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Occupancy Monitoring for Smart Building Based on IOT

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ABSTRACT:

Internet of things (IOT) is a vision towards future internet where "things" are provided with enough intelligence to communicate with each other without the human intervention. With the proliferation of internet of things (IOT) devices such as smart phones, sensors, cameras and RFID etc. It is possible to collect massive amount of data for localization and tracking of people within commercial buildings. This proposed occupancy monitoring develop effective data fusion techniques for improving occupancy monitoring accuracy using a multitude of sources for the occupancy collection of data, IR sensors are used for the detection of existence of the persons and it will count the people in the buildings .

Keywords:

Occupancy monitoring, Energy-Efficiency, IOT, Sensor, Localization, Wi-Fi, Alarm.

1. INTRODUCTION:

With the proliferation of internet of things (IOT) devices such as smart phones, sensors, cameras, and RFIDs, it is possible to collect massive amount of data for localization and tracking of people within commercial buildings. Enabled by such occupancy monitoring capabilities, there are extensive opportunities for improving the energy consumption of buildings via smart HVAC [1] [14] control. In this respect the major challenges we envision are following 1) To achieve occupancy monitoring in a minimally intrusive way e.g. using the existing infrastructure in the buildings and not requiring installation of any apps in the users smart devices, and 2) To develop effective data fusion techniques for improving occupancy monitoring accuracy using a multitude of sources.

This paper surveys the existing works on occupancy monitoring and multi-modal data fusion techniques for smart commercial buildings. Buildings are known to be one of the largest consumers of electricity; the US Department of energy estimates that buildings consume 70% of the electricity in the US. Recent efforts have focused on making buildings more energy efficient [5], including research that target specific areas such as lighting and managing IT energy consumption within buildings. Smart buildings are becoming a reality with the integration of building management systems (BMS) [1][6]. With an underlying monitoring and communication infrastructure [4] that consists of smart devices such as sensors, cameras, RFIDs, meters, and actuators.

These smart devices, along with the communication infrastructure, are referred to as internet of things (IOT). These approaches have certain drawbacks with respect to accuracy, cost, intrusiveness, and privacy. Accuracy, cost and intrusiveness are inter-related in the sense that with the increased cost, you can deploy additional devices (such as various sensors, RFIDS, cameras) and increase the accuracy of the system while at the same time increase the intrusiveness. Therefore [10], a wise method to reduce costs is to rely on the existing infrastructure as much as possible. This automatically addresses the intrusiveness issue since there will be no need to deploy additional devices inside the rooms and additional applications on the users' devices. None the less, this raises the question of accuracy which may be severely affected. This paper provides [18] an analysis of the existing approaches and help address therefore mentioned issue by promoting the use of multi-modal data fusion that will be collected from the existing IOT network.

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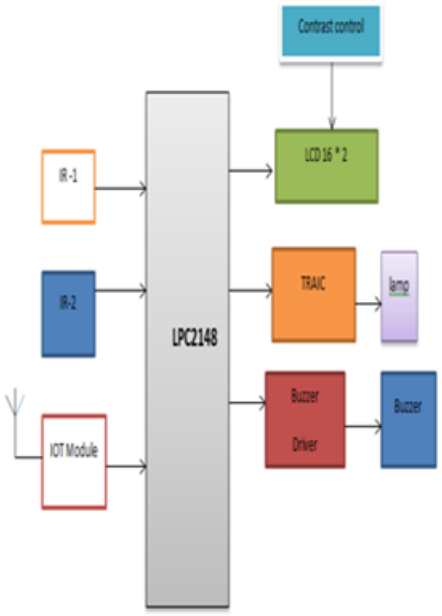
A data fusion process could improve the accuracy of occupancy detection while maintaining a low intrusiveness. By exploiting the system energy among the available data, information fusion techniques can filter noisy measurements coming from IOT devices and make predictions and inferences about occupancy status. Specifically, we first analyze the variations of the problem and the available IOT devices and then survey the existing works with respect to these assumptions. There are a number of variations when we refer to occupancy monitoring problem. These are interrelated but depending on the goal of the application, in the past, various forms of the problem are studied for occupancy detection. This problem studies whether a space is occupied or not at a given time. This is typically in the form of binary answers which does not tell how many people exist if the space is occupied. The spaces considered here are typically offices or private spaces. These all problem are overcomed by using this system.

2. PROPOSED SYSTEM:

In this paper, for the occupancy collection of data, IR sensors are used for the detection of existence of the persons and it will count [2][3] the people in the buildings entering that is these sensor are used for obstacle detection, depending on that obstacle, the data will be displayed on LCD and occupancy on mobile phone or computer. IR sensor interfaced with microcontroller if any any obstacle detected [7] then it will turn on the energy devices [22]. At the exit also the sensor is used to reduce the count as they are out of the building. If count decreased then turn off the energy devices. The sensor is IR pair, infra red made of LED and a Photo transistor. This enhances the occupancy data in the buildings, leading to the smart buildings. This data will be displayed on the Phone as well the computer using IOT module. Due to that IOT module the system will become real time. The information will be displayed on the LCD. LCD 16*2 is interfaced to the controller used. The Buzzer is also connected to the Microcontroller, so that the alert will be issued to the security people.

Whenever IR sensor detect obstacle then buzzer automatically alerts, it is used for security purpose [8]. The IOT module is interfaced to the controller to send the information of occupancy to the concern person or the authorities of the smart buildings [24]. This output of this system can be checked at the Android mobile Phone or in the computer. This system uses the voltage according to the controller used here.



3. HARDWARE MODULE: ARM7:

The LPC2148 are based on a 16/32 bit ARM7 TDMIS ™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol

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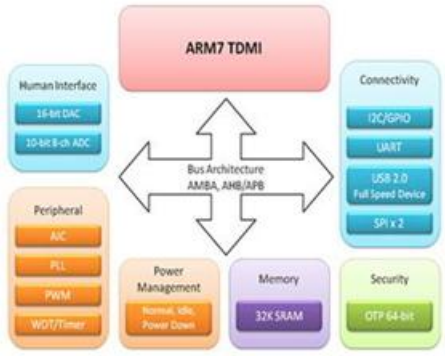
converters and embedded soft modems as well as many other general-purpose applications.



4. ESP8266EX:

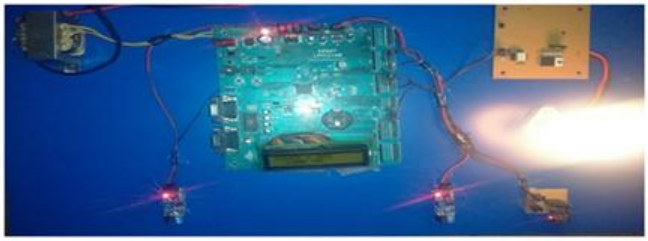
• 802.11 b/g/n
• Integrated low power 32-bit MCU
• Integrated 10-bit ADC
• Integrated TCP/IP protocol stack
•Integrated TR switch, balun, LNA, power amplifier and matching network
•Integrated PLL, regulators, and power management units upports antenna diversity
• WiFi 2.4 GHz, support WPA/WPA2
•Support STA/AP/STA+AP operation modes
• Support Smart Link Function for both Android and iOS devices.

5. APPLICATION:

It is mainly used for offices, colleges, school.
In hotels.
The need for this device is for occupancy monitoring for smart building.
It is beneficial for hospitals.
In industry.

6. IMPLEMENTATION RESULT:

The system 'OCCUPANCY MONITORING FOR SMART BUILDING BASED ON IOT' is successfully implemented and verified. The IOT based buildings will help save energy will minimize human efforts in few circumstances. The in-built system is for safety due to IOT module. It doesn't need manual effort and automatically takes required mitigation steps before any efficiency purpose. Following fig. shows hardware structure.



CONCLUSION AND FUTURE SCOPE:

It can be concluded that we are able to design a Smart building with a safety system to save energy and reduce manual effort using the various sensors and Wi-Fi in this study. We have shown implementing a system which will Wi-Fi and sensor setup to occupancy detection in a building. Results of tests indicated that this system could help users automatically turn ON or OFF fans and light based all energy consuming devices. The developed system effectively monitors and controls the occupancy monitoring for energy efficient smart building. Thus, the real-time monitoring of the electrical appliances can be viewed through a website. The system can be extended for monitoring the whole intelligent building. Finally, we investigated the current efforts where IOT comes into picture with the involvement of smart phones and Wi-Fi APs. There is a large and growing demand for this service. In future, work carried by using wareable sensor or watches. As well as in future we work on battery instead of power supply.

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