

# WiFi Automation

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**Abstract-** An embedded project is a combination of hardware and software designed to perform a specific task. The main scope of this project is to develop the application for industrial automation using wire less communication as Wi-Fi embedded technology to reduce the complexity in design. The main scope of the project is to control the Industrial Machines by using Wi-Fi Technology. Wi-fi also known as 802.11b uses radio waves to send information at speeds of up to 11 Megabits per second over a range of up to 300 m. When combined with a wireless access point or wireless router, it provides users with wireless high speed internet access. Wi-Fi technology is now found in host of non computer electronic devices as well, such as home theater receivers, portable gaming devices, DVD players and even digital cameras. In our project we tried to demonstrate the wi-fi technology using small application. The project work includes study and design of hardware unit and software. We programmed Wi-Fi module which is interfaced to the micro-controller unit and some analog circuit which in turn drives the loads. So the complete project can be divided in to two modules i.e. Design of the user interface application and the other is the microcontroller Unit and its software which will be written in Embedded C Language.

**Index Terms-** About four key words or phrases in alphabetical order, separated by commas. Keywords are used to retrieve documents in an information system such as an online journal or a search engine. (Mention 4-5 keywords)

## I. INTRODUCTION

Mechanical mechanisation refers to the ability to control any or all electrical devices in our house or office, whether we are present or not. Present robotization is one of the most fascinating breakthroughs in home technology in recent years. Several items are now available that allow us to control our devices naturally using an advanced cell application controller from anywhere on the planet. The private expansion of "building robotization" is mechanical computerization (also known as domestics). It is the action of mechanical machines or the mechanisation of the company. Any AC/DC devices, unified control of lighting, fan, HVAC (heating, ventilation, and air conditioning), apparatuses, and other frameworks may be included in modern computer technology to provide improved accommodation, solace, energy efficiency, and security. Handicapped can provide increased personal happiness to persons who may require parental figures or institutional support in some way. The recent technological breakthroughs that allow for the use of Bluetooth and Wi-Fi have enabled a variety of devices to communicate with one another. Using a WIFI shield to act as a Micro web worker for the Arduino, which eliminates the need for wires connections between the Arduino board and PC, lowering costs and allowing it to function as a standalone device. An embedded project is a combination of hardware and software designed to perform a specific task. The main scope of this project is to develop the application for industrial automation using wire less communication as Wi-Fi embedded technology to reduce the complexity in design. The main scope of the project is to control the Industrial Machines by using Wi-Fi Technology. Wi-Fi also known as 802.11b uses radio waves to send information at speeds of up to 11 Megabits per second over a range of up to 300 feet. When combined with a wireless access point or wireless router, it provides users with wireless high speed internet access. Wi-Fi technology is now found in host of non computer electronic devices as well, such as home theater receivers, portable gaming devices, DVD players and even digital cameras. In our project we tried to demonstrate the Wi-Fi technology using small application. The project work includes study and design of hardware unit and software. We programmed Wi-Fi module which is interfaced to the micro-controller unit and some analog circuit which in turn drives the loads. So the complete project can be divided in to two modules i.e. Design of the user interface application and the other is the microcontroller Unit and its software which will be written in Embedded C Language.

## II. LITERATURE REVIEW

As shown in Figure 1, this system implements a novel block diagram for the implementation of WiFi Automation. The name of a popular wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections. The Wi-Fi Alliance, the organization that owns the Wi-Fi (registered trademark) term specifically defines Wi-Fi as any "wireless local

area network (WLAN) products that are based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards. Initially, Wi-Fi was used in place of only the 2.4GHz 802.11b standard, however the Wi-Fi Alliance has expanded the generic use of the Wi-Fi term to include any type of network or WLAN product based on any of the 802.11 standards, including 802.11b, 802.11a, dual-band, and so on, in an attempt to stop confusion about wireless LAN interoperability. Wi-Fi works with no physical wired connection between sender and receiver by using radio frequency (RF) technology, a frequency within the electromagnetic spectrum associated with radio wave propagation. When an RF current is supplied to an antenna, an electromagnetic field is created that then is able to propagate through space. The cornerstone of any wireless network is an access point (AP). The primary job of an access point is to broadcast a wireless signal that computers can detect and "tune" into. In order to connect to an access point and join a wireless network, computers and devices must be equipped with wireless network adapters". Wi-Fi is supported by many applications and devices including video game consoles, home networks, PDAs, mobile phones, major operating systems, and other types of consumer electronics. Any products that are tested and approved as "Wi-Fi Certified" (a registered trademark) by the Wi-Fi Alliance are certified as interoperable with each other, even if they are from different manufacturers. For example, a user with a Wi-Fi Certified product can use any brand of access point with any other brand of client hardware that also is also "Wi-Fi Certified". Products that pass this certification are 2.5GHz for 802.11b, 802.11g, or 802.11n, and 5GHz for 802.11a. A common misconception is that the term Wi-Fi is short for "*wireless fidelity*," however this is not the case. Wi-Fi is simply a trademarked term meaning IEEE 802.11x. Wi-Fi (short for "*wireless fidelity*") is a term for certain types of wireless local area network (WLAN) that use specifications in the 802.11 family. The term Wi-Fi was created by an organization called the Wi-Fi Alliance, which oversees tests that certify product interoperability. A product that passes the alliance tests is given the label "Wi-Fi certified" (a registered trademark). Originally, Wi-Fi certification was applicable only to products using the 802.11b standard. Today, Wi-Fi can apply to products that use any 802.11 standard. The 802.11 specifications are part of an evolving set of wireless network standards known as the 802.11 family. The particular specification under which a Wi-Fi network operates is called the "flavor" of the network. Wi-Fi has gained acceptance in many businesses, agencies, schools, and homes as an alternative to a wired LAN. Many airports, hotels, and fast-food facilities offer public access to Wi-Fi networks. These locations are known as hot spots. Many charge a daily or hourly rate for access, but some are free. An interconnected area of hot spots and network access points is known as a hot zone. Unless adequately protected, a Wi-Fi network can be susceptible to access by unauthorized users who use the access as a free Internet connection. The activity of locating and exploiting security-exposed wireless LANs is called war driving. An identifying iconography, called war chalking, has evolved. Any entity that has a wireless LAN should use security safeguards such as the Wired Equivalent Privacy (WEP) encryption standard, the more recent Wi-Fi Protected Access (WPA), Internet Protocol Security (IPSec), or a virtual private network (VPN). Wi-Fi is a wireless data networking protocol, which allows for PCs and laptops to access the internet, within a given area or "hotspot", via a high frequency wireless local area network (WLAN). The term Wi-Fi was coined by the Wireless Ethernet Compatibility Alliance (WECA) as another name for IEEE 802.11b networking standard. WECA is still involved in certifying new wireless modems in order to verify that they are fully compatible with the standard.

Table 1.1

<b>Release date</b>	<b>Frequency band</b>	<b><u>Throughput</u> (typical)</b>	<b><u>Net bit rate</u></b>	<b>Range (Indoor)</b>
October 1999	2.4 GHz	~5 Mbit/s <sup>[4]</sup>	11 Mbit/s	~38 m <sup>[citation needed]</sup>

802.11b has a maximum raw data rate of 11 Mbit/s and uses the same media access method defined in the original standard. 802.11b products appeared on the market in early 2000, since 802.11b is a direct extension of the modulation technique defined in the original standard. The dramatic increase in throughput of 802.11b (compared to the original standard) along with simultaneous substantial price reductions led to the rapid acceptance of 802.11b as the definitive wireless LAN technology. 802.11b devices suffer interference from other products operating in the 2.4 GHz band. Devices operating in the 2.4 GHz range include: microwave ovens, Bluetooth devices, baby monitors and cordless telephones. In 2000, 802.11b became the standard wireless Ethernet networking technology for both business and home. The Wi-Fi organization was created to ensure interoperability between 802.11b products. With a realistic throughput of 2.5-4Mbps, it is fast enough for most network applications and tolerable for file transfers.

## III. HARDWARE DESIGN

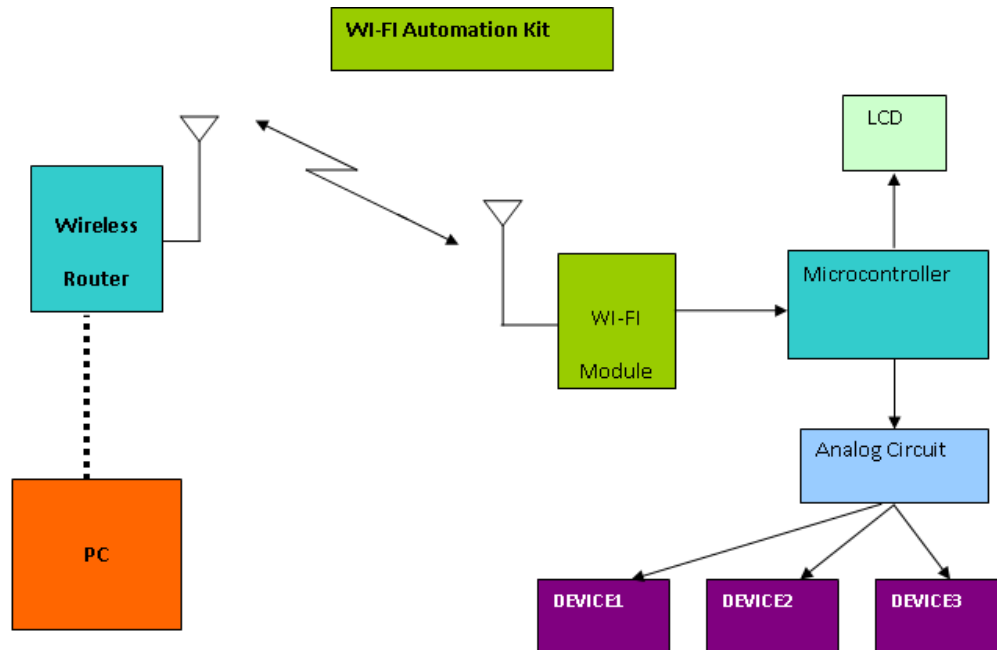


Fig.1. WiFi Automation Block Diagram

## A. Microcontroller

The AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry standard 80C51 and 80C52 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcomputer, which provides a highly flexible and cost effective solution to many embedded control applications. The AT89C52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, three 16-bit timer/counters, six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89C52 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 contents but freezes the oscillator, disabling all other chip functions until the next hardware reset.

## B. WiFi Module

The 802.11b (Wi-Fi) Application Kit Getting Started instructions included with the Application Kit show how to set up and program the RCM3100. Figure 1 shows how your development setup might look once you're ready to proceed. Wi-Fi is popular name for 802.11b is one of the wireless schemes available in the 802.11 suite conforming to standards defined by IEEE. 802.11b describes the media access and link layer control for a 2.4 GHz implementation, which can communicate at a top bit-rate of 11 mega samples/s. Other standards describe a faster implementation (54 mega samples /s) in the 2.4 GHz (802.11g) and a 54 mega samples/s implementation in the 5.6 GHz band (802.11a). The adoption of 802.11 has been fast because it's easy to use and the performance is comparable to wire-based LANs. Things look pretty much like a wireless LAN. Wi-Fi (802.11b) is the most common and cost-effective implementation currently available. This is the implementation that is used with Z-World's Wi-Fi Application Kit. A variety of Wi-Fi hardware exists, from wireless access points (WAPs), various Wi-Fi access devices with PCI, PCMCIA, Compact Flash, USB and SD/MMC interfaces, and Wi-Fi devices such as Web-based cameras and print servers. 802.11b can operate in one of two modes—in a managed-access mode (BSS), called an infrastructure mode, or an unmanaged mode (IBSS), called the ad-hoc mode. The 802.11 standard describes the details of how devices access each other in either of these modes.

The infrastructure mode requires an access point to manage devices that want to communicate with each other. An access point is identified with a channel and SSID that it uses to communicate. Typically, an access point also acts as a gateway to a wired network, either an Ethernet or WAN (DSL/cable modem). Most access points can also act as a DHCP server, and provide IP, DNS, and gateway functions. When a device wants to join an access point, it will typically scan each channel and

look for a desired SID for the access point. A special SSID “default” or “any” means match the SSID of any access point. Once the access point is discovered, the device will logically join the access point and announce itself. Once joined, the device can transmit and receive data packets much like an Ethernet-based MAC. Being in a joined state is akin to having link status in a 10/100Base-T network. 802.11b interface cards implement all of the 802.11b low-level configurations in firmware. In fact, the 802.11b default configuration is often sufficient for a device to join an access point automatically, which it can do once enabled. Commands issued to the chip set in the interface allow a host program to override the default configurations and execute functions implemented on the interface cards, for example, scanning for hosts and access points.

The different softwares used to design a smart automobile security system are listed below.

#### A. KEIL C

Keil software is the leading vendor for 8/16-bit development tools (ranked at first position in the 2004 embedded market study of the embedded system and EE times magazine). The leading vendor of 8/16-bit development tools is Keil Software. Since the market's inception in 1988, Keil software has been represented in more than 40 countries; the Keil C51 compiler is the de facto industry standard, supporting more than 500 different device types. ARM development tools are now available from Keil Software. C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, and evaluation boards are all made by Keil Software for the 8051, 251, ARM, and XC16x/C16x/ST10 microcontroller families. Keil software is represented worldwide in more than 40 countries, since the market introduction in 1988; the keil C51 compiler is the de facto industry standard and supports more than 500 current 8051 device variants. Now, keil software offers development tools for ARM. The Keil C51 C Compiler for the 8051 microcontroller is the most popular 8051 C compiler in the world. It provides more features than any other 8051 C compiler available today. The C51 Compiler translates C source files into relocatable object modules which contain full symbolic information for debugging with the  $\mu$ Vision Debugger or an in-circuit emulator. In addition to the object file, the compiler generates a listing file which may optionally include symbol table and cross reference.

#### B. FLASH MAGIC

The COM port handshaking signals can be used by Flash magic to control the entry into ISP mode of some microcontroller devices. Handshake signals are commonly used to control pins like Reset, PSEN, and VCC. The exact pins required depend on the device. Flash Magic will automatically place the device into ISP mode at the start of an ISP operation if this feature is supported. At the end of the ISP operation, Flash Magic will automatically cause the device to execute code.

#### C. ORCAD

ORCAD really consists of tools. Capture is used for design entry in schematic form. You will probably be already familiar with looking at circuits in this form from working with other tools in your university courses. Layout is a tool for designing the physical layout of components and circuits on a PCB. During the design process, you will move back and forth between these two tools.

#### D. MATLAB

This is the tool that is used for image recognition and processing. Using this code, the captured image is compared to previously stored images, and the result is used to determine whether or not the person is authenticated.

### IV. RESULTS

The name of a popular wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections. The Wi-Fi Alliance, the organization that owns the Wi-Fi (registered trademark) term specifically defines Wi-Fi as any "wireless local area network (WLAN) products that are based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards." Wi-Fi is supported by many applications and devices including video game consoles, home networks, PDAs, mobile phones, major operating systems, and other types of consumer electronics. Any products that are tested and approved as "Wi-Fi Certified" (a registered trademark) by the Wi-Fi Alliance are certified as interoperable with each other, even if they are from different manufacturers. For example, a user with a Wi-Fi Certified product can use any brand of access point with any other brand of client hardware that also is also "Wi-Fi Certified". Products that pass this certification are required to carry an identifying seal on their packaging that states "Wi-Fi Certified" and indicates the radio frequency band used (2.5GHz for 802.11b, 802.11g, or 802.11n, and 5GHz for 802.11a). A common misconception is that the term Wi-Fi is short for "*wireless fidelity*," however this is not the case. Wi-Fi is simply a trademarked term meaning IEEE 802.11x.

### V. CONCLUSION

In this project two Wi Fi modules are used, a transmitter module and a receiver module. The transmitter module consists of switches, microcontroller, encoder and an Wi Fi transmitter. The receiver consists of a microcontroller, decoder, Wi Fi receiver and machines. The switches on the transmitter module control the operation of the machines. That is, the machines are switched on and off from a distance using the transmitter module. The main scope of this project is to control the operation of appliances from a remote place.

Using this concept a maximum of 256 machines can be operated. The range of this project operation is only 300m however by interfacing this technology with Wimax and also uploading the user interface page to the internet the range of this operation can be drastically increased.

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