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DEVELOPMENT OF ELECTRONIC TIME LOCK CONTROL FOR SECURITY SYSTEM

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ABSTRACT
The problems associated with production of electronic devices without corresponding locking system has been a serious concern in the security system. This paper looked into the development of electronic time lock control system in security system. Due to the fact that lives and property may be at stake, it is important to always have a reliable lock system, putting into consideration the high rate of crime and insecurity. The design is made of a keypad unit for entering the access time, a LCD that displays different messages at specific time, a door controller section made up of an H-bridge driver IC that controls the movement of the motor attached to the door and an alarm system that triggers when the conditions are bridged. The whole system is controlled by an AT89S52 microcontroller programmable IC. The setup allows the user to operate in real-time and also preserving the time data if the main power supply fails. The design is meant to prevent unauthorized person from having access to ones properties through the use of times and it's focused on security system for buildings, cars, safes, doors and gates.
Keywords: Locking system; Microcontroller; Programming; LCD; Security system

1. INTRODUCTION

Over the years, various control systems have been designed to prevent access to unauthorized user (Alan, 2013). The main reason for providing locks for our buildings, home, office, church, school, etc. is for security of our lives and property. It is therefore important to have a stress free and convenient means of achieving this purpose. Automatic doors have become a standard feature on many different types of buildings and they are becoming increasingly popular every day with respect to developing an effective electronic devices geared towards providing adequate security. Home security has been a major issue of concern because of the dramatic increase in crime rate and everybody wants to take proper measure to prevent intrusion or unwanted/unauthorized user. In addition, there was a need to automate home so that user can take advantage of the technological advancement in Real Time technology and computer control system (Alan, 2016). It is also interesting to know that commonly used devices like a telephone land line or the Global System of Mobile communication (GSM) can possess features which can be used domestically by individuals or industries to

operate appliances like; door, electric bulb, television, refrigerator, air condition, robotic arm, etc.

Therefore, the challenges associated with continued production of electronic devices without a corresponding locking system has been met with the design and construction of programmable electronic time lock. No doubt, this will serve as a measure to prolong the life span of such electronic devices and also ensure adequate safety and required protection of data, files, electronic devices and a host of facilities which include computer systems, televisions and most especially to provide a means for restricting and disallowing unauthorized user from gaining access to an automobile car through the ignition system

The micro controller-based time lock presented here is an access control system that allows only authorized persons to access a restricted area, this system is best suitable for corporate offices, automated machine (ATMs) and home security. It comprises a small electronic unit which is in fixed at the entry door to control a solenoid-operated lock with the help of a stepper motor, when an authorized person enters predetermined user password via the global system for mobile communication (GSM) keypad, the stepper motor is operated for a limited time to unlatch the solenoid-operated lock so the door can be open. At the end of preset delay time, the stepper motor is operated in reverse direction and the door gets locked again. When the time has been incorrectly entered three times in a row, the time lock will switch to block mode, this function thwarts any attempt by 'hackers' to quickly try a large number of times in a sequence (Allen, 2015). If the user forgets his password, the time lock can be accessed by a unique 8-digit administrator password and the secret time can be changed any time after entering the current time (Master time)

The increasing rate of crime, attacks by thieves, intruders and vandals, despite all forms of security gadgets and locks still need the attention of people to find a permanent solution to the well-being of lives and properties of individuals. To this end, we design a cheap and effective security system for buildings, cars, safes, doors and gates, so as to prevent unauthorized person from having access to one's properties through the use of times, we therefore experiment the application of electronic devices as locks.

2. REVIEW OF RELATED WORKS

2.1.1 Design and Construction of Automatic Sliding Door

Lew Hewitt and Dee Horton instigated the idea of building an automatic sliding door back in 1954, when they saw that existing swing doors had difficulty operating in Corpus Christi's (a Catholic festival) winds. So instead of always fixing glass doors shattered by Corpus Christi's wind they tried to give the problem a lasting solution. Their work led to the invention of an automatic sliding door that would circumvent the problem of high winds and their damaging effect. Their work was later patented and in 1960, Horton Automatics developed and sold the first automatic sliding doors in America. Their automatic doors used mat actuator as the access control mechanism.

Vol. 2. No. 1. 2020. ISSN: 2672-4995 (Online) 2672-4987 (Print)

Over the years, modifications have been made to improve this door. In 2015, the manager of building, security systems at the University of Maryland and one time head of security for the Washington, D.C. from 1978-1988, designed and implemented a centrally controlled, electronic door access system to secure the University of Mary land.

2.1.2 Automatic Doors

The automatic slide door invented by Dee Horton and Lew Hewitt were not the only kinds of automatic doors that exist. Many other types of doors have also been patented and achieved commercially, they include: - Automatic slide door, Automatic swing doors, Automatic folding doors and Automatic revolve doors

2.1.3 Access Control and Security

To control access, a door must be modified in some manner to provide signals to the system to let it know whether or not the door is to be open or close, prohibiting passage of unauthorized persons. Simple access control is frequently used by corporate organizations and firms to limit access to their facilities, eliminating the need for a guard as well as the cost and headache associated with key control.

3. METHODOLOGY

3.1 DESIGN OF THE BLOCK DIAGRAM

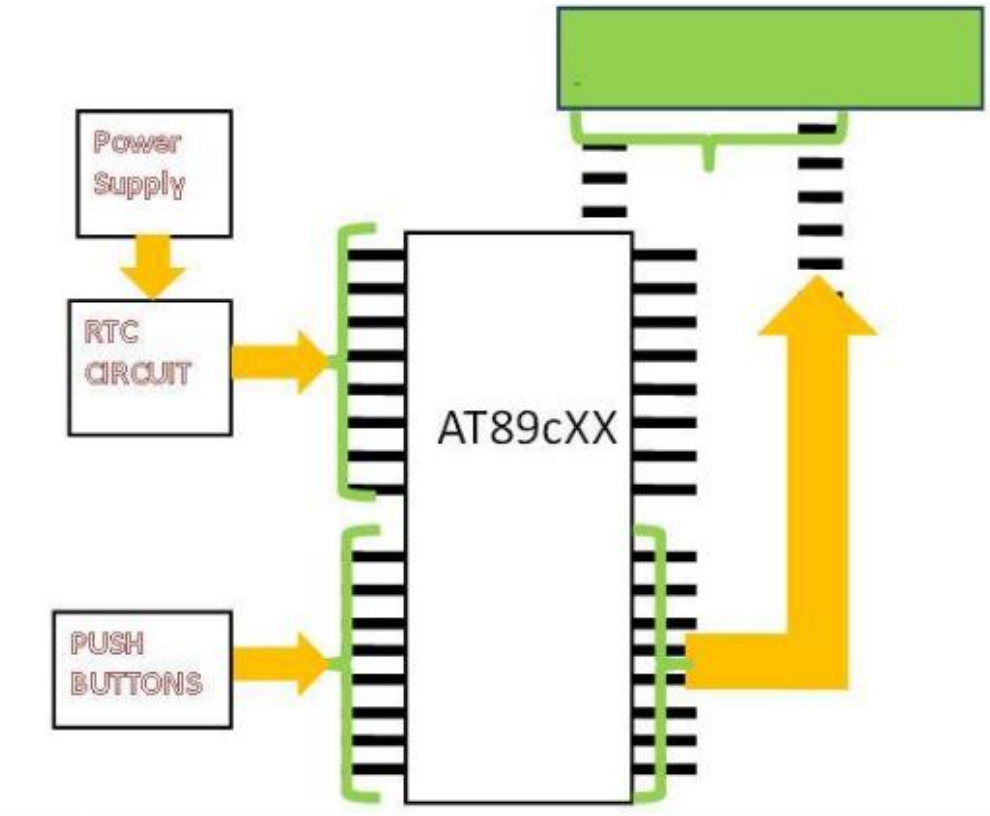

Fig 3.1: Block diagram

Vol. 2. No. 1. 2020. ISSN: 2672-4995 (Online) 2672-4987 (Print)

Real time clock is a digital clock which display real time on 16x2 LCD display. Here in this circuit, we can also set alarm and time. The DS1307 serial real-time clock (RTC) is a low-power, full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM. Address and data are transferred serially through an I^2C, bidirectional bus. The ck/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with AM/PM indicator. The DS1307 has a built-in power-sense circuit that detects power failures and automatically switches to the backup supply. Timekeeping operation continues while the part operates from the backup supply

4. RESULTS AND DISCUSSIONS

An AT89S52 microcontroller is a programmable IC, which needs to be programmed to suit the design. The source code was first compiled on the notepad and then test run on keil uvision Simulator. Proper concentration was given to the code during compilation in order to avoid any logical and syntax errors. The hex file was then generated and transferred to the chip with the aid of a universal programmer designed by topwin.

All the ICs were tested separately on a bread board to make sure they work properly. The whole circuit was also tested on the bread board to make sure it was design correctly. During construction, each section was tested as it was built to make sure the connections were done correctly before going onto the next section. This was done by applying the correct logic signals to the ICs and observing the output.

Vol. 2. No. 1. 2020. ISSN: 2672-4995 (Online) 2672-4987 (Print)

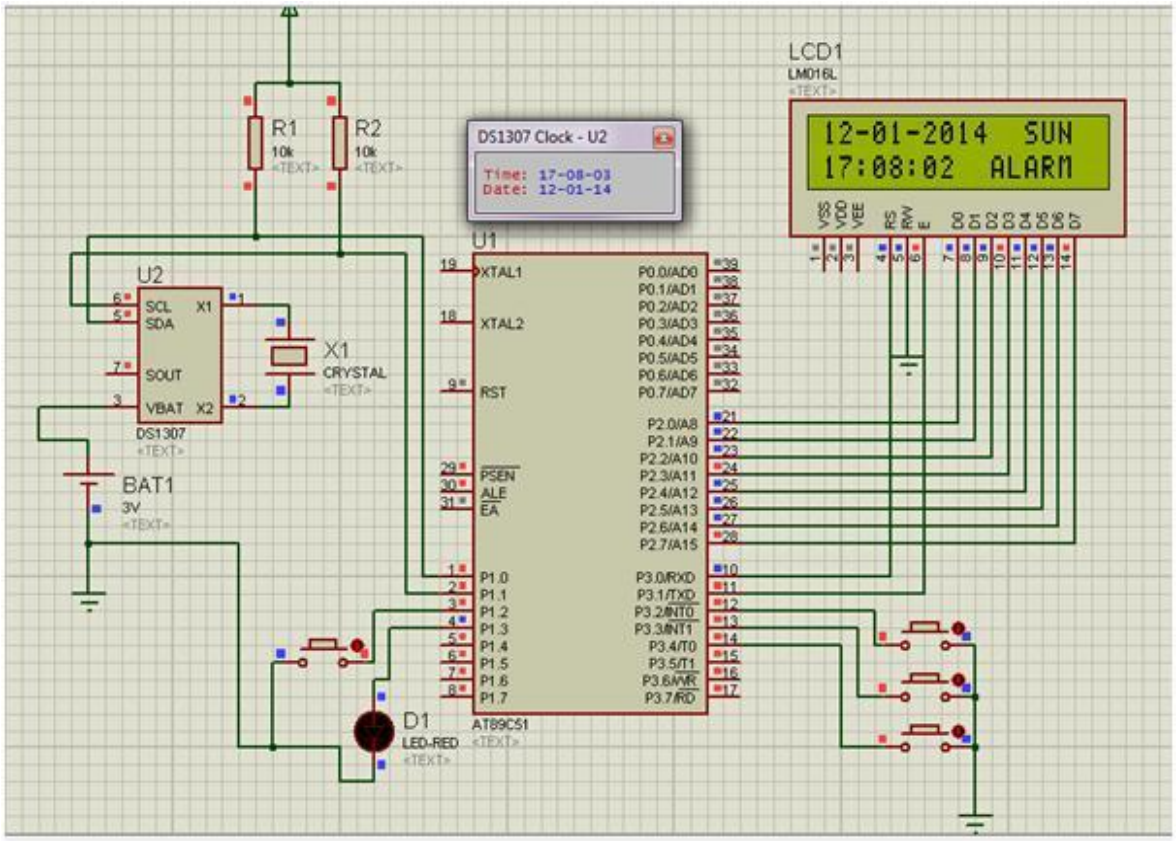

Fig 4.1 Proteus simulation

When the circuit is powered on, a welcome message is displayed on the LCD and a menu with 9 options (0-8) is displayed (refer to the figure). The options are explained here:

0: Erase EEPROM (fills eeprom with 0xff bytes)
1: Write EEPROM (starts writing eeprom starting with 0x0000 address)
2: Read EEPROM (reads eeprom starting with 0x0000 address)
3: Write EEPROM page (writes one page of EEPROM at specified page number)
4: Read EEPROM page (Reads one page of EEPROM at specified page number)
5: Display RTC Date (Displays current date from RTC)
6: Display RTC time (Displays current time from RTC)
7: Update RTC Date (Setting new date in RTC)
8: Update RTC time (Setting new time in RTC)

5. CONCLUSION

The device "electronic time lock" is designed and implemented successfully. It describes the hardware structure required to implement a real-time clock using the DS1307 circuit, monitored by a development system equipped with an ATMEL family

microcontroller. The real-time clock operates continually, powered by a battery backup supply. When the main power supply is "on", the clock is displayed on an LCD. This setup allows the user processes to operate in real-time, preserving the time data if the main power supply fails. The developed program features a series of commands for initializing, displaying and managing

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