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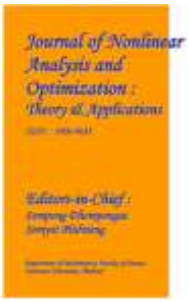

SIGNIFICANT GROWTH IN HOME AUTOMATION AND ITS SECURITY SYSTEM USING ARDUINO

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ABSTRACT
Because automation enables activities to be accomplished with less human interaction and more effectively, it has become increasingly important in today's society (for example, in household and industrial automation). The practise of automating household chores and appliances so they may be managed remotely via a phone or computer is known as home automation. A home security system includes alarm systems, smoke detectors, security cameras, and other sensors. In this project, a home automation and security system is created. The HC-05 Bluetooth module and an Arduino UNO R3 microcontroller board were used to create the Solar Home Automation and Security System, which can be controlled remotely using a smartphone. Arduino is a platform for making electronic projects that is open-source and free. At any point in time, it may be readily programmed, wiped, and reprogrammed.

1. INTRODUCTION

Due to the reduction in the need for human intervention, automation (such as industrial automation and residential automation) has become more and more important in today's society. in a more thoughtful manner
A home security system includes an alarm system, smoke detectors, and video cameras.
Furthermore to any additional sensors that is attached to it
In this project, a home automation and security system is created. Using an Arduino UNO R3 microcontroller board, Smart Home was created. You are able to automate and secure your home using the HC-06 Bluetooth module. Using a Smartphone, the system is managed. The creation of electronic projects Programming, erasing, and reprogramming are easy processes. Solar energy is available at all times, regardless of the day, the hour, the day, the week, or the minute type of energy that comes from the sun.

2. METHODOLOGIES

Bluetooth based Home Automation System :
According to government statistics, the number of Internet users has exceeded 2 to 39 million and the number of SIM cards in circulation has increased by about 400% since the beginning of Myanmar's telecommunications revolution in 2014. .. Myanmar is currently a country with an official population of 53 million and has at least 33 million active mobile phone subscriptions. Currently, most of the mobile phones used in Myanmar are "smartphones", which offer more options than regular mobile phones in case of connection problems. The smartphone usage rate in Myanmar is reported to be 80%. Smartphones typically support one or more short-range wireless technologies such as Bluetooth and infrared, and can send data over these wireless connections. Smartphones can provide computing mobility, ubiquitous data access, and ubiquitous intelligence to almost every aspect of business processes and people's daily lives [1]. One of the smartphone applications developed is

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smart home technology [2]. The foundation for building automation systems for offices and homes is increasing day by day and has many advantages. Industrialists and researchers are working to build efficient and affordable automated systems to monitor and control a variety of machines such as lights, fans, garage door motors, smoke detectors and other needs [3].]. Today, the use of Bluetooth technology on smartphones is not just used to transfer data and files. In recent years, Bluetooth technology has been used as one of the applications of home automation systems. Bluetooth technology operates without a license, is available at frequencies of 2.4 GHz, and can also connect digital devices in the range of 10m to 100m at speeds up to 3 Mbit / s, depending on the Bluetooth device class. it's different. [Four]. You can control your home appliances by using a home automation system. Therefore, many manual interventions are replaced by reducing manpower and saving time.

Home automation system design. It retains the existing electrical switch and its state is synchronized throughout the control system with a low voltage start-up method, increasing security against the risk of electric shock and providing security to the vulnerable. This article uses a Bluetooth-based home automation system with an Android smartphone and an Arduino UNO microcontroller board. Such a system will allow users to control lighting and water at home. You can use Bluetooth to use your home pump and garage motor and smoke detector. The main requirements of users are Android smartphones and control circuits that are almost every hand these days. The control circuit consists of an Arduino Uno microcontroller that handles user controls for switching devices and detects alarms. Because Bluetooth technology is an inexpensive and secure wireless network, microcontrollers and smartphones are connected using Bluetooth wireless technology. The application also focuses on smoke detection by a secure application for unauthorized users. Remote control is done via a GUI (graphical user interface) -based touch screen operation, such as through a smartphone / tablet with an Android operating system.

3. LITERATURE REVIEW

Home automation:

ADAMYA KUMAR: Technology is a method that never ends. The use of an Arduinouno R3 and Bluetooth to construct a low-value home automation system. This approach is intended to be low-cost and scalable, allowing different types of devices to be managed with just minor changes to the core. Secret protection is used to ensure that only authorised users have access to the equipment' reception.

Pankaj Bhardwaj: I'm Pankaj Bhardwaj, and I'm For more than a decade, the home automation industry has piqued the interest of researchers. Smart phones have become a need for everyone on the planet as a result of the advancement of modern technology. With the rise in energy consumption and population, it is more important than ever to preserve energy in any way feasible. The inability to manage and access equipment from a far

SECURITY SYSTEM

R.ANGELINE: Fire detection in homes is vital to avert property destruction due to both natural and caused fires.

C.K. GOMATHY, M.D. : Fire is the most explosive substance that spreads quickly. Aside from its benefits, it also has drawbacks, such as posing a threat to life and property. Fire accidents claim the lives of many individuals all over the world. Our proposed project, "Fire Alarm System," aims to avoid such occurrences. Whenever it senses smoke or flame, the sensor alerts the nearest fire station and sounds an alarm. Then the appropriate one is notified.

GAS DETECTOR

RHONNEL S. PACULANAN: I'm RHONNEL S. PACULANAN, and I'm LPG leaks are a problem in both the home and the workplace these days. If you do not identify and modify as soon as possible, your life will be jeopardised. The goal of our research is to provide a solution by cutting off gas supply as soon as a gas leak is detected, in addition to raising an alarm.

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Infrared sensor:

PoojaAjmera: An infrared (IR) sensor detects a specific light wavelength in the infrared (IR) spectrum using a select-light sensor. We are now surrounded by electrical and communication gadgets, such as infrared sensors, which are used in a variety of applications. Infrared sensor can be found in any mobile phone with an infrared sensor blaster feature. This feature is used in all electrical gadgets, and these devices are all connected to one device, your phone.

C)BLOCK DIAGRAM:

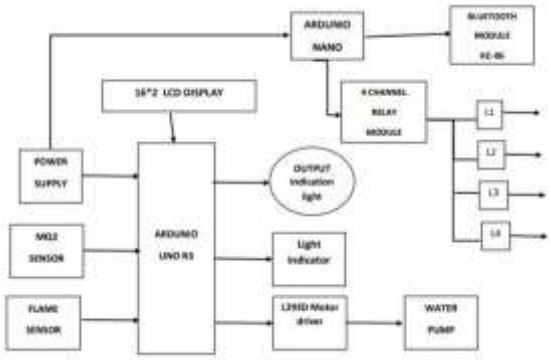

Fig 4.1

The block diagram above depicts a home automation and security system. Ardunio UNO and Nano, MQ2 sensor, 4 channel relay, flame sensor, IR sensor, motor, motor drive, Bluetooth HC-06, LCD display, and power supply are all included.

The Ardunio Uno is the brain of the home automation system, while the Ardunio Nano is the brain of the security system. The system is controlled by the code programmed into the Ardunios, and Bluetooth is controlled by orders received from the Android application.

In this project, the automation system can run four loads at the same time. The display shows the system's stability and status. The system's components are described below.

i)ARDUINO UNO:

The Arduino UNO is the perfect board to get started with electronics and coding. UNO is the most used and documented board for the entire Arduino family. Arduino Uno is a microcontroller board based on ATmega328P. It has 14 digital I / O pins (6 of which can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal, a USB connector, a power jack, an ICSP header, and a reset button. It contains everything you need to support a microcontroller. Connect to your computer with a USB cable, or power on with an ACtoDC adapter or battery to get started. "Uno" means one in Italian and was selected for the release of Arduino Software (IDE) 1.0. Uno Board and Arduino Software (IDE) version 1.0 is a reference version of Arduino and is now evolving to a newer version. Uno board is the first in a series of USB Arduino boards

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Fig 4.2

ii) BLUETOOTH MODULE (HC-06):

HC-06 Bluetooth Module is a smooth to apply Bluetooth SPP (Serial Port Protocol) module, designed for obvious wi-fi serial connection setup. Its communique is thru serial communique which makes a smooth manner to interface with controller or PC. HC-06 Bluetooth module affords switching mode among grasp and slave mode because of this that it capable of use neither receiving nor transmitting data. The Bluetooth module HC-06 is a MASTER/SLAVE module. By default, the manufacturing facility putting is SLAVE. The Role of the module (Master or Slave) may be configured simplest with the aid of using AT COMMANDS. The slave modules can not provoke a connection to every other Bluetooth device, however can receive connections. The master module can initiate connections to other devices. Users can use it as an alternative to the serial port for connecting the MCU to GPS, PCs, and embedded projects.

Fig 4.3

iii)ARDUINO NANO:

Arduino is an open-source microcontroller board that was first released in 2005. It's a platform that makes it simple and inexpensive for anyone interested in building electronic devices that can be programmed to interact with the outside world utilizing sensors and actuators. It offers a wide range of functions, including input, output, processing, receiving, and sending data over the internet. To programmed the Arduino development board, developers use the Arduino Integrated Development Environment (IDE) and C or C++ programming languages. Several variations of the Arduino hardware have been developed throughout time, starting with the Arduino-Uno and progressing to the Mega, Mini, Nano, Lilypad, and other models. The Nano is the tiniest of the bunch, as its name suggests. It isn't as inexpensive as other Arduino boards.

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Fig 4.4

iv) Relay module:

LEDs light up, indicating that the relay is active. The four relays on the module are rated for 5V, which implies that when there is about 5V across the coil, the relay is engaged. The switching transistors serve as a buffer between the relay coils, which require high currents, and the low-current inputs. They magnify the input signal so that the coils in the relays may be driven. Because the coils provide an inductive load, the freewheeling diodes avoid voltage spikes across the transistors when the relay is turned off. When the coil of the relevant relay is powered, the indicator

Fig 4.5

v) IR SENSOR:

Remote controllers and sensing are two examples of wireless applications that use IR technology. The electromagnetic spectrum's infrared component can be divided into three primary regions: near IR, mid-IR, and far IR. Depending on the application, the wavelengths of these three zones differ. The wavelength of the near IR region spans from 700 nm to 1400 nm, the wavelength of the mid-IR region goes from 1400 nm to 3000 nm, and the wavelength of the far IR region ranges from 3000 nm to 1 mm. Fiber optic and IR sensors use the near-IR range, heat sensing uses the mid-IR region, and thermal imaging uses the far-IR region. In comparison to other frequencies, IR has the widest frequency range.

Fig 4.6

vi) GAS SENSOR:

Sensors are technological gadgets that allow you to interact with the outside world. Sensors that detect light, noise, smoke, proximity, and other variables are available. These are now available in both analogue and digital formats, thanks to technological advancements. Sensors are an important aspect of safety systems since they allow for communication with the outside world. Fire sensors are used to detect fires and take the necessary safeguards in a timely manner. Humidity sensors are used to manage humidity in the unit for the smooth operation of control systems and sensitive electronics. MQ2 Gas sensor is one such sensor that is utilized in safety systems to detect dangerous gases. The MQ2 gas sensor is an electrical sensor that detects the concentration of gases in the air, such as carbon monoxide.

Features of gas sensor

- Operating Voltage is +5V
- Can be used to Measure or detect LPG, Alcohol, Propane, Hydrogen, CO and even methane
- Analog output voltage: 0V to 5V
- Digital Output Voltage: 0V or 5V (TTL Logic)
- Preheat duration 20 seconds

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- Can be used as a Digital or analog sensor
- The Sensitivity of Digital pin can be varied using the potentiometer.

Fig 4.7

vii) FLAME SENSOR:

A flame sensor is a sensor that is most sensitive to ordinary light. That's why this sensor module is used in flame alarms. This sensor detects flame if the light source emits a wavelength between 760 nm and 1100 nm. When exposed to extreme temperatures, this sensor is quickly damaged. As a result, this sensor can be placed a set distance away from the flame. The flame detection may be done from a distance of 100cm with a detection angle of 600 degrees. These sensors are utilised as a flame alert in firefighting robots. A flame-sensor is a type of detector that is primarily designed for both detection and response.

Fig 4.8

D)Advantages of home automation and security system:

- Controlling all of your home devices from a single location.
- The ability to adapt to new gadgets and appliances.
- Increasing the level of security in your home.
- Home control from a distance...

Disadvantages of home automation security system:

- Security Issues: As with any digital equipment, as more people utilise smart home gadgets, security will become a bigger issue.
- Cost: astronomically high
- Higher levels of acceptance

E)Applications of home automation security system:

- Lighting control
- HVAC
- outdoor grass irrigation
- kitchen appliances
- security systems

2) RESULTS:

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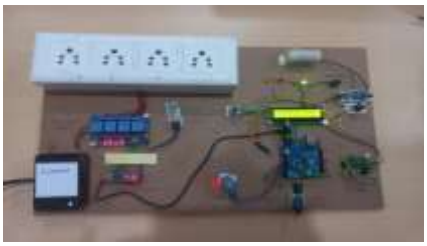

FIG 8.1 PROJECT KIT

The total project package, shown in Figure 8.1, contains both homeautomation and security. The workings of both the home automation and security systems are clearly explained with figures below.

Fig 8.2 home automation

Home automation is depicted in fig8.2 above. We can see that the major component in the automation system is the Arduino NANO. The HC-06 bluetooth module is connected to a 4-channel relay, which is attached to a socket. We're using an Android phone with the Arduino Bluetooth app installed, which we couple with the HC-06 bluetooth module, and there's an on/off switch in the app. We can use it for a variety of appliances, but we're going to utilise four application because we're utilising a four-channel relay.

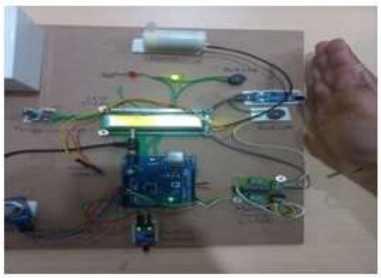

Fig 8.3 theft sensor

The theft sensor is shown in fig8.3 above. When a human blocks the rays from reaching the sensor, the rays return to the sensor, and the sensor detects the presence of the person. The sensor is connected to a buzzer for indication, which emits a beep when the presence of a human is detected.

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Fig 8.4 fire sensor

The fire sensor shown in fig. 8.4 is connected to a buzzer for indication. When a flame is created, the particles in the flame are detected by thesensor,which causes the led connected to it to illuminate and the buzzer to ring. To put out the fire, we connected a water pump here.

Fig 8.5 smoke sensor

The smoke sensor in fig. 8.5 is attached to a buzzer for indication. Smoke is made up of gas particles that are detected by the sensor (the grey color). When the sensor detects dangerous gases, the sensor's lightilluminates and the buzzer attached to it sounds.

Conclusion:

Making sure the house is occupied before turning on electronics, monitoring the brightness, and turning off unnecessary lights can all help save energy. Homeowners can have more control and protection thanks to the technology when combined with home security systems that are securely integrated. The next step would be to develop this technology such that it could be used to automate large-scale settings like factories or offices. Home Automation offers a universal standard for items that can communicate with one another. Thanks to standardisation, smart houses can control, among other things, lighting, atmosphere, energy management, and security.

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