

Research Article

The Design of Smart Window Control System Based on GSM Network

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Abstract

As we all know, the role of windows is to adjust the indoor environment and to achieve the comfort of residents. Most of the windows currently used are simply push-pull or translational, and are controlled by humans. However, when you forget to close the window and encounter rainy weather, you will be inconvenienced. Therefore, this paper developed a control system that can control the window switch according to the input from user via remote or GSM. The system can realize transmission of wireless data through the GSM module and infrared remote control; realize measuring of environmental parameters through several sensors; realize flexibly driving of DC servo motor through the program. The system has the characteristics of simple circuit, low cost, stability Reliability.

Keywords: GSM, alarm circuit, automatic lock drive circuit

Introduction

Eyes are the Windows of the spirit and window is the eye of our room, the significance of window to building, occupants is presently effectively mindful of individuals in the city' life. In some cases we go neglect to close the window, out of nowhere in downpour, we are in a difficult situation. In some cases due to oversight, toxic gas can't spread out of Windows and we are in a difficult situation. Hence we have structured a lot of astute window control framework dependent on GSM remote correspondence module. Gathering natural parameters through the relating sensors, the framework can understand canny fumes, astute security, and Automatic insurance of downpour. When it rains, we need to close the window to ensure that our room does not get flooded. We usually do not think much of such things that we do without much thought. However, for the disabled, getting to the windows and closing them can be a great ordeal. It would be nice if the windows can close themselves at the press of button or else did not even need to press the button.

B. Motivation

As we as a whole know, the job of windows is to alter the indoor condition and to accomplish the solace of inhabitants. The vast majority of the windows as of now utilized are just push-pull or translational, and are constrained by people. Notwithstanding, when you neglect to close the window and experience stormy climate, you will be hindered. In this way, this paper built up a control framework that can control the

window switch as per the contribution from client by means of remote or GSM.

C. Objectives

1. To do the literature survey of current techniques for designing window control system
2. To control window via text message and via remote control.

Review of Literature

For the shrewd windows framework prerequisites of insightful home, GAO Song et al [1] planned a sort of control framework for brilliant window. The center of this control framework is the microcontroller STC12C5410AD, The framework acknowledged transmission of remote information through the GSM module and infrared remote control ;acknowledge estimating of natural parameters through a few sensors; acknowledge deftly driving of DC servo engine through the program . The framework has the qualities of basic circuit, minimal effort, steadiness Reliability. As we as a whole know, the job of windows is to alter the indoor condition and to accomplish the solace of occupants. The greater part of the windows as of now utilized are basically push-pull or translational, and are constrained by people. In any case, when you neglect to close the window and experience blustery climate, you will be bothered. Subsequently, paper [2] built up a control framework that can consequently control the window switch as indicated by the indoor and open air condition changes. The framework utilized MQ-2 sensor to identify burnable gas inside, infrared test to

test the outside instance of the window, temperature and stickiness sensors to distinguish the indoor temperature and moistness, photograph resistor to gauge the light force. The controller gathers sensor data to control the stepper engine to change the condition of the window open or close. Simultaneously there are capacities, for example, customary switch windows, key switch windows and remote control switch window. In the wake of testing, the framework has understood the remote control and programmed controlled capacity of the window, arrived at the objective of keen home, and has great application prospect. Paper [3] comprises of arduino uno r3, GSM module, sensor module, power supply module and so forth parts. Among them, arduino uno r3 control module is made out of 14 computerized pins leads out I/O ports. The I/O ports may control the engine driver circuit, Automatic lock drive circuit. Force supply of 5v will be given. Also, they utilized LCD so as to show temperature. Utilizing temperature sensor we are come to think about temperature. At whatever point temperature is above 35°C around then window will be open and fan additionally turns on. At whatever point temperature is above 45°C around then window will be shut with the goal that room didn't get warmth and fan turns on. For typical individual we can open and close windows yet for crippled individual it will be troublesome. We can turn on fan by utilizing transfer. In arduino we have 200Ma however fan takes a shot at 12v and 1000mA subsequently we are utilizing ULN2003 driver ic henceforth it can improve flow. Transfer is SPDT Relay we are utilizing. Water sensor is use to recognize downpour at whatever point it identifies downpour around then window will be shut with the goal that room didn't get overflowed and at whatever point downpour stops window will be open. we additionally have comparator ic LM324 ic it changes over simple to advanced. Ldr sensor is utilized at whatever point it gets low light powers around then window will be shut and light turns on. Smoke sensor is utilized to identify smoke at whatever point it recognizes smoke around then window will be open for air venting with the goal that individual didn't get suffocated and we are utilizing GSM so as to send message to relative of that individual so they may come and support the individual. Here we are utilizing brush less dc engine so as to control the windows. 10k potentiometer is utilized to modify affectability of LDR and smoke sensor. Nowadays security is the most fundamental issue wherever on earth, so security of everything has expanded essentialness recently. In [4], trying to reproduce the broad assessment related to the distinctive gateway jolts and entryway security structures that are essential in the fields, for instance, home, endeavors and vehicle security where potential results of attack are extending step by step. Security structure is required for solace and prosperity. Ordinary lock systems using mechanical lock and key instrument are being superseded by new propelled strategies for locking structure. We present the

arrangement and use of a GSM based remote security system which take an astoundingly less force. The system can reaction rapidly as gatecrasher identify and GSM module will do caution property holder. Suspected activities are given to remote customer through SMS using GSM innovation. Creation framework exhibited in [5] included equipment, firmware and programming to build up a smart control arrangement of programmed window engine with different remote sensor organize (WSN) gadgets for wellbeing and ecological checking. The pieces of this development are improved by actualizing the WSN bit into natural sensors that may distinguish temperature, lowliness, lethal gas, exhaust cloud or airborne, and so forth. With inserted framework structure, these sensors are fit for conveying WSN signal parcels dependent on ZigBee convention that adheres to the IEEE 802.14.4 benchmarks. The essential equipment of the framework is the window engine with circuit configuration by coordinating small scale control unit (MCU), radio recurrence (RF) and WSN receiving wire to get direction. The firmware created under installed framework can connect equipment and programming to control the window at the predefined position. At the back end, the control framework programming can oversee various sensor information and give the interface to remote checking.

With the development of science and innovation, individuals have a longing for advantageous and open to living. Making agreeable and sound indoor conditions is a significant thought for structuring shrewd homes. As handheld gadgets become progressively incredible and omnipresent, this paper proposes an imaginative utilization of savvy handheld gadgets (SHD), utilizing MIT App Inventor and fluffy control, to play out the ongoing observing and keen control of the planned wise windowsill framework (IWS) in a shrewd home. A conservative climate station that comprises of condition sensors was built in the IWS for estimating of indoor illuminance, temperature-dampness, carbon dioxide (CO₂) fixation and outside downpour and wind heading. As indicated by the deliberate condition data, the proposed framework can consequently send a direction to a fluffy microcontroller performed by Arduino UNO to completely or mostly open the electric drapery and electric window for adjusting to atmosphere changes in the indoor and outside condition. In addition, the IWS can consequently close windows for downpour sprinkling on the window. The introduced novel control strategy for the windowsill [6] extends the SHD applications, yet incredibly upgrades accommodation to clients. Paper [7] presents a savvy window dazzle framework to control right measure of daylight expected to sparkle a room. The framework can be worked in either manual or programmed mode. The manual mode enacts two press catches for the tilting control. For programmed mode, the visually impaired will open or close, contingent upon the measure of light that is radiating through the window. The visually

impaired will be shut completely when the sensor level is beneath 200, and will be opened at half when the worth is over 800. On the off chance that the sensor level is somewhere in the range of 200 and 800, the visually impaired level will be completely opened. A servo engine is appended to the visually impaired's controlling shaft for the activation of tilting. The outcomes show that the framework is usable and can be utilized financially in office and home. The examination paper [8] stressed on the structure and continuous execution of microcontroller based force window control utilized as a control framework for moving a force window board. The motivation behind force window control framework is to rise and lower entryway glass with the assistance of a switch and its activity is constrained by the utilization of following sensors LPG sensor, LOR sensor and position sensor to supplant the utilization of hand-turned wrench handle. Force window framework comprises of driver engine, power electronic and control framework. The control unit faculties both hard and delicate deterrents and deactivates an engine that moves the glass when any block is recognized. The controller likewise faculties hindrances on fire up of the engine and manages the speed of the window board by beat width regulating engine signals. In other manner the controller detects obstacles by keeping up information which is identified with engine activity in three distinctive memory cradles that are normally endless supply of heartbeats that are identified with engine speed. The entire framework can be structured as a smart control framework by applying number of conditions which results to the development of the force window. It builds the security of the car just as expands human solace inside the vehicle. Such applications are fire wellbeing in the vehicle, over temperature identification, detecting of LPG spillage. Equipment execution incorporates some fundamental info switches, sensors associated with the microcontroller and the LEOs and LCO are utilized to show the status of yield. Info sensors utilized for this exploration are LPG sensor, LOR sensor and position sensor, yield is the working of the engine. The usage work is completed utilizing A VR ATMEGA 16 microcontroller. In [9], they are executing a brilliant home control arrange by utilizing remote sensor systems (WSNs) power line correspondence (PLCs). In the savvy home, the objectives are to diminish the effect of remote impedance. In the savvy home, they are to control the system 4 pointless vitality utilization. In each room, they are building up a disengaged WSNs with one facilitator with the coordinated into the PLCs handset. The executives station by means of PLCs in WSNs got by moving condition parameters for is facilitator capable. In savvy home apparatuses they control the message for PLCs then it's straightforwardly moved by utilizing as opposed to WSNs proposed shrewd home control organize is significantly alleviated. The effect of remote obstruction on the trial results. Lightning framework and examination of the enlightenment of a

fluorescent light are exhibited also in shrewd home control. Control was assessed without the vitality sparing of lightning framework. Under the savvy control, it tends to be diminished at any rate on the shady or bright day and it can show the numerical consequence of power utilization. The besides shrewd home control arrange calculation executed by the proposed for the model. Test results exhibited in this framework show the limit of these modems to defeat the threatening condition because of the inverter and to ensure solid correspondence over the PWM arrange. The proposed framework is for all intents and purposes workable for savvy home control systems. Paper [10] utilized 51 (single chip microcomputer) SCM as the activity and information preparing focus. As indicated by the difference in daylight power and surrounding temperature, another kind of canny drape control framework is structured by receiving photosensitive component and temperature sensor. What's more, the structure additionally has a manual control mode. In the downpour, when the light power is frail, the vacant situation of the window ornament can be set by the client. The framework can expand the client to give easy to use activity and happy with living condition. The framework can be applied to home or office condition, with a wide scope of uses and straightforward activity, etc.

Proposed Methodology

Eyes are the Windows of the soul and window is the eye of our room, the importance of window to building, residents is now already aware of people in the city' life. Sometimes we go forget to close the window, suddenly in rain, we are in trouble. Sometimes because of oversight, poisonous gas cannot spread out of Windows and we are in fearful trouble. Therefore we have designed a set of intelligent window control system based on GSM wireless communication module. Collecting environmental parameters through the corresponding sensors, the system can realize intelligent exhaust, intelligent security, and Automatic protection of rain.

Advantages of Proposed System:

1. Control the window switch according to the input from user via remote or GSM

A. Architecture

This system consists of single-chip microcomputer control module, GSM module, sensor module, power supply module and remote control etc parts. Among them, the single-chip microcomputer control module is composed of Arduino module. The I/O ports may control the motor driver circuit, Automatic lock drive circuit, Alarm circuit.

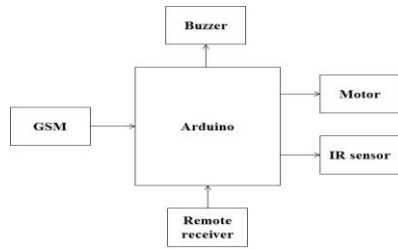


Fig. 1. Proposed System Architecture

Timing to open and shut the Windows and curtain. Analyzing of environmental brightness parameters collected by sensors , setting the upper and lower limits of environmental brightness etc, reasonably controlling of Windows and curtain opening and shutting, And giving binding SIM card which send alarm information. Receiving GSM module’s data, controlling windows and curtain open and close According to data ‘s content, and sending data of the window and curtains ‘s state at this moment and environment brightness parameters to binding SIM card. Settings manually/automatic switch button. In manual condition, controlling window and curtain open and shut by remote control.

B. Algorithm

An interrupt suspends the execution of an application to do something else – it is triggered by an interrupt request. An interrupt service routine (ISR) is initiated. RTI instruction has to be at the end of the ISR to load registers. All resets and interrupts use vectors. A vector indicates the start address of reset or interrupt routines. A vector address is a 2- byte memory location that stores a vector. Typical Motorola processors use a single area of memory to store the vectors =_i known as the vector table. We can divide the interrupt sources into four groups:

- Interrupts from on-chip resources
- External interrupts
- Software interrupts • Reset exceptions
-

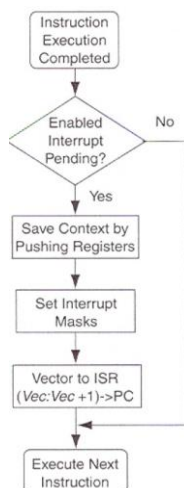
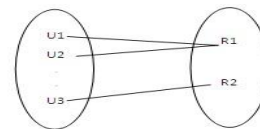


Fig. 2. interrupt based algorithm

The interrupt process consists of hardware that detects an event and signals the CPU. The CPU changes the program flow to the Interrupt Service Routine. The process in the side diagram is called exception processing because the CPU will execute the next instruction except when one of the interrupts is pending. An interrupt is said to be pending when it is enabled, its event has been detected, and it has not been serviced

C. Mathematical Model

Many users can obtain one result or multiple results.



Set Theory:

$$S = \{s, e, X, Y, \phi\} \quad (1)$$

s = Start of the program.

- 1) Log in user.
- 2) Get the data from sensors or Hardware e = End of the program.

e = End of the program

Display the captured data on the screen (monitor or mobile).

- 1) Display the captured data on the screen (monitor or mobile).
- 2) Log out the user.

X = Input of the program.

• Input should be sensors data.

Y = Output of the program.

• Finally we display the captured data on the screen (monitor or mobile).

X, Y U

Let U be the Set of System.

$$U = \text{Client}; I; S; H; A; D; Rg \quad (2)$$

Where Client, I, S, H, A, D, R are the elements of the set.

Client=User

I=Input data (sensors data).

S=Sensor.

H=Hardware.

A. Results and Performance

Performance of sensor

Sr. No.	IR sensor	Message	Motor
1	0	0	0
2	1	0	1
3	0	1	1
4	0	0	0
5	1	1	1

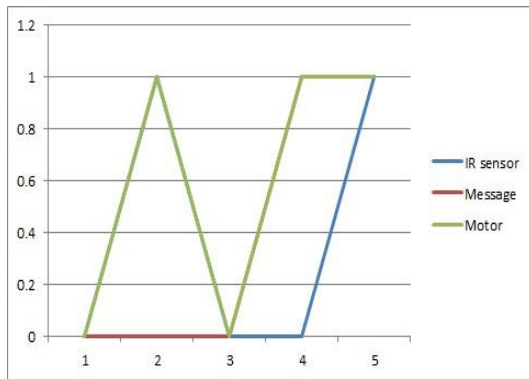


Fig. 3. Sensor data

Conclusion

Through the sensor, the windows are naturally controlled opened and shut. There is an enormous hole between test venture look into and the real business, the framework is still in facilitating flawlessness. Alongside the improvement of the GSM, programmed control framework will turn out to be more has the advancement and application prospect. In the meantime, keen window control framework is a critical piece of knowledge family unit, additionally research and impeccable the framework has the imperative central.

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