

“BSIOTR IT SMART LAB using IOT”

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Abstract – As there are various techniques technologies used in IoT in our side we are making the smart lab with IoT based automation system, which protects lab equipment’s and take the record of students that who enters in lab. Due to this system the problem of taking attendance was time consuming and paper based work was reduced and also the problem of equipment stolen in lab also critical issue that may also be solve by this system if any equipment get out of the lab the message or notification immediately get to Admin and also to the Lab In charge. So we are very pleasure to present this project.

Key Words: Atmega328, ESP8266, My SQLite, DFMiniMP3 Module, APIs, PHP My SQL Cloud, IFTTT

1. INTRODUCTION

In Traditional way today in all colleges in classrooms and labs we go and take attendance for the exact count of students present in labs or classrooms. Instead of this way we are using the best automatic counting of students in labs and classrooms. we have used one module which counts-in and counts-out the students in the room, and also one another module we going to implement the complaints get from the staff that students steal the equipment’s from the labs like mouse and some other small equipment’s, so we used one another module for provide security to the equipment’s bye stolen. In this project we are study about these two models. There are total two modules first is Count Record of People and second one is lab Equipment Device track.

2. SYSTEM ARCHITECTURE

This project is divided in two parts one is count of people and another is for tracking lab equipment.

2.1 STUDENT COUNT:

In the first part of the module we have comprised the ESP 8266 (WiFi module), Atmel’s Atmega 328 (microcontroller) and Ultrasonic Distance Sensor (sensor) which works as an client. An Ultrasonic Distance Sensor which keeps the count. if anyone passes through it hits a counts. And wait if it passes out through another sensor. As soon as it count in the count is incremented and stored in server database we have made an database table which contains only ID and count out if decremented.

2.2 TRACKING LAB EQUIPMENT:

In second part of module it contain of the ESP 8266 (WiFi module), Atmel’s Atmega 328 (microcontroller). This system design is client server architecture. Here small WiFi chips are attached to lab equipment’s with a unique name for identification. The counter work is done by the microcontroller and sends to the WiFi module which takes the count and also checks continuously the Device chips in lab are available or not if available it hits ON in URL then stores at respective Database, if device is outside the Lab it hits OFF in URL and notifies to the server and also with an Fast2SMS Server send to the respective in charge of the Lab as shown in below Fig.

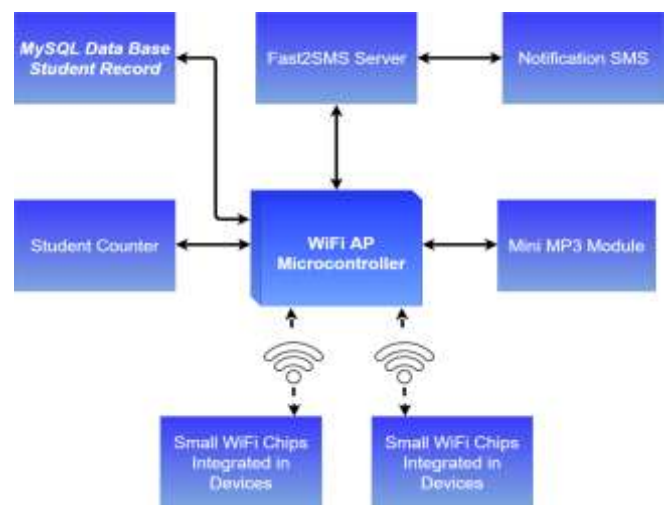


Fig-1: System Architecture

3. HARDWARE AND SOFTWARE IMPLEMENTATION

The overall block diagrams system is divided into two sections as Hardware Implementation and Software implementation

3.1 HARDWARE IMPLEMENTATION

1) ESP8266(Wifi Module)

Core processor ESP8266 in smaller sizes of the module encapsulates Tensilica L106 integrates industry-leading ultra-low power 32-bit MCU micro, with the 16-bit short mode, it has Clock speed support 80 MHz, 160MHz, it has to supports the RTOS and integrated Wi-Fi which on-board antenna. The module supports standard 802.11 b

agreement and complete TCP/IP protocol stack. Users can use the add modules to an existing device networking, or building a separate network controller.ESP8266 is high integration wireless SOCs, it designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.ESP8266EX also integrates a next version of Tensilica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the Wi-Fi functionalities. ESP8266EX is often united with external sensors and other application specific devices through its GPIOs; a codes for such applications are provided in examples in the SDK. Smart Connectivity Platform (ESCP) determines cultivated system-level features include fast sleep/wake context switching for energy-efficient VoIP with adaptive radio biasing. For low-power operation, advance signal processing and spur termination and radio co-existence features for common cellular, Bluetooth, DDR, LVDS, LCD interference modification.



Fig-2: ESP8266(Wifi Module)

2) Atmega328 (Microcontroller module)

The high-performance Microchip Pico Power 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-write capabilities, it has 1024B EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes. It has internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, a 6-channel 10-bit A/D converter programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts.



Fig-3: Atmega328 (Microcontroller module)

3) Ultrasonic Distance Sensor

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit.



Fig-4: Ultrasonic Distance Sensor

4) Relay

A relay, in short, is a switch that opens or closes circuit electronically or electromechanically. The most common relay mechanism employs an electromagnet to mechanically operate a switch. If you want to turn on and off the main 220V that's running through your home appliances through a microcontroller, then the relay is just the device you need.



Fig-5: Relay

5) DFMini MP3 Module:

The DF Player Mini is a small and low price MP3 module with a simplified output directly to the speaker. The module can be stand-alone module with attached battery, speaker and push buttons or used in combination with an Arduino UNO or any other with reception/transmission capabilities.



Fig-5: DFMini MP3 Module

3.2 SOFTWARE IMPLEMENTATION

1) Atmel Studio:

To Program the Atmega328 Microcontroller we used this IDE.

Atmel Studio is use to provides a large set of features for project development and debugging. The most features are listed below.

- Rich code editor for C/C++ and Assembly featuring the powerful Visual Assist extension
- It has Cycle correct simulator with advanced debug functionality

- Atmel Software Framework allowing creation of modular applications and providing building blocks for a prototype on any AVR platform
- Debugging on actual devices using Debugging Tools
- Rich SDK to enable tight integration of customer plugins

2) Arduino IDE:

To Program the Atmega328 Microcontroller we used this IDE. Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory. The default boot loader of the Arduino UNO is the boot-loader. Boards are loaded with program code via a serial connection to another computer. Some serial Arduino boards contain a level shifter circuit which is used to convert between RS-232 logic levels and transistor-transistor logic (TTL) level signals. Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable via its own ICSP header. Other alternatives, such as the Arduino Mini and the unofficial Boarduino, use a removable USB-to-serial adapter board or cable, Bluetooth or other methods, when used with customary microcontroller tools instead of the Arduino IDE, standard AVR in-system programming (ISP) programming is used.

3) NetBeans IDE (PHP Website):

To design the Website for server side algorithm. PHP (recursive acronym for PHP: Hypertext Preprocessor) is a widely-used .it is open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML.

PHP is a general-purpose scripting language that is especially suited to server-side web development, in which case PHP generally runs on a web server. Any PHP code in a demanded file is executed by the PHP runtime, usually to create dynamic web page content or dynamic images used on websites or elsewhere. PHP is a server-side scripting language designed primarily for web development. It is also used as a general-purpose programming language. Originally created by Rasmus Lerdorf in 1994, the PHP reference execution is now produced by The PHP Development Team.

4) Coffee Cup HTML Editor:

To design the Web Page using PHP, HTML 5 and Java Script are used .The CoffeeCup HTML Editor is an HTML editor which can supports both raw HTML and editing. The WYSIWYG editing is no longer available in the newer

versions, starting in 2012, (after version 12.5). Originally created by Nicholas Longo and Kevin Jurica, it was first released to the public in August 1996.

According to the journalists the editor was the first to support Java script (version 3.5 Sep. 1996), split-screen editing (version 4.0, March 1997) and built-in FTP upload (version 5.2, February 1998).

The HTML Editor was selected Best Windows HTML Editor in the About.com Readers' Choice Awards two years in a row in 2011 and 2012.

5) NodeMCU LUA

We used the Node MCU IDE to program the Wi-Fi Module using the Lua Programming Language. NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" is by default refers to the firmware rather than the Dev. kits. The firmware uses the Lua scripting language. It is based on the Lua project and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and spiffs.

6) Xampp IDE:

To Build the PHP web Server for PMC Corporation website using the XAMPP Local Host. XAMPP can Build PHP websites with the MySQL Data base and with Apache server.

7) FileZilla Web Client:

We use the FileZilla Web client for uploading our website to the Server of the 000Webhost. With this client side software it is easy to upload the all contents of our local website file in one click.

4. CONCLUSION

Our project, stands on concept SMART LAB for proper supervision and monitoring of labs. These two modules collaborate together to ensure class management and security. After implementation, the modules preliminary testing gave legitimate results. The second stage now stands with testing the model in real life application by applying these modules in different classes and labs. Feedback of teachers and students were collected. Feedback collection stands as an important aspect as it leads to improved quality, credibility and successful model deployment at every stage which in turn enhances the product

5. REFERENCES

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