LOW COST DEVICES FOR HOME AUTOMATION SYSTEMS

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Abstract: *The article presents the design of Home Automation System (HAS) with low cost and wireless system. This system is intended to help and supply support so as to meet the requirements of older and disabled in home. Also, the good home conception within the system improves the quality living reception. The switch mode and voice mode square measure accustomed management the house appliances. The video feedback is received within the automaton application that streams the video of IP Camera. The main control system implements wireless technology to provide remote access from smart phone. The design remains the prevailing electrical switches and provides additional safety management on the switches with low voltage activating methodology. The switches standing is synchronized altogether the system whereby each computer program indicates the real time existing switches standing. The system meant to regulate electrical appliances and devices in house with comparatively low price style, user-friendly interface and ease of installation.*

Keywords: HOME AUTOMATION, AUTOMATION PROTOCOLS, LOW COST CONTROLLERS

1. Introduction

Home automation is outlined as single or networked devices and systems that raise the protection and snugness of homes, maintain pleasant indoor conditions energy efficiently, facilitate inhabitant's residency and coping of everyday chores and enable.

Today we have a tendency to reside in twenty first century wherever automation is taking part in necessary role in human life. Home automation permits North American nation to regulate house appliances like lightweight, door, fan, AC etc. Home automation not solely refers to cut back human efforts however conjointly energy potency and time saving. The main objective of home automation and security is to assist incapacitated and previous aged folks which is able to alter them to regulate home appliances and alert them in crucial things. Home automation has created it potential to own what's typically noted as a 'smart home', a home that can detect and identify you, automatically adjust the lighting to your predefined style, open doors mechanically, play your favorite music, water your flowers within the morning, activate the safety lights in the dead of night and switch them off within the morning, heat water for bathe and tea, stream to you anywhere in the world via the internet a live video of what is happening in and around your house. It makes it potential to link lighting, recreation, security, telecommunications, heating, and air conditioning into one centrally controlled system. This allows you to form your house a vigorous partner in managing your busy life.

Automation or automatic management, is that the use of varied management systems for in operation instrumentation like machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships, craft and alternative applications and vehicles with stripped or reduced human intervention. Some processes have been completely automated. Automation has been achieved by numerous suggests that as well as mechanical, hydraulic, pneumatic, electrical, electronic devices and computers, usually in combination. Complicated systems, like trendy factories, airplanes and ships typically use all these combined techniques. The biggest good thing about automation is that it saves labor; but, it is also used to save energy and materials and to improve quality, accuracy and precision.

2. Low cost home automation controllers

There is a lot different approaches to the home automation offered on the market. Insteon may be a home automation (domotics) technology that permits lightweight switches, lights, thermostats, leak sensors, remote controls, motion sensors, and other electrically powered devices to interoperate through power lines, radio frequency (RF) communications, or both. It employs a dual-mesh networking topology during which all devices square measure peers and every device severally transmits, receives, and repeats messages. Like alternative home automation systems, it's been related to the net of Things. Android@Home was announced by Google in May 2011. The system is declared to figure with a mesh network within the 900MHz frequency bands. Google chose 900MHz because it is least likely to be crowded than the wi_ 2400 spectrum. It is assumed that their protocol, announced in the Google's I/O Developers Conference, was based on SNAP from Synapse Wireless. It is still a closed protocol.[2] The Z-wave is a wireless communications proprietary standard designed for home automation, specifically to remote control applications in residential and light commercial environments. This technology, which is developed by Sigma designs' Zensys, uses a low power RF radio embedded or retrofitted into home electronics devices and systems, such as lighting, home access control, entertainment systems and household appliances. The technology has been standardized by the ZWave Alliance, an international consortium of manufacturers that oversees interoperability between Z-Wave products and enabled devices [4].

ZigBee may be a specification for a collection of high level communication protocols victimization tiny, low-power digital radios based on the IEEE 802.15.4-2003 standard for wireless personal area networks (WPANs), such as wireless headphones connecting with cell phones via short-range radio.

The technology outlined by the ZigBee specification is meant to be easier and fewer dear than alternative WPANs like Bluetooth. ZigBee is targeted at radio frequency (RF) applications that require a low data rate, long battery life, and secure networking [5]

The next statement put forwards the design of home automation system using KNX. The design is based on a standalone embedded system board KNX at home. Home appliances are connected to the KNX module and communication is established between the KNX and Android/IOS mobile device or tablet. The home appliances are connected to the input/output ports of the embedded system board and their status is passed to the KNX module. The device with high cost and scalable to less modification to the core is much important. It presents the design and implementation of automation system that can monitor and control home appliances via android phone, ios phone or tablet. KNX could be a standardized (EN 50090,ISO/IEC 14543), OSI-based network communications protocol for intelligent buildings. KNX is that the successor to, and convergence of, three previous standards: the European Home Systems Protocol (EHS), BatiBUS, and the European Installation Bus (EIB). The KNX standard is administered by the Konnex Association [3].

This commonplace is predicated on the communication stack of EIB however enlarged with the physical layers, configuration modes and application expertise of BatiBUS and EHS.

KNX defines several physical communication media:

- Twisted pair wiring
- Powerline networking
- Radio
- Infrared
- Ethernet (also known as EIBnet/IP or KNXnet/IP)

KNX is intended to be freelance of any specific hardware platform.

A KNX Device Network are often controlled by something from associate 8-bit microcontroller to a computer, according to the needs of a particular implementation. The most common style of installation is over twisted try medium. KNX is approved as associate open commonplace to International commonplace (ISO/IEC 14543-3) European commonplace (CENELEC nut 50090 and CEN nut 13321-1) and China Guo Biao(GB/Z 20965).

KNX has quite one hundred members/manufacturers together with terrorist organization, Bosch, Miele & Cie kilogram, ON Semiconductor, Schneider Electric Industries S.A., Siemens, Uponor Corporation and Jung.

There are three categories of KNX device:

1. A-mode or "Automatic mode" devices automatically configure themselves, and square measure meant to be oversubscribed to and put in by the tip user.

2. E-mode or "Easy mode" devices need military training to put in. Their behavior is pre-programmed, however has configuration parameters that require to be tailored to the user's requirements.

3. S-mode or "System mode" devices square measure employed in the creation of customized building automation systems. S-mode devices have no default behavior, and should be programmed and put in by specialist technicians.

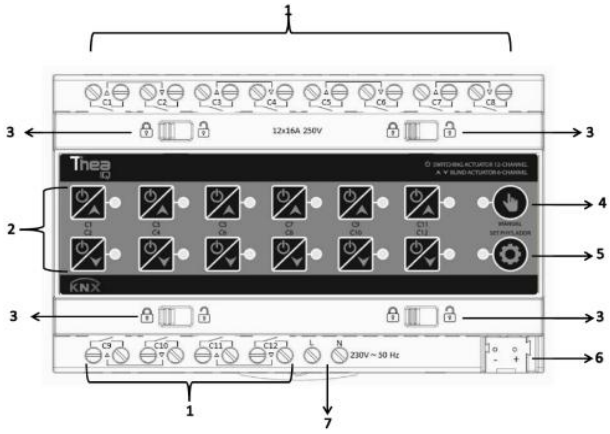

***Figure 1**: Logo of the KNX and example of controller*

KNX, associate abbreviation of Konnex, is associate open commonplace (see nut 50090, ISO/IEC 14543) for business and domestic building automation.

KNX devices can manage lighting, blinds and shutters, HVAC, security systems, energy: KNX Applications management, audio video, white goods, displays, remote control, etc.

KNX evolved from 3 earlier standards; the ecu Home Systems Protocol (EHS), BatiBUS, and the European Installation Bus (EIB or Instabus). It will use twisted try, power line, RF, infrared or Ethernet links in a tree, line or star topology. On this network, the devices form distributed applications and tight interaction is possible. This is implemented via interworking models with standardized data point types and objects, modelling logical device channels. The KNX commonplace has been designed on the OSI-based EIB communication stack extended with the physical layers, configuration modes and application experience of BatiBUS and EHS.

KNX installations can use several physical communication media:

- Twisted pair wiring (inherited from the BatiBUS and EIB Instabus standards)
- Power-line networking (inherited from EIB and EHS - similar to that used by X10)
- Radio (KNX-RF) based on Z-Wave protocols
- Infrared
- Ethernet (also referred to as EIBnet/IP or KNXnet/IP)

KNX is not based on a specific hardware platform and a network can be controlled by anything from an 8-bit microcontroller to a PC, according to the demands of a particular building. The most common form of installation is over twisted pair medium.

KNX is associate approved commonplace by the subsequent organizations, (inter alia)

- International standard (ISO/IEC 14543-3)
- European standard (CENELEC EN 50090 and CEN EN 13321-1)
- US standard (ANSI/ASHRAE 135)
- China Guobiao (GB/T 20965)

It is administered by the KNX Association, a non-profit organisation governed by Belgian law which was formed in 1999. The KNX Association had forty four registered hardware and code merchandiser members from 44 nations as at one July 2018. It had partnership agreements with lot of installer companies in 163 countries and more than 440 registered training centres. This is a royalty-free open standard and thus access to the KNX specifications is unrestricted.

KNX encompasses tools for project engineering tasks such as linking a series of individual devices into a functioning installation and integrating different media and configuration modes. This is embodied in a Engineering Tool Software (ETS) suite.

3. Conclusion

The main function of Home Automation with aim of monitoring, controlling home appliances. The primary focus is to make safe and secure the home we live in and have information on status of electronic devices.

As prime target, some household appliances were monitored and then used the information for controlling devices. Use of software's like ETS were integral part in completing the desired monitoring and controlling tasks.

There is enough devices on affordable price which give a good opportunity to create the fully functional home automation system with convenient remote control by IP or Bluetooth.

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