



WIRELESS NETWORK SOLUTION TO ACHIEVE SMART LED LIGHT AND ILLUMINATION DIMMING CONTROL FOR HOUSEHOLD ENVIRONMENT

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Abstract:

High power depletion may leads to biggest problem in future. In order to prevent such problem, needs to save energy. Light-Emitting diode (LED) are now used to offices, home, industrial more efficiently than traditional lights. But that light control system outdated and energy inefficient and also have some problems such as high cost, installation issue and difficulty of maintainance. This paper nominate a low cost, wireless, easy to install, adaptable and smart LED lighting system to automatically adapt the light intensity to save energy and maintaining user satisfaction. This system combines motion sensor and light sensor in a low power wireless solution using GSM communication and also illumination dimming control can be conducted using mobile phone using global system for mobile communication (GSM). So users are able to control home lighting by Operating cellphones via global system for mobile communication (GSM). This Paper utilize to decrease the power consumption and user satisfaction.

INTRODUCTION:

Energy saving and environmental friendliness/awareness is a burning issue in current research. In reality, Carbon dioxide (CO₂) emissions are strongly associated with energy consumption, these originate from the ignition of hydrocarbons (oil, natural gas and coal) either directly blistered (transport and heating) or for production of electricity in power plants. Lighting systems are a major provenience of electricity consumption in the world. In Europe, the amount of electrical energy used in luminescent buildings is considerable, about 40% and lead to around 35% of carbon dioxide emissions. In existent years the European Union EU has actively promoted political campaigns toward energy efficiency. While earlier analysis and industrial works have shown that simple lighting controls using motion sensors, such as Pyroelectric InfraRed (PIR) sensors, are effective reducing the amount of electrical energy used for lighting buildings, advanced lighting control strategies have the probable to achieve even greater energy savings, better quality of service and offer many advantages over simple on/off controls. After all, until present, progressive control strategies, such as

dimming light according to the day lighting or load dropping, which require a more systems-oriented approach, have been less successful. This is especially due to the high cost of installation and maintenance and the impossibility of retrofitting.

This new technology is encouraging interest in controlling the light to reduce power consumption. WSN in combination with LED lights and novel drivers decreases the power expenditure of the brightness in several application scenarios by several orders of magnitude. WSN has the probable to conclude a low cost and ultra high power saving system. However, particular attention must be paid during the design process of hardware and software.

Illumination is a very basic necessity for a household and it can make a home more modern and comfortable. Individuals live under significant stress so light and colors can help people relax at home. Here the illumination is control by using GSM technique. GSM competes primarily with Code Division Multiple Access scientific knowledge, which is the automation used by five of the seven largest carriers in the United States. While GSM provides agreement, multitasking and speed asset over CDMA on a 3G network, most carriers around the world are switching to the Long Term development standard for their 4G networks. This paper shows the design, development and accurate measurements of a total low power and less expensive wireless sensor network to achieve power saving through automatic control and demonstrates its advantages in terms of power saving and scalability using in-field experimental conclusion.

DEVICES AND METHODS

This illustrates a conceptual scheme of the proposed system. It consists of groups of LED panels managed by multiple sensors (motion and light) and spread intelligence. The nodes converse wirelessly during a GSM mesh network with a manager, some routers and some End Devices (EDs). Each group has a wireless controller (GSM) directly associated to its operator to be set the light intensity during a pulse-width modulation (PWM) signal. The PWM signal is used to instruct the rank of the LED luminosity with the width of the pulse (duration) of microcontroller signal as explain better in next chapter. The value of the PWM is certain by a control



unit, given by one of the distributed routers provide with sensors. Each router use the sensors' data to adapt the intensity according with the user's preferences with the goal of maximize the energy saving and users' preferences. The GSM net in a mesh configuration permit building a scalable and modular system easily expandable, and allows each sub group of lights to be completely free and flexible in terms of area monitored/controlled. In fact, every router has a flexible and controllable number of associated ED's and LED panels, which it can control below the same conditions. Christo Ananth et al. [7] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety. In the existing system the stress was given on the safety of the vehicle, modification in the physical structure of the vehicle but the proposed system introduces essential concept in the field of automobile industry. It is an interfacing of the advanced technologies like Embedded Systems and the Automobile world. This "Intelligent Sensor Network for Vehicle Maintenance System" is best suitable for vehicle security as well as for vehicle's maintenance. Further it also supports advanced feature of GSM module interfacing. Through this concept in case of any emergency or accident the system will automatically sense and records the different parameters like LPG gas level, Engine Temperature, present speed and etc. so that at the time of investigation this parameters may play important role to find out the possible reasons of the accident. Further, in case of accident & in case of stealing of vehicle GSM module will send SMS to the Police, insurance company as well as to the family members. The LED panels, highly capable white LED for illumination; The CC2530 that provides the management of GSM and is present in each lump of the network; The MSP430 for the manager of the LED panels' smoothing and where the distribute disintelligence implemented. MSP430 is present in all the nodes; A dimmable profitable driver for the LED, which provides a highly dimmable range (up to 89%) and an accurate control (constant current) for the smooth A light and PIR sensors, used by the router to monitor and control the brilliance value. In the following chapter the wireless network and the three architectures of the nodes are currented.

A. Wireless Driver Device

In each LED panel a new tool is needed to enable the wireless control. The single reason of this tool is to control through PWM the operator LED providing an accurate smoothing of the light and to communicate with the wireless network. As mentioned previous the node is built about the CC2530 and MSP430 from TI, where the CC2530 chip is used for the net and the MSP430 on board is the core intelligence which manages the radio chip and where the firmware is running.

To allow the power period to convert and give a stable 3V supply to the node, a step down small withdraw (LDO) regulator with an ultra low inert current TLV70433 from Texas Instruments was used. This chip has a very low inert current with high conversion efficiency and it is optimized specially for the MPS430. For the end tool, we do not have any sensors on board as the PWM value is determined from the router which controls more than one device in the same group and it will be on hand in next chapter. This has the benefit to bringing flexibility in the deployment and more consistent feedback on the light in the Monitored area.

B. Router for Monitoring and Decisions Making

This device is in charge of the most essential workload in the network with the next main duties: i) manage the routing set of rules of the GSM stack, monitor the Environmental parameters throughout the sensors, ii) take the decision on the light greatness, and iii) launch the control Configuration to the boards that are assign under its control during the network configuration.

C. Base Control Station

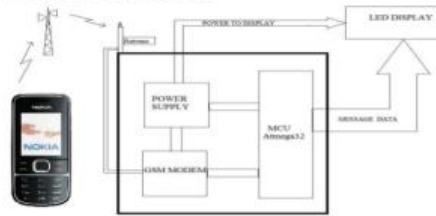
The base control station is the center of the proposed system as it allows the visualization of the lighting scheme and the setting of essential parameter such as the users' first choices. The role of the coordinator is only to manage the net and allow the user interface through a remote host. The device is provided with interface to be associated with UART to USB ready to use as showed in Figure. recognition to the interface and the remote host it is probable to set the users' preferences, and monitor the entire network and store all the data to evaluate the power saving.

D. Wireless Sensor Network

One of leading goals in heedful the proposed system was the scalability, the low power and a identical network for commercial use. GSM is a wireless communication technology among many devices in a wireless personal area network (WPAN). The GSM alliance has developed low-cost, low power intake, wireless communication constant, and the CC2530 chip set was select. Consequently, this standard is designed to be more inexpensive than other WPANs (Wi-Fi or Bluetooth) for rising low power embedded schemes for user electronics, residence and building mechanization, industrial wheel, PC peripherals, health sensor application, toys and games.



BLOCK DIAGRAM



LIGHTING CONTROL ALGORITHM

As it was obtainable in the previous section there are three different devices which essential three dissimilar algorithms to work properly.

A. End Device Algorithm:

It shows the main present diagram of the intend. The main task of the network executive is to receive and set the right clarity for the LED panel (Figure 7). Thus, after the device joins the network, a router is related to it. Since it delays for the PWM value decided from the router's own algorithm and collections the LED light power of the panel. After the value is set, the radio goes into replacement mode for energy saving. The stir up time to get a new brightness value dismiss be selected by the user as this affects the response time, in the offered method 500ms was selected, because it is a high-quality transaction between power saving and reactivity. This simple way with the above mentioned hardware allow every scalable driver to be exact through a normal GSM network.

B. Router and direct Algorithm

The router procedure is somewhat additional difficult than for the end device. The core of smart lighting cleverness is distributed toward every router which after that wheel one or more end devices. To get this important goal, the router has as main blocks, the message and manage algorithm on it. The communication wedge is in charge of receiving data from the network about the user's preferences and send data about the category of the restricted panels to the isolated host. As the network is a mesh, the information can hop to supplementary routers previous to accomplishment the arranger which monitors the status of the panels and manages the errors.

C. Coordinator Algorithm

The main character of the coordinator, over setup and control of the GSM WSN, is to connect the wireless devices deployed in the structure with a secluded crowd which provides the user interface. The arranger also sends the user preferences to the routers and collects the standing information starting the routers to store the monitored status in a remote database. The statement is

prepared through the UART haven of the microcontroller and the UART to USB converter that allows connecting the dongle to each swarm with an USB line. Thus, the controller works as a gateway and it is required for a graphical display of the fallout and consumer put in, in addition data on wireless device operations are supplementary with the LEDs light address; so, all faults and the state are easily well-known. As the host limit also stores the lowering value of all the panels the user or network manager can have an overlook of the power intake and occupied time of every plate in a graphical vision. The course is also equipped with a organization proposal that acts in casing of rejection responses sent from the plate to focus the errors.



Deployment of the system in the VerdeLED company offices

GSM

Global System for Mobiles is the primary machinery used internationally for 3G mobile networks, with about a 73 percent market share. GSM competes principally with Code Division Multiple Access equipment, which is the technology used by five of the seven biggest carriers in the United States. While GSM provides compatibility, multitasking and speed advantages over CDMA on a 3G network, most transporters around the world are switching to the Long Term Evolution regular for their 4G networks.

Ease of Changing Phones

Every GSM phone has an International component Equipment Identification number to identify the receiver. GSM also uses a Subscriber Identity element card to store a customer's account information. If you buy a new GSM phone, you can only remove the SIM card from your old phone, place it in your new phone and begin using the new phone right away. You are not compulsory to register the new phone's IMEI number with a GSM provider.



The ease of converting receivers and the power of GSM mobile networks globally provide customers with a larger collection of phones to select since. However, while you can generally use a GSM phone on any carrier's 3G GSM network in Europe, that's not also factual in the Combined States. AT&T and T-Mobile, the two U.S. GSM carriers, use dissimilar frequencies for their 3G networks. A 3G T-Mobile phone influence connect to the AT&T network, but it probably won't be able to transmit say or facts on the right occurrences to effort fit, and might revert to 2G speeds.



Synchronized Voice and Data

While you use a GSM net you can chat on the phone and waves the Internet or sync your email at the same time. That's frequently not an option if you're using a phone on a CDMA network. CDMA unconfined an add-on option called synchronized Voice and Data Optimization that would facilitate callers to use voice and data at the equal time, but the add-on would require change to both the CDMA network and CDMA phones. Carriers in the collective States have not depend the add-on for their networks.

A GSM net is usually much quicker than a CDMA network. Most GSM carriers adopted the High Speed Packet Access conservatory for 3G networks that support statistical locations as fast as 42Mbps. On a 3G CDMA network, the maximum data transmit rate is 3.6Mbps.

4G LTE:

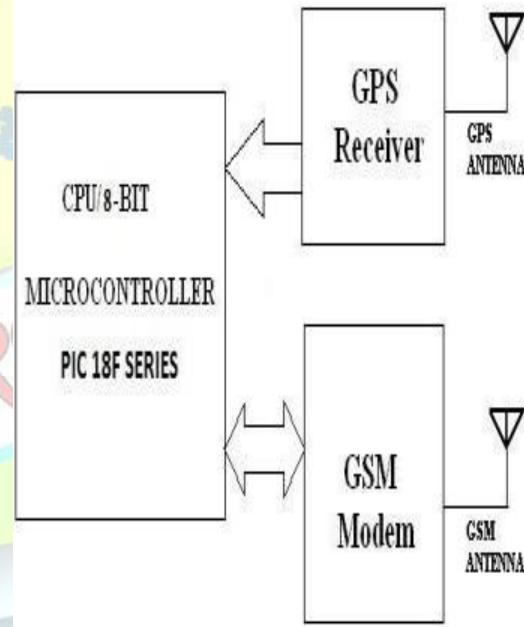
Most carriers have adopted the LTE ordinary for their 4G networks, which enables very fast immediate transfers of equally voice and data. However, all U.S. carriers will keep their 3G networks in place awaiting at least 2020. Regulars who live in an area without 4G treatment will want to continue to use a 3G network. iPhone users will

have to promote to the iPhone 5 or a later version to use the accepted phone on a 4G network.

GSM (Global System for Mobile statement) is a cellular technology used for transmitted mobile voice and data services. Out of all cell technologies in use today, GSM is the most prevalent. However, it is important to know that even though GSM is at present the industry regular in cell technology, it has both compensation and disadvantages of which regulars should be aware.

Extensive Coverage

The clearest gain of GSM is its general use all through the world. According to GSM website, GSM has a synchronized band, which resources that equal though altered countries may operate on dissimilar frequency bands, users can transfer effortlessly between networks and possess the similar number. As a result, GSM users essentially have coverage in over 218 countries.



Feature of GSM:

GSM is structured to extra technologies and evolution of wireless mobile telecommunication that deliver all speed tour-transferred data(HSCSD) GPRS is attractive the data rate for GSM evolution(EDGE)



GSM security issues such as theft of service, legal and isolation interception stay to increase substance interest in common service for mobile community.

Advantages

GSM is more fit network with robust pitfall. Low signal inside the structure and house. The subscriber globally creates much better in network effect for GSM receiver maker's carriers and end it can be use repeat. A customer has been super vice quality and low cost a mound in alternatives to making cells like (SMS). It is simple to implement. International roaming is not a largest problem. GSM allow network operation to after nomadic service so that consumer can use whole over the world.

CONCLUSION

A new scheme to manage LED lighting with a low price and low power wireless sensor network has been proposed. This technique requires the consumption of matching sensors with GSM radio that generate a PWM signal to control existing profitable LED operators, which can significantly reduce the power consumption of the LED lighting. The use of a light sensor and a PIR sensor in arrangement with the user preference allows the distributed intelligence to save energy reducing the light intensity. Because many materials of LED lights are already placed, this solution is also suitable for retrofitting. Moreover the network is bendable and scalable due to the GSM. Experimental results indicate that the proposed scheme outperforms the state-of-the-art with a significant reduction of power consumption and cost for the single and groups of LED lights via the small power, scalable WSN. It has been shown that this approach decreases the power consumption in a valid life office purpose by more than 55% throughout 6 months (in an unpredictable Irish weather scenario). The prototypes are organized to be inserted in a commercial driver to enable wireless capability and distributed control.

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