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Home Automation using Raspberry Pi 3

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Abstract: *This paper provides an effective and flexible home control and monitoring system with the aid of an integrated micro-web server with IP connectivity for access to and control of equipment and devices remotely using. The proposed system does not require a dedicated server PC with respect to similar systems and offers a new communication protocol for monitoring and controlling the home environment with more than just switching functionality. Smart home interfaces and device definitions to ensure interoperability between Rasberry pi devices from various manufacturers of electrical equipment, meters and Smart Energy enables products to allow manufactured. We introduced the proposed home energy control systems design intelligent services for users.*

Keywords: *Rasberry pi, Smart Home, Home Automation.*

I. Introduction

Intelligent management of the power system, facilitate the joint use the current and minimizes power loss during transmission and power consumption is highlighted by the global community, academic institutions, and State administration. To gain full utility and customer protection dimensions, the idea of a smart grid enabling technologies used in In recent years, attracting a great deal of attention in the energy industry and academia Such studies. With continued growth in popularity and functionality of mobile devices, demand advanced mobile applications widespread human life continue to grow. The use of Web Services is an open and interoperable method for providing remote access service or applications can communicate with each other. An attractive market for home. Automation and network of busy families and individuals will be physical Limitations. electronics prototyping platform based on Flexible, easy-to-use hardware and software. The microcontroller Board of Based on the AT megha16. The Low-voltage switching relays were used to integrate Devices with Controller is to show switching functionality. The LM35 temperature Sensor is used to control a smart home environment. A supervisory control system Intranet, low cost and high performance can react The Wifi technology. An end node, the node sends data to the coordinator, and the coordinator Hub sends the data back to the terminal end of the loop. Since all devices have their own IP Address based on IPv6, they can be directly connected to an external network. So, all smart devices It can not only through the handheld remote control device to the central and local home, but can also be controlled remote computer control through the introduction of home Internet Gateway machine.

II. Related Work

Smart Home is applied in order to provide comfort, energy efficiency and better security. Smart Home System is still rarely used in Indonesia because of the cost and the difficulty of getting the device. The objective of this paper is to offer a Small Smart Home System designed and created by utilizing WLAN network based on microcontroller. The system is able to monitor and control lights, room temperature, alarms and other household appliances. Results from testing the system show proper control and control monitoring functions can be performed from a device connected to a network that supports HTML5. [1].Smart home network excite new possibilities. We proposed a new smart home energy management system based on Wifi sensor networks to make home networks more intelligent and automatic . The role of the SHEMS for managing energy usage is a crucial factor in addressing the home's growing energy concerns. The Smart Energy initiative serves these needs by providing an adoptable and sustainable experience by linking new and useful digital technologies to the needs of consumers. By empowering consumers with near real-time information of their energy usage through an array of products and services, the intent is to help consumers use energy more efficiently and also to minimize their personal impact on the environment.

We implement the proposed system and develop related hardware and software. We suggest new SHEMS based on the proposed system. We expect that our work contributes towards the development of ubiquitous home networks. As a part of future work, we will apply IEEE 802.15.4 standard technology in our home. [2]. Wireless sensor networks (WSNs) and power line communications (PLCs) are used in this work to implement a smart home control network. i**nternal Communication** Every data transmit between

Wifi networks can be communicated by each other, so people in any room can control the other room's devices. The query flow-work of home appliance is shown as follows: Appliance receives information from home gateway by Wifi module and detects the household appliance's status, and the corresponding status will be transmitted to the home gateway by Wifi module. If all appliances work properly, home gateway stores appliances' status. If not, home gateway reports an error message to supplier.

Hardware Implementation and Home Automation Devices

The Atmegh 16 and Wifi were used to implement the micro server for the Home gateway in figure 4. Home gateway connects to the Internet a. The microcontroller that uses ATMEGA 16, an Atmel AVR processor which can be programmed by the computer in C language via USB port. LM35 temperature sensor was used for temperature monitoring while a non-invasive 30A current sensor was utilized for power monitoring. Used to successfully integrate the current sensor with the Atmegha 16. The hardware architecture presented is flexible and allows other home appliances and devices to be seamlessly integrated with minimal changes. [6]

Energy Management

Consumer-side energy management is a part of the smart grid program. The customer can control the power consumption according to the power line's load, Smart-grid enabled smart homes with time-of-use metering and energy management devices and tools help consumers monitor, manage and control energy usage, while helping them optimize performance and reduce energy losses from major appliances, heating, cooling and lighting. With a smart home energy management system, consumers can manage energy usage and costs throughout the day, without compromising their lifestyles. The network architecture of SHEM system.

System Architecture

In the proposed design, a low cost smart home system for remotely controlling and monitoring the smart home environment is presented. An overview of the proposed system architecture is shown The sensors and actuators/relays are directly interfaced to the main controller.

.WIFI WIFI

Wifi is an open global standard built on the IEEE 802.15.4 MAC/PHY. Wifi defines a network layer above the 802.15.4 layers to support advanced mesh routing capabilities. The Wifi specification is developed by a growing consortium of companies that make up the Wifi Alliance. The Alliance is made up of over 300 members, including semiconductor, module, stack, and software developers in figure 12.[11]. Wifi Series 2The difference between Series 1 (S1) and Series 2 (S2) isthat the latter enhances the power output of the antenna to 2mW. S2 also enhances the data protocol of the Wifi module.S2 is similar to S1 in enabling simple and easy communication between microcontrollers and supporting point-to-point and point-to-multipoint communication. [12]

The entire system in this project was to make the appropriate size component is a device smaller and can fit into the existing switch housing designed. The prices also become a factor in the component selection of the components.

Procedure

1. The function of the relay module as normal switch "ON" and "OFF" will turn a lamp. An infrared detection system consists of infrared sensor as an input, while the relay module as starting Atmegh 16. The Wifi is a feature-rich RF module for use on a wireless sensor network. The IEEE 802.15.4 protocol greatly reduces the work of the programming f ensuring data communications. The Wifi has many other features for use in a WSN beyond its networking ability. Now that you have a better understanding about the Wifi's features and uses, we will look at means of interfacing the RF Wifi to your microcontroller and showing examples of use.[14].
2. The access point consists of that can connect to the Internet and transmission of data to hosting server . website. This smart switch device, the lamp in a house controlled manually with the infrared switches detection system or wirelessly with C# App. You might be wondering why you should go through the trouble of building a native client when the web application we wrote can be accessed by the web

browser. Well, if all you wanted to do was toggle light switches on and off, then I would say you don't need a native client.

Building the Solution

In order for X10-managed lights and appliances to be remotely controlled, we are going to assemble a variety of separate technologies and use them in a unified way. We will do the following:

1. Test the X10 computer interface and modules with the application.
2. Create a s application that provides a C#- based front end.
3. Create an Server application that will communicate with the Rails application, turning the light on and off via a native onscreen toggle switch control.

III. Implementation Of Smart Home Control Network

Wifi networking module circuit and sensors Wifi technology is a new type of wireless, short, low power network communication technology, which has so many technological advantages, such as low complexity, low Total wireless and Internet communication system architecture. Each Smart-

Switch devices had their own address. The address name is the number of smart switch device to follow as the address name of the smart switch unit 1 is smart switch node 1 and the address is the number of this unit to follow until the last units are in used a house. The access point has been installed on the first floor. The smart switch devices on the first floor can be communicated to the access point with single-hop radio frequency protocol (RF). The smart switch equipment to the second floor cannot communicate directly to the access point because the signal x bee is loss due to obstructions.

IV. Result And Specifications

A. power management atmosphere is easy to control. Where it represents the active administration of energy management, flexible and scalable according to the needs and desire. Design and implementation of a smart home system The purpose of the system is to use the integrated installation Wifi mobile phone for automation without a lot of equipment and less expensive as well as what the high response system Wifi communication with wireless connection and less hostess between the transceiver and the server and Wifi Series 2 Hardware and software. Making better use of energy in the house by remote control by the technical system represented structuring sensor remote Wifi Smart house consists of a server with the wireless system where the of server logs.

DESIGN REQUIREMENT FOR SHM FRAMEWORK-BASED IoT

Parameter	Requirement
Sensing modules	Thousands of sensors and actuators are needed for large-scale network
Motes	Tmote Sky, Zolertia Z1 motes or MicaZ
Operating system	Contiki OS
Network topology	Multi-hop mesh network
Mobility	All static
Transmission range	50 ~ 300m
Max. Bit Rate	250 Kbit/s
Nodes Power source	Often from internal Batteries
Network lifetime	~ 5 years
Wireless channel	2.4 GHz, Low-power radio based ZigBee 3.0 protocol
Identification	IPv6 addressing on each node
Gateways	Sink node acting as border router
Routing	RPL - Evaluate with link throughput metric and or energy routing metric
Transport	UDP, QoS at transport
Application	Web-based application using CoAP protocol
Databases	NoSQL document databases (CouchDB, Couchbase server)
Processing platform	Spark engine
Other considerations	Time synchronization, low throughput, low latency
Security	Security protocols based on cryptographic algorithms for data encryption

Fig 3. New Architecture

In this paper we propose a new architecture for the monitoring and control system that uses a flexible home- based at a reasonable price and implemented by Wifi wireless transceiver The proposed architecture is used in a quiet based web services in an interoperable application layer for communication between the remote user and the home device. All , the Wi-Fi connection is the support built, the home access device to control.

The main characteristics of these solutions
are as follows.

1) Most of the solutions use licensed or unlicensed spectrum bands (cellular or noncellular technologies).
2) Low-power consumption, which provides a long life of sensing devices battery and increase network lifetime from 5 to 10+ years.
3) The selection of reliability and safety sensors.
4) Data rate from 100 b/s to 250 kb/s.
5) Short or long geographical coverage (Wifi/IEEE

802.15.4 standards, low-power Wi-Fi, or LPWAN technologies).

References

[1]. Andi Adriansyah, Akhmad Wahyu Dani" Design of Small Smart Home System Based on Arduino" 2014 Electrical Power, Electronics, Communications, Controls, and Informatics Seminar (EECCIS)

[2]. Dae-Man Han and Jae-Hyun Lim, Member, IEEE" Design and Implementation of Smart Home Energy Management Systems based on Wifi" IEEE Transactions on Consumer Electronics, Vol. 56, No. 3, August 2010

[3]. Mingfu Li, Hung-Ju Lin" Design and Implementation of Smart Home Control Systems Based on Wireless Sensor Networks and Power Line Communications" 10.1109/TIE . 2014 .2379586, IEEE Transactions on Industrial Electronics.

[4]. Kim Baraka, Marc Ghobril, Sami Malek, Rouwaida Kanj, Ayman Kayssi"Low cost Arduino/Android-based Energy-Efficient Home Automation System with Smart Task Scheduling" 2013 Fifth International Conference on Computational Intelligence, Communication Systems and Networks.

[5]. Zhenyu Zoua, Ke-Jun Lib*, Ruzhen Lia and Shaofeng Wub " Smart Home System Based on IPV6 and WIFI Technology" Procedia Engineering 15 (2011) 1529 – 153

[6]. Rajeev Piyare "Internet of Things: Ubiquitous Home Control and Monitoring System using Android based Smart Phone" International Journal of Internet of Things 2013, 2(1): 5-11

[7]. Yue Li " Design of A Key Establishment Protocol for Smart Home Energy Management System" 2013 Fifth International Conference on Computational Intelligence, Communication Systems and Networks

[8]. Shiu Kumar"UBIQUITOUS SMART HOME SYSTEM USING ANDROID APPLICATION" International Journal of Computer Networks & Communications (IJCNC) Vol.6, No.1, January 2014

[9]. Andi Adriansyah, Akhmad Wahyu Dani" Design of Small Smart Home System Based on Arduino" 2014 Electrical Power, Electronics, Communications, Controls, and Informatics Seminar.

[10]. IBoard datasheet by "www. iteadstudio.com " Tech Support: support@iteadstudio.com

[11]. Wifi datasheet by Digi International, Inc. All rights reserved"www.digi.com" rf-experts@digi.com

[12]. Nazrul Anuar Nayan, Ili A.M. Ikhsan, Yasuhiro Takahashi " Using Wifi Communication Technology in a smart Home Wireless Sensor Network "Proceedings of Second International Conference on Modern Trends in Science, Engineering and Technology 2014"

[13]. Arduino Technical specs "www.arduino.cc/en/Main/arduino boarduno"

[14]. " Getting Started with Wifi RF Modules" Version 1.0 by Martin Hebel and George Bricker with Daniel Harris.