# Arduino Based Automatic College Bell System

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#### Abstract

The main objective of this project is to implement an Automatic college bell system using an Arduino. In this Arduino based college bell circuit, we used three major components which are IC RTCDS1307, Arduino Uno Board, and 16x2 LCD modules. Here, Arduino is used for reading time from ds1307 and display it on 16x2 LCD.DS1307 sends time/date using 2 lines to arduino. A buzzer is also used for alarm indication, which beeps when alarm is activated, simultaneously voice module will read out the data displayed on the LCD module. Here, the code is designed in a way so the bell will be activated for every 50 minutes as per the college schedule, the bell will be ringing for 50 seconds from the instant it is activated and simultaneously LCD screen will display the completion of a particular session, which indicates the students and faculty about the completion of a particular session and simultaneously the voice module will also read out the data which is being displayed on the LCD screen. *Keywords: Solar energy, Air Cooler, Battery, Cooling unit etc.* 

#### 1. Introduction

In today's life, everyone gives importance to time. Time does not wait for anybody. Everything should be performed in time & accurately. Now a day's school or college bells are manually operated. Hence there is a big question of accuracy. Also there is necessity of manpower and money. Hence here we should use automatic control system, which saves our manpower and money & also highest accuracy. [1]. In this project the scope is to design a Automatic College Bell And Its Implementation On Arduino Uno Board. An Automatic College Bell is a digital circuit that is used for the purpose of automatic switching of bell as per the given schedule without any human intervention.

Generally, wherever we may go, it might be a school or an organization if start or stop of any process is to be conveyed to a large number of people, a bell is used over there which signals the start or stop of any process. So, all these bells are generally operated by the humans directly which is not advisable always as it is not efficient and even accuracy of the time is also being changed. So, in order to avoid this automation based bell system is to be introduced. [2]. Automation or automatic control, is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships, aircraft and other applications with minimal or reduced human intervention. Some processes have been completely automated. The biggest benefit of automation is that it saves labour; however, it is also used to save energy and materials and to improve quality, accuracy and precision.[3]

## 2. Problem Definition

A bell is a percussion instrument that is used in schools to notify students when it is time to go to class in the morning and when it is time to switch classes during the day. The first bell usually signals to students that it is time to report to class. The bell is an important instrument in both primary and secondary schools, as well as in industries and other businesses where the bell timer is critical to the smooth operation of the day (Wikipedia 2011). Bells are also associated with clocks that ring to indicate the hour. Clock towers or bell towers can be heard from a long distance, which was especially useful when clocks were too expensive for widespread use. When struck, the bell shape is typically an open-ended hollow drum that resonates. Before 2000 BC, bells were known in China, as well as Egypt, India, Greece, Rome, and other ancient cultures. Bells were first used in Eastern Christian churches and spread throughout Europe from the sixth to the eleventh centuries.

#### 3. Literature Review

Abyash Gautam et al. [2010] designed and proposed a microcontroller controlled automated college bell. The system demonstrates a simple configuration of a circuit of automatic school\college bell using Microcontroller AT89S52 which is designed so as the bells in the school\colleges are not to be operated manually and are fully automatic and once data is entered the college bell rings after a regular interval as per the programmers need and the timing may be changed in between to include breaks.it also displays time. In today's world where time is money it can be wasted on Operating manual things and one of the most common would be school/college bell which has to be operated hour after hour and which is also not accurate and requires the use of



manpower this can be easily overcome by using a fully automatic system which is operated using a microcontroller where the college bell is operated fully automatic and doesn't requires any manpower and which is much more accurate than the one which is operated manually. It replaces the manual switching of the bell in the college.

Henry Ohiani Ohize et al. [2017] proposed a design of microcontroller- based automatic school bell. In this system they have used a 89c51 microcontroller and a keypad that is used to set the timings, after setting the timing the controller will operate the bell using the relay after the set time interval. No wireless connection of speakers in this system, author uses wired communication between controller and speaker.

Syed Naveed Uddin et al. [2016] proposed automatic school bell with user defined time schedule, the system is implemented using Arduino based system which has RTC on it, it also has a keypad that is used to set the timings and after the particular time intervals the bell rings which is connected through the relay. It has an Inbuilt Real Time Clock (DS1307 /DS 12C887) which tracks over the real time. The bell ringing time can be programmed at any time, so that it can be used at normal class timings as well as Exam Times.

Aman Tirpude et al. [2015] prposed a microcontroller based automatic college bell. The master device is our microcontroller ATmega16 and the slave device is Max232. The Max232 is being interfaced with the microcontroller which is used to convert signals from a TIA-232 (RS-232) serial port from a PC/Laptop to signals suitable for use in TTL-compatible digital logic circuits. The interval of time after which the bell should ring is already programmed and loaded in the microcontroller. If the present time matches the time scheduled in the PC/Laptop, logic high is driven to the output port of microcontroller and the bell rings (6 to 10 seconds). The small voltage (12v) acts as an enable to the relay circuit, which turns on the 230v to the bell and the bell rings.

Shweta Butoliya et al. [2015] presented a microcontroller based automatic college bell with monitoring system The GSM modem communicate with the microcontroller through universal asynchronous trans-receiver pin of IC P89V51RD2, which is used for serial communication. The baud rate used here is 9600. At the initial stage the values of SCON, TMOD and TH1 are set. The microcontroller transmits a set of AT commands to read the message. LED display board accommodates 336 LED's (7\*48 LED display) with 7 rows and 48 columns. As we know 1 character is of 8 bit we are using 6 shift register IC's are connected in cascading to shift each character column by column.

#### 4. Experimental Block Diagram



Fig.1. Block Diagram of system

#### 5. Working

From the above block diagram we can make out the circuitry involved in the design of an automatic college bell. Here, we are making use of ARDUINO UNO board for dumping the code written in ARDUINO IDE 1.6.7 software using Python coding and then we can check the required output of bell by interfacing it to the ARDUINO UNO board. The heart of the circuit is the ATMEGA microcontroller. The microcontroller we have used is ATMEGA328 which is the master device. which automatically counts every second, once enabled. The intervals of time after which the bell should ring is already programmed and loaded into the microcontroller. Once the time that is fixed matches with the time in the RTC clock, the bell rings. The bell rings continuously for a fixed time (50 seconds in our implementation) which is also mentioned at the time of programming. The circuit is implemented by interface the DS1307 with the ATMEGA328 microcontroller. It is through this serial interface that the exact time is read into the ATMEGA328 microcontroller and is compared against the set of time in the code. If the present time matches with the time that is set in the program, that is when the bell should ring, logic HIGH is driven to the output port of the microcontroller. This small voltage (5V) acts as the enable to the relay circuit, which turns on the 230V to the bell and the bell rings. Another part of the system is the time display. The time value read into the microcontroller from RTC is also given as output through its port pins every instant to be displayed, along with comparing the values internally. The output value from the microcontroller pins are displayed in the 16X2 LCD display, which gets automatically updated every minute. In the application of the automatic bell that we have used, the microcontroller is configured as the master device. Microcontroller serially communicates with the RTC (DS1307), which is the slave device.



#### 6. Results And Discussions

The whole point of the "Arduino Platform" is to allow for easy and fast prototyping. Being able to just hook up an LCD and be able to display messages on it in a matter of minutes, instead of hours, is just amazingly powerful and convenient when you have an idea in your head and just want to see if it works. When you need more control and are actually thinking on converting your prototype into a real product, then yes, you need to get deep down into the microcontroller and get rid of all the excess fat, trim the circuit to just the bare bones, optimize the code, etc. For prototyping, the Arduino platform gives you a lot of pre-wiring and free code libraries that will let you concentrate on testing your idea instead of spending your time building supporting circuitry or writing tons of low level code.

Using an Arduino simplifies the amount of Hardware and software development you need to do in order to get a system running. On the software side, Arduino provides a number of libraries to make programming the microcontroller easier. The simplest of these are functions to control and read the I/O pins rather than having to fiddle with the bus/bit masks normally used to interface with the Atmega I/O (This is a fairly minor inconvenience). More useful are things such as being able to set I/O pins to PWM at a certain duty cycle using a single command or doing Serial communication. Personally, I think the greatest advantage is having the hardware platform set up already, especially the fact that it allows programming and serial communication over USB. This saves me the trouble of having to do my own PCB (which can cost more than an Arduino) or bread boarding (which most people won't like doing).

So, coming to the results, The program have been written in such a fashion that, the bell should ring simultaneously for every 50 minutes along with the display of the date and time on the lcd screen indicating the completion of a particular session and beginning of another session exactly at that instant of time at which the bell rings continuously for 50 seconds from the movement it is activated. Here, in our implementation, the bell rings at 9 instants of time in a day's schedule which is according to the program we have assigned.



Fig. 3. Project Model

# 7. Advantages

A. It is an automation system.

*B*. Human errors can be avoided.

C. Safety is assured.

#### 8. Disadvantage

A. It is used in colleges, schools.

B. Also used in industries.

C. In railway station and airport.

D. Digital watches, washing machine, oven.

#### 9. Conclusion

In conclusion, in present time world are going for automation accuracy and time saving, in the energy sector they are going for non-conventional energy sources. Here, automatic college bell can be successfully designed on microcontroller based automated operation and also power by solar PV system. It can be applicable in school and colleges as per to save manpower and also to save time and decrease the human error. It will give maximum accuracy and as per the timing which can be easily reprogrammed by a common laymen and can also vary timing for some classes as per the schedule of the college. We can say that it will be much useful for colleges or schools or other educational institutions. It can be built using easily available equipment and can be used in real time in schools and in colleges. The world technology is going to more and more in automation for less man and money saving. It will also help in industries for performing different operation in specific time interval.

## 10. Future Scope

In this design, more advancement and upgrades can be done. The timings can only be edited by an authorized person. Another advantage is that the timings can be edited more number of times as per their wish. Another advantage is that it provides security since it uses a password. It can also be made by using GSM. Through GSM, the RTC can be controlled and so the timings can be edited.



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