to extend the coverage, say, providing access to the Zigbee receivers controlling the garage lighting and shutter which is in the nearby shed. The router itself may host an application like a CC Camera which is continuously in active monitoring state. It can also handle local address allocation or de-allocation. A ZBE is optimized for low power

consumption and is the cheapest among the three node types. It communicates only with the coordinator and is the point where sensors are deployed. Any end device like lighting units, air conditioning elements etc. can be Zigbee End Devices. Unicast Device Discovery is done if Network ID is available; else Broadcast Device Discovery is done. A ZBR or ZBC's response to Device Discovery query is a payload containing IEEE address, the Network Address and all known network addresses. Device bindings which are logical links between end devices can be created like binding of a Lamp Application Object with a Switch Application Object. The Radio unit and the Processing unit are often built into a single chip to reduce costs. When a car enters the premises, the radio transmitter inside the car broadcasts its presence to the Zigbee Coordinator through routers. The coordinator then binds the garage shutter's receiver with the Car's transmitter and all packets from the Car transmitter are routed to the Shutter, which can then open and close without stepping out of the car. The whole transaction can be automated such that by the time the car reaches the garage door, it automatically opens.

Software tools

Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.





- Industrial control applications.
- Status monitor.

Future scope

LIQUID CRYSTAL DISPLAY:

LCD stands for **Liquid Crystal Display**. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs)

These components are “specialized” for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

This project depend upon the LCD display

Flash Magic

Flash Magic is a tool which is used to program hex code in EEPROM of micro-controller. It is a freeware tool. It only supports the micro-controller of Philips and NXP. It can burn a hex code into that controller which supports ISP (in system programming) feature. Flash magic supports several chips like **ARM Cortex M0, M3, M4, ARM7 and 8051**.



Conclusion

Here we have designed a simple, low-cost controller based on Wireless Tracking System for wireless sensor monitoring system which enables to monitor the weather parameter in an industry or anywhere by using Zigbee technology and display the parameter on LCD.

Advantages:

- Easy of operat
- Low maintenance cost
- No wastage of time
- low power consumption and high accuracy

Applications:

- Residential access control.
- Bank safety system.

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