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TOPIC

Smart Home Controlled Via Different Smartphones

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Table of Contents

GENERAL INTRODUCTION	1
Chapter 1 INTERNET OF THINGS	3
1 Introduction	4
2 Internet of Things vision	4
3 Different Definitions of IoT	5
3.1 IAB Definition.....	5
3.2 ITU Definition.....	6
3.3 IEEE Paper	6
3.4 Oxford Dictionaries.....	6
3.5 IoT Is a Technology Concept	6
4 From IP to the Edge	7
5 IP version.....	9
5.1 Limitations of IPv4.....	9
5.2 Consequences of the Limited IPv4 Address Space	10
5.3 Features of IPv6	14
5.4 IPv6 has Support for Security and Mobility	16
5.5 What about IPv5?	16
6 IOT Application Protocol.....	17
7 Smart Systems and Internet of Things IoT.....	18
7.1 Smart Home, Smart Buildings and Infrastructure	19
7.2 Smart Cities	20
7.3 Smart Logistics and Retail	21
8 IoT Privacy and Security	22
8.1 Security Issues.....	22
8.2 Privacy Considerations.....	23
9 Conclusion.....	24
Chapter 2 SMART HOME.....	25
1 Introduction	26
2 History	26
3 Smart Homes Today.....	27
4 Smart Home Networking	29
4.1 TYPES OF LOCAL NETWORK	29
4.2 Devices under Control.....	33

4.3	Sensors and Actuators	33
4.4	Controller	34
4.5	Remote Control Devices	34
4.6	Communication Mechanism.....	34
5	Smart Home Microcontrollers.....	35
5.1	Raspberry Pi	35
5.2	Arduino.....	36
6	Smart Home from research perspective	37
6.1	Structure	37
6.2	Architecture.....	38
6.3	Middleware.....	39
6.4	Artificial Intelligence Methods.....	39
7	Conclusion.....	40
	Chapter 3 ARDUINO.....	41
1	Introduction	42
2	History and background of the Arduino.....	42
3	Arduino Shields for Smart Home	43
3.1	WiFi Shield	43
3.2	Ethernet shield.....	43
3.3	GSM Shield.....	44
3.4	XBee Shield.....	45
4	Arduino Sensors and Controllers for Smart Home.....	46
4.1	MQ Gas sensors	46
4.2	DHT22 temperature-humidity sensor.....	47
4.3	door sensor “Magnetic contact switch”	47
4.4	Membrane 3x4 Matrix Keypad (3x4).....	48
4.5	Liquid Level Sensor	49
4.6	Liquid Flow Meter:	50
4.7	Half Size Breadboard	50
5	Electronical background.....	51
5.1	Voltage	51
5.2	Ampere.....	51
5.3	Resistors	51
5.4	Resistor color Codes.....	52
6	Conclusion.....	53

Chapter 4 IMPLIMENTATION.....	54
1 Introduction.....	55
2 Architecture.....	55
2.1 Server side.....	56
2.2 Client side.....	58
3 Application scenarios.....	59
3.1 Scenarios diagrams.....	59
4 Interfaces.....	66
5 Technologies used.....	67
5.1 Arduino IDE.....	67
5.2 Star UML 2.7.0.....	69
5.3 HTML5.....	69
5.4 CSS3.....	70
5.5 jQuery.....	70
5.6 JavaScript.....	70
5.7 Bootstrap.....	71
5.8 Sublime text.....	71
6 Conclusion.....	71
GENERAL CONCLUSION.....	72
REFERANCES.....	74
Figure 3.9: Membrane 3x4 Matrix Key pad 3x4.....	48
Figure 3.10: Standard 4Tape Liquid Level Sensor with Plastic Casting.....	49
Figure 3.11: Liquid Flow Meter - Inlet 1/2" Nounal Threaded.....	50
Figure 3.12: Half Size Breadboard.....	51
Figure 3.13: Resistors Examples.....	52
Figure 3.14: Example 1.....	52
Figure 3.15: Example 2.....	53
Figure 3.16: Example 4.....	53
Figure 3.17: Example 3.....	53
Figure 3.18: Example 5.....	53
Figure 3.19: Example 6.....	53
Figure 4.1: Home Page.....	56
Figure 4.2: Use Case Diagram.....	60
Figure 4.3: Activity Diagram of Home Page.....	61
Figure 4.4: Sequence Diagram of Home Page.....	62
Figure 4.5: Activity Diagram of Change Garage System.....	63
Figure 4.6: Sequence Diagram of Change Garage System.....	64
Figure 4.7: Sequence Diagram of Change Garage System.....	64
Figure 4.8: Activity Diagram of Change Garage System.....	65

Chapter 4 IMPLIMENTATION.....	54
1 Introduction.....	55
2 Architecture.....	55
2.1 Server side.....	56
2.2 Client side.....	58
3 Application scenarios.....	59
3.1 Scenarios diagrams.....	59
4 Interfaces.....	66
5 Technologies used.....	67
5.1 Arduino IDE.....	67
5.2 Star UML 2.7.0.....	69
5.3 HTML5.....	69
5.4 CSS3.....	70
5.5 jQuery.....	70
5.6 JavaScript.....	70
5.7 Bootstrap.....	71
5.8 Sublime text.....	71
6 Conclusion.....	71
GENERAL CONCLUSION.....	72
REFERANCES.....	74
Figure 3.9: Membrane 3x4 Matrix Key pad 3x4.....	48
Figure 3.10: Standard 4Tape Liquid Level Sensor with Plastic Casing.....	49
Figure 3.11: Liquid Flow Meter - Inlet 1/2" Nominal Thread.....	50
Figure 3.12: Half Size Breadboard.....	51
Figure 3.13: Resistor Examples.....	52
Figure 3.14: example 1.....	52
Figure 3.15: example 2.....	52
Figure 3.16: Example 4.....	53
Figure 3.17: Example 3.....	53
Figure 3.18: Example 5.....	53
Figure 3.19: Example 6.....	53
Figure 4.1: Home Plan.....	56
Figure 4.2: Use Case Diagram.....	58
Figure 4.3: Activity Diagram of Fixing Temperature Scenario.....	61
Figure 4.4: Sequence Diagram of Fixing Temperature Scenario.....	62
Figure 4.5: Activity Diagram of Closing Garage Scenario.....	63
Figure 4.6: Sequence Diagram of Closing Garage Scenario.....	64
Figure 4.7: Sequence Diagram of Opening Garage Scenario.....	64
Figure 4.8: Activity Diagram Gas detection scenario.....	65

GENERAL INTRODUCTION

An increasing number of common household devices is being connected to the Internet. The set-top box was one of the first to be equipped with an Internet connection to enable interactivity, but recently also smaller devices become connected. There are many examples of already commercially available devices, like thermostats, light switches, LED lights, etc. Together, this Internet-of-Things (IoT) results in a smart home environment where the configuration of IoT actuators (e.g. desired temperature or light level) is adjusted to the preferences and routines of its residents. Automated control algorithms are typically implemented as rule-based systems that perform well under expected situation.

Real-time context construction has however largely remained unaddressed by the IoT research community. Humans cannot be completely casted in rules, and the home resident's desires might change instantly. In these unanticipated situations the user will want to manually override the automated object setting, at least temporarily. The configuration and settings of connected objects are typically managed in one of two ways: by web services in the cloud, or by a companion app on the mobile device of the resident. The commercial reality of a multi-vendor environment results in a modern version of the 'basket of remotes' problem. All users are connected to the same server using the same application. Clearly, smart homes must be configurable via an intuitive interface, common to all actuators, that enables ad-hoc interactions in an unobtrusive way. We are currently building a prototype that meets these requirements. The idea is that users can adjust an actuator directly by using only their mobile devices to perform the actual operation. Users could then simply increase the room LED.

The organization of my dissertation is as follows: Chapter one deals mainly with Internet of Things (IoT) vision and its components, where we explain the utility of Internet protocol IP and some of its versions features, in particular IP 6, Alongside with IoT Applications Protocols. We talk also about some critical issues, such as security and privacy.

Chapter two gives an overview about the smart home (home automation). We introduce a brief history of smart homes from traditional visions to modern smart homes. We also present many approaches that have been adopted in smart homes technologies, some types of local networks and microcontrollers that we can use to realize home automation projects, then we give ...

In chapter three, we talk about the famous controller Arduino, and present its basic functionalities. We talk about Arduino shields, sensors and controllers destined for smart home

projects and electrical background. We should mention that Arduino is the controller that we have used to realize our contribution.

Chapter Four presents our approach for controlling smart homes via different smartphones. In this chapter we introduce first a graphical representation of smart home, and how their components including the Arduino controller are connected, and how they interact with smartphones of different family's members. After that, the two main sides of our realization, which are client side and server side are presented. Some scenarios are presented as well. We finally conclude by giving an insight on our mobile web application.

GENERAL CONCLUSION

Automating your home is feasible these days. Although, it has been around for a while, it has not been a potential option for a lot of people due to its immense cost. However, thanks to the development of Android and Arduino technologies, practically anyone can implement some kind of automation at their home. Although microcontrollers have been in home automation solutions for a long time, none of them have been open-hardware and open-source. The emerging of microcontrollers like Arduino fosters the development of smart homes solutions. With the add-on modules Arduino gives us endless opportunities to link and configure different devices in our home. By implementing the wireless-based systems, we showed how Arduino can be adapted in a smart home environment.

In this dissertation, we have implemented a smart home system that enable us to control electronic devices at home remotely via different smartphones at the same time, and to receive alerts on the situation of the smart home including for instance the situations of emergencies. The results were satisfying. The devices were controlled by sending instructions using local network. A LED light was used to show the demonstration of an electronic device management. Arduino Uno Board was used as a microcontroller while the W5100 Ethernet model was used for communication between the microcontroller unit and the mobile station. We created a multiplatform mobile phone application which is web mobile application used to control our hardware. Any mobile have the application can control our home.

The home automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet. The designed system does not only monitor the sensor data, like temperature, gas, light, motion sensors, but also it does actuate a process according to such requirement. For example, switching on the light when it gets dark. This will help the user to analyze the conditions based on various parameters in the home anytime and anywhere.

Future work

Due to some financial issues and the non-availability of some equipment, we were unable to realize some parts of our system, so using this system as framework, the system can be expanded to include various other options which could include:

- home security features like capturing the photo of a person moving around the house and storing it onto the cloud. This will reduce the data storage than using the CCTV camera which will record all the time and store it.
- The system can be expanded for energy monitoring, or weather stations. This kind of a system with respective changes can be implemented in the hospitals for disable people, or in industry, where human invasion is impossible or dangerous, and it can also be implemented for environmental monitoring.

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ملخص:

يختلف نظام التشغيل الآلي للمنزل الذكي عن الأنظمة الأخرى عن طريق السماح للمستخدم بتشغيل النظام من أي مكان في جميع أنحاء العالم من خلال الاتصال بشبكة الانترنت. عملنا يتمثل في تقديم نظام ألي المنزل باستخدام اردوينو أونو التي تعمل دمج الاتصالات اللاسلكية، والشبكة المحلية مع الهاتف الذكي للمراقبة والرصد لتمكين المستخدم بواسطة جهاز التحكم عن بعد من تشغيل أو التحكم بمختلف أضواء، والمرابوح، والأجهزة داخل مجال شبكتهم. يقوم النظام تلقائيا بالتحكم على أساس بيانات الاستشعار. تم تصميم هذا النظام ليكون ذو تكلفة منخفضة وقابلة للتوسيع مما يسمح بالتحكم بمجموعة من الأجهزة.

كلمات مفتاحية: المنزل الذكي، المنزل الأوتوماتيكي، الأردوينو، هاتف ذكي.

Abstract

The home automation system differs from other systems by allowing the user to operate the system from anywhere around the world through internet connection. Our work presents a Home Automation system (HAS) using Arduino Uno that employs the integration of wireless communication, and local network with smartphone controlling and monitoring to provide the user with remote control of various lights, fans, and appliances within their home. The system will automatically change on the basis of sensors' data. This system is designed to be low cost and expandable allowing a variety of devices to be controlled.

Keywords: Home Automation, Smart Home, Arduino, Smartphone.

Résumé

Le système domotique diffère des autres systèmes en permettant à l'utilisateur de faire fonctionner le système de partout dans le monde entier grâce à la connexion Internet. Notre travail, présente un système Home Automation (HAS) en utilisant Arduino Uno qui emploie l'intégration de la communication sans fil et réseau local avec smartphone de contrôle et de surveillance pour fournir à l'utilisateur le contrôle à distance des différentes lumières, ventilateurs et appareils au sein de leur champs. Le système change automatiquement sur la base des données des capteurs. Ce système est conçu pour être à coût raisonnable et extensible permettant une variété d'appareils à contrôler.

Les mots clé : Maison Intelligent, Maison Automatique, Arduino, Smartphone.