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ARDUINO BASED INTELLIGENT BUILDING MANAGEMENT SYSTEM USING IOT

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ABSTRACT

The Internet of Things (IoT) is a fast-growing technology. The Internet of Things (IoT) is a network of physical items or things that are integrated with physics, software, sensors, and network properties, allowing them to collect and share information. In this article, we're creating a system that can mechanically monitor Building applications and issue Alerts/Alarms or make intelligent decisions using the Internet of Things. The Internet of Things has provided India with a great opportunity to develop sophisticated industrial systems and applications via the use of wireless devices and sensors. This review paper's key contribution is that it highlights the applications of IoT in sectors that monitor buildings.

Key Words: Building Management System (BMS), ArduinoIDE, Embedded System, Automation, Building services,Sensor.

1. INTRODUCTION:

In today's world, there is a persistent requirement for automated appliances. With the expansion in the way of life, there is a sense of urgency for creating circuits that would facilitate the complexity of life. While planning an intelligent building, a Building service engineer, an Architect & Hardware Engineer is required, but in the case of the ordinary building, a Building service engineer and an Architect are enough. For many years, buildings that offer comfortable, a flexible and energy efficient living environment at a minimal cost has been the expectation of building owners and occupiers. To achieve this goal, a variety of advanced building technologies have been developed in the past two decades, aiming to improve the building performance to satisfy a variety of human needs and environmental sustainability. Building automation frameworks are the smart systems that include a combination of suitable software and hardware which are utilized for automation of computer systems. This system ease usage of important functions such as gate opening, door opening, lighting, fire

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extinction, and security. Some building automation systems can also provide an emergency alert service. However, current building applications have some common problem, such as comprehensive functions operate in isolation, can't be managed in overall fashion although overall management's tremendous potential in future applications. European Union supported Building as a Service (BaaS) project deals with this various problem which aims to provide a comprehensive software platform for present and future commercial building management and building innovation, with flexible and cost-efficient integration of mentioned services, an overall management idea is targeted.

2. GOALS AND OBJECTIVE

Goals:

The main goals of our system are, Central controlling facility Automate and take control of various operations, manages all the systems which coordinates various systems to provide a comfortable working environment in an efficient way. To provide a best facility in building area and reduces the human effort.

Objective:

The main objective of our system is to provide building automation in building area like opening and closing gate via RFID card, smart common area lighting depends on object motion or human motion, smart door lock system using keypad as well as fire detection and alert to main system etc.

Purpose:

Behind choosing this project, automated central control system in all modern big buildings is very important and necessary for the qualitative improvement of the working conditions as well as rational energy distribution. All buildings system have some form of mechanical and electrical system in order to provide the functional necessary for maintaining exact working environment.

3. LITERATURE REVIEW

IoT Based RFID Gate Automation System:

The main aim of the system is that it utilizes the RFID framework alongside IOT which is the eventual fate of electronic correspondence. Here we likewise supplant the microcontrollers prior utilized with a raspberry pi 2 which is a mini processor that is both a microcontroller just as a server. The vehicle that should be approved is given a RFID tag with an exceptional number. Presently when the vehicle comes to close to the door RFID tag peruses the code, and send a flag to raspberry pi which checks for the relating subtleties of the one-of-a-kind number and on the off chance that it matches with the spared information in the database, at that point it again makes an impression on the engine which opens the entryway. The IN and OUT time of each vehicle that enters the are is spared in a database

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and furthermore a web server which encourages us to get to those subtleties wherever we are utilizing IOT.

Automatic Room Light Controller with Visitor Counter:

In these projects, they designed and implemented a BiDirectional Counter & Home Automation utilizing the idea of an Embedded System. The objective clients of the project can be anyone right from a common man to any association. Suppose if anyone uses our project for Seminar Purpose then the track reputation of the persons attending the seminar will give the exact idea about the no. of person attending and leaving the seminar and accordingly the Project Model will control the Electronics Gadget of the room. This type of project is useful in developing countries and this project has a splendid future. In this computerized world, Technology is very advanced and we prefer things to be done automatically without any human efforts.

Design and Implementation of a Digital Code Lock using Adriano:

Digital code lock system is totally depending on arduino. Arduino has been the brain of thousands of embedded projects. We can set the PIN and reset it without using external device. It is useful. It is 90% working and can be easily developed. The project explain here is based on Arduino and is simpler and more reliable than simple microcontroller based digital code lock. Here is an LCD display which is used to interface with the project to output lock status. In this project, we

have an additional advantage that the user can change the PIN. The user will be prompted to set a password at installation. This password inputted at installation will continue to serve the lock until it is changing. The program will check for the current password and allows the user to change Password only if the current password is input correctly. Applications: It can be used in places where we required more security. It can also be used indoor, lockers, offices, main gate of the house, ATM etc.

4. SYSTEM ARCHITECTURE

Block diagaram:
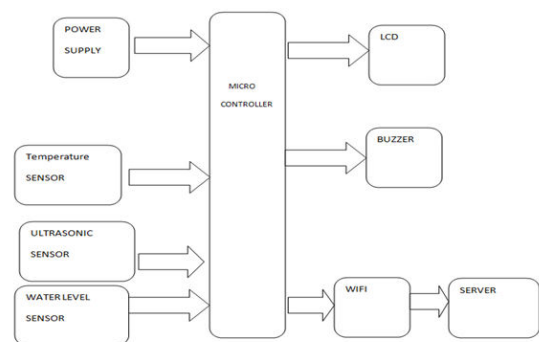
5. DESCRPTIONOFCOMPONENTS

ARDUINO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.
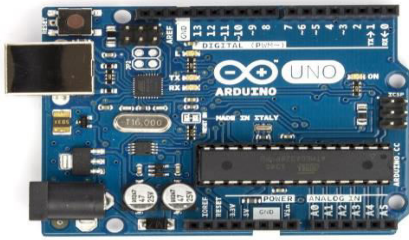
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Fig 5.1: Arduino

BUZZER

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.

Fig 5.2: Buzzer

TEMPERATURE SENSOR

A sensor (also called detectors) is a device that measures a measurable attribute and converts it into a signal which can be read by an observer or by an instrument. For example, a mercury-in-glass thermometer converts the measured temperature into expansion and contraction of a liquid which can be read on a calibrated glass tube. A thermocouple converts temperature to an output voltage which can be read by a voltmeter.
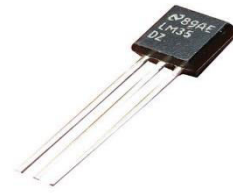

Fig 5.3: TEMPERATURE SENSOR

GAS SENSOR MQ 135:

MQ gas sensors are a family of sensors which are used to detect a wide variety of gases like alcohol, smoke, methane, LPG, hydrogen, NH3, Benzene, Propane etc. These sensors are made up of electrode which is coated with a sensing material, and it is heated to make it more reactive and sensitive.

Fig 5.4: GAS SENSOR MQ 135

LIGHT DEPENDENT RESISTOR

A photoresistor or light dependent resistor is an electronic component that is sensitive to light. When light falls upon it, then the resistance changes. Values of the resistance of the LDR may change over many orders of magnitude the value of the resistance falling as the level of light increases.
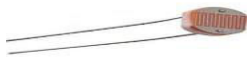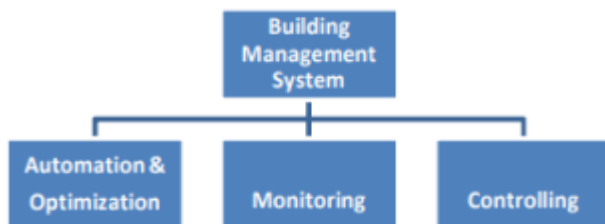
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Fig 5.5: LDR

6. BASIC FUNCTION AND WORKING MODEL OF BMS

In the comfort way of human lifestyles in the building, there are many systems has automated, with increase the almost all the function to throughout all the system with less economics introduces. The building structure is equipped with electronic circuits, monitoring, controller, sensors, and DC motors. To provide better security. Sensor and hardware part are implemented. Light control, fire system, gate open close, door control proposed here. Keeping in the mind internal facility has also automated, controlling light in buildings should be necessary. Keeping all the things in the mind all the system are introduces building automated here.

Building automation systems

Most basic criteria for building automation operation for commercial buildings are to ensure comfort for users and security of the building, by controlling building technological infrastructure, while minimizing energy consumption. The comfort means providing optimal conditions of indoor thermal parameters and indoor air quality (CO_2 and humidity) and parameters of indoor lighting of a workplace and common areas. The security means to execute the functionality of occupancy monitoring, controlling who has access to protected areas of the building and alarming by I&HAS (Intruder & Holdup Alarm System).

Smoke alarm system:

Smoke evacuation systems are vital to the safety of building living people and other visitors in your building. The system detect the smoke contain then system gave the alert message. A smoke or fire is detected with the help of MQ3 sensor. A smoke evacuation system identifies where the smoke originates from and controls the movement of the smoke so it does not reach exit areas and other safe zones within the building. Whenever smoke or fire is detected that time buzzer or alert system will be active.

Light model:

In this module the wastage of energy is reduces. In this model the system on the light depend on the person availability of the people. When person move from corridor then light will be ON/OFF. We use IR sensor for detect the object or motion in corridor or common area for glowing lights or LED.

RESULTS
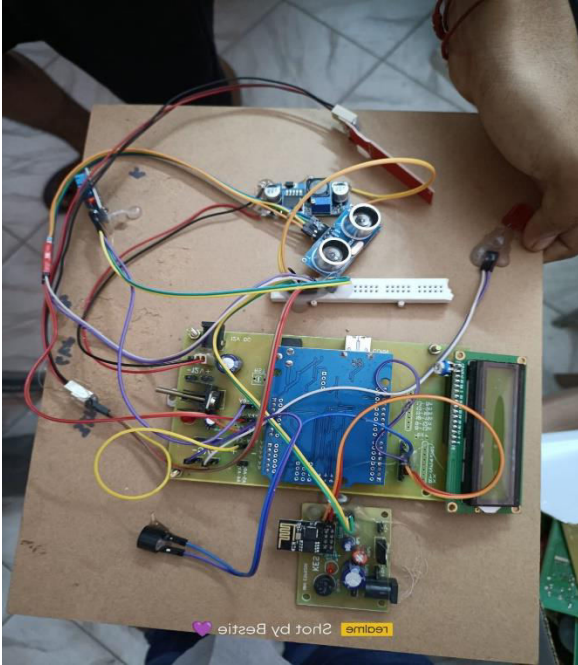
Hardware prototype

CONCLUSION:

For the most part, we can say that the intelligent building management system is a set of software and hardware for monitoring and controlling different sections of a building. In this 21st century with the advent of the several artificial intelligent technologies the work places became very cozy to work with. It has changed the uncondensed working environment leading to the increased output and also lessen the running cost to a certain extent. Lighting efficiency it will cut down the electricity bills. But any how today the cost of such equipment's to make a building artificially intelligent is a costly means. With the increase in demand of such systems the cost of these will become affordable as more and more builders will be using such systems in future.

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