SMART BUILDING
Using Web Application
(Second Controlling Method)

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ABSTRACT

As technology advances, there is an increasing demand for the internet to allow us to control every facet of our lives, usually from apps on our phones or our smart devices Whether we are able to remotely turn on our heating, set timers on our lights to ensure they are shining, etc..

This work aims to study the possibility of controlling the smart building using Web Application to provide User Friendly Interface and Remote Connection through the internet or intranet.

Smart building web application is an example of what's possible with based Internet of Things projects.

This paper describes part of an integrated project for implementation of smart building controlled by several ways, which is considered as a Second Method to control the building.

Keywords : Web application, C# language, ASP.NET, Smart building.

I. Introduction

Today, Smart buildings are complex concatenations of structures, systems and technology. Over time, each of the components inside a building has been developed and improved, allowing building owners to select lighting, security, heating, ventilation and air conditioning systems independently.

There is a possibility to develop a practical way to control the whole building more easily, As well as the possibility of controlling the devices and equipment inside the building remotely from anywhere, and to identify the current state of the building.

This work aims to design and use the Web Application to control the building through any smart device from anywhere via the internet. as shown in Fig1.
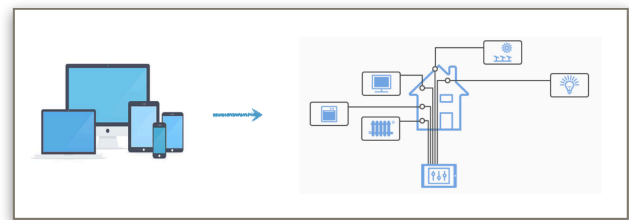

Figure1. Intelligent Building Diagram

This work is organized as follows: Section II covering the main concepts of the Web Based Application. Section III representing important information about Programming Language C#. Then the ASP.NET Web Application is defined in section IV . Section V contains the practical part of Smart Building Web Application. Finally section VI drawing the major conclusions from this work.

II. Web Based Application

A web application " web app " is a software program that is stored on a remote web server and delivered over the Internet through a browser interface. Unlike traditional desktop applications, which are launched by operating system. It will make it independent of operating system, place, and used hardware.

Web apps have several advantages over desktop applications. Since they run inside web browsers, developers do not need to develop web apps for multiple platforms because the appearance is dependent on the browser rather than the operating system, also they do not need to distribute software updates to users when the web app is updated. By updating the application on the server, all users have access to the updated version.

Additionally, the data you entered into a web app is processed and saved remotely. This allows to access the same data from multiple devices, rather than transferring files between computer systems.

The Web Application has been created and used in this work to control building appliances by any smart device from anywhere.

A. Advantages of Web Apps

B Web-based applications offer a range of advantages over traditional desktop applications:

- Web Application are accessible anytime, anywhere, via any smart device with an Internet connection.

- Web based applications are far more compatible across platforms than traditional installed software [1].

- Installation and maintenance becomes less complicated.

- The upgrades for web application are only performed by an experienced professional to a single server, the results are more predictable and reliable [2].

- Web based applications can considerably lower the costs because of reduced support and maintenance, lower requirements on the end user system.

- The web application takes a couple of minutes to set up, it just need the URL, a user name, and password.

- There are many technologies can be used for building web-based applications, depending on the requirements of the application, such as the newer Microsoft .NET platform uses Active Server Pages, SQL Server and .NET scripting languages [2].

- Web applications do not need the storage space on Users' computers because most of the information is stored somewhere on a server.

B. The Way The Web application function

The Fig2 details the three-layered web application model [3]:

- The first layer is normally a web browser or the user interface.

- The second layer is the dynamic content generation technology tool such as Java servlets (JSP) or Active Server Pages (ASP).

- The third layer is the database containing content and customer data.
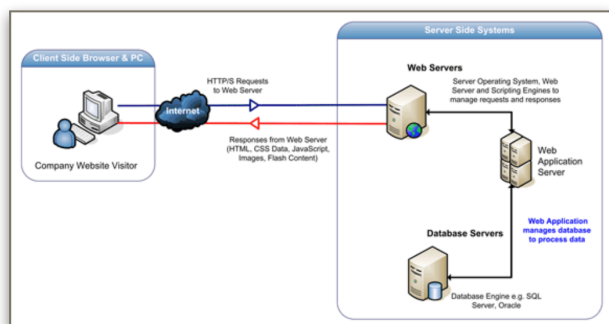

Figure2. The three-layered web application model

III. Programming Language C#

The programming language has been used to program the smart building web application is C#.

C# (pronounced "C sharp") is a programming language that is designed for building a variety of applications that run on the .NET Framework. C# is simple, powerful, type-safe, and object-oriented language. The many innovations in C# enable rapid application development while retaining the expressiveness and elegance of C-style languages [4].

C# can be used to create Windows client applications, Web services, distributed components, client-server applications, database applications, and much, much more. Visual C# provides an advanced code editor, convenient user interface designers, integrated debugger, and many other tools to make it easier to develop applications based on the C# language and the .NET Framework [4].

Visual Studio is one of the programs that can be used to design programs written through C Sharp language, because it includes C#. (The Visual Studio has been used in this work to develop a web application for the Smart Building).

IV. ASP.NET Web Application

ASP.NET (originally called ASP+) is the next generation of Microsoft's Active Server Page (ASP). It is an open source web framework for building modern web applications and services. With ASP.NET we can quickly create web sites based on HTML, CSS and JavaScript, scale them to millions of users and easily add more complex capabilities[4].

ASP.NET is a unified Web development model that includes the services necessary to build enterprise-class Web applications with a minimum of coding. ASP.NET is part of the .NET Framework, so that it provides access to all of the features of that framework. For instance, we can create ASP.NET Web applications using any .NET programming language and .NET debugging facilities [4].

The ASP.NET application codes can be written in any of the following languages [5]:

- C#

- VisualBasic.Net

- Jscript

- J#

ASP.NET is used to produce interactive, data-driven web applications over the internet. It consists of a large number of controls such as text boxes, buttons, and labels for assembling, configuring, and manipulating code to create HTML pages.

V. PRACTICAL PART " Smart Building Web Application "

Web application is used to control the smart building by using any device from anywhere via the Internet.

Web application has several advantages over desktop applications. They run inside web browsers which mean it will operate in any device has a web browser rather than the operating system, so it can considerably lower the costs because of reduced requirements on the end user system.

In this work, Smart building web application has been created by using ASP.NET MVC framework and C# language via Microsoft visual studio.

After the creation of web application, it has been published in a local web server, and can be opened and used by any smart device exist on the same network of the local Web server by writing the URL (**http://localhost/smartBuilding/**) of the application in the device's browser.

The Interface of The Smart Building Web Application

The Smart Building Web Application consists of four pages (Home Page, About, Contact, Switches)

1. Home Page

Home Page as shown in Fig3 is the first interface of the web application, it contains the name of the application.

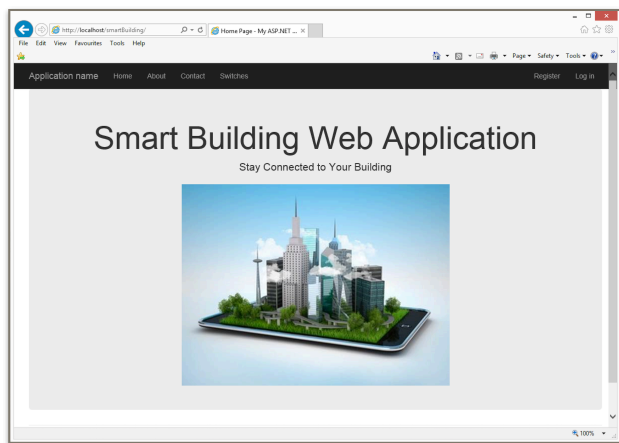Figure3. Web Application (Home Page)

2. About

This page contains a brief explanation about the basic idea of smart buildings, as well as a simplified explanation about the idea of this application as shown in Fig4.

Figure4. Web Application (About Page)

3. Contact

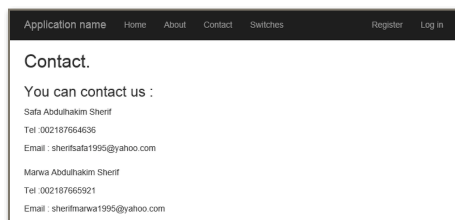This page contains our contact information to communicate with us for any queries as shown in Fig5.

Figure5. Web Application (Contact Page)

4. Switches

This page as shown in Fig6 contains an index includes a set of switches that allow us to control equipments and components in the building, in addition to the knowledge of the current status of this equipment.
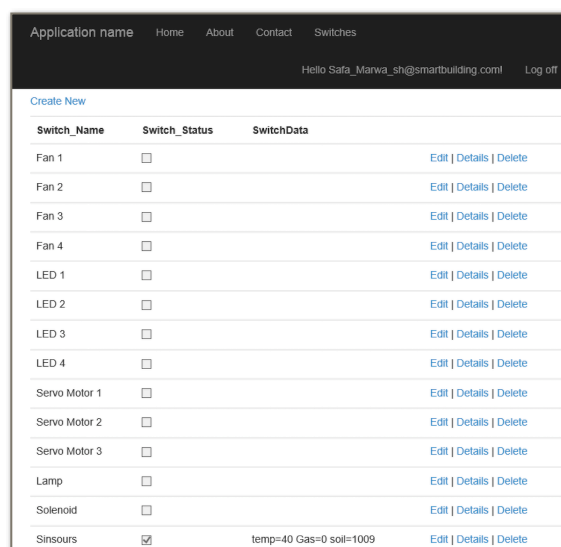

Figure6. Web Application (Switches Page)

To open Switches page must first log in by entering the email and Password as shown in Fig7.
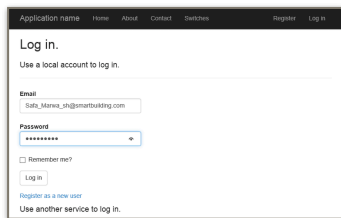
Figure7. Web Application (Log in Page)

To change the current status of any switch, we must click on the edit button that located next to each switch in the index as shown in Fig6.

After pressing the edit button, edit page as shown in Fig8 will appear and Allows us to change the status of the switch.
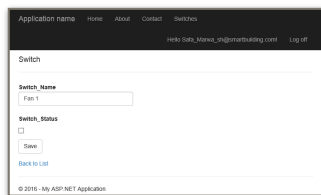

Figure8. Web Application (Edit Page)

Web Application Flow Chart

Smart Building Web Application provides " User Friendly Interface " to control the smart building from any smart device.

The flow chart in Fig9 is clarifying how the web application works and how it communicate with database, as well as how to communicate with smart building controller.
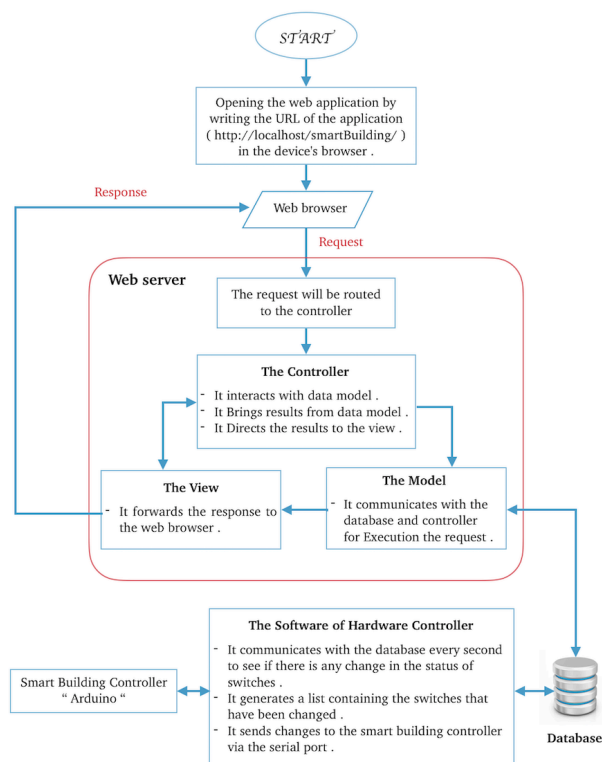

Figure9. Web Application Flow Chart

VI. Conclusion

A web application " web app " is a software program that is stored on a remote web server and delivered over the Internet through a browser interface.

Web application has several advantages over desktop applications. They run inside web browsers which mean it will operate in any device has a web browser rather than the operating system, so it can considerably lower the costs because of reduced requirements on the end user system.

In this work the Smart Building Web Application is designed to control the smart building by using any device from anywhere via the Internet.

REFERENCES

[1]   Benefits of Web Based Applications

http://www.streetdirectory.com/ travel_guide/136495/world_wide_web/ benefits_of_web_based_applications.html

(October, 15th 2017)

[2]   The benefits of web-based applications http://www.magicwebsolutions.co.uk/ blog/the-benefits-of-web-based-applications.htm

(October, 15th 2017)

[3]   Web Applications: What are They? What of Them?

http://www.acunetix.com/websitesecurity/ web-applications/

(October, 15th 2017)

[4]   Microsoft

https://msdn.microsoft.com/en-us

(October, 15th 2017)

[5]   ASP.NET - Introduction

https://www.tutorialspoint.com/asp.net/ asp.net_introduction.htm

(October, 15th 2017)