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Automatic solar powered college bell system using GSM

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Abstract-

Theworldoverthedecadeshasmadeconsiderableadvancementi nautomation; automationis employedinevery sectorwhetheritishomeorindustry. Hereanewdesignisbeing presented.Thisdesignfindsatremendoususeatprimaryandsec ondaryschoollevelsaswellasincolleges ItusesReal TimeClock(DS1307)whichtracksthereal time. The bellautomaticallyrings atpreprogrammedtime intervalsand also displaysthetime by using LCD display. The lowpoweraspectisbrought aboutbyusing'SLEEP'modeinPIC microcontrollerwhichkeepsthesystem inidlestatewhenitisnot inuse. Themajor advantageofthisimplementationisthatitgives ustheexacttimeandnomanualoperation isneededwhileusing verylesspower.Thesystemismadebyestablishing aserial interfacebetweenPICmicrocontroller(PIC16F877A) .It avoid the human help with accuracy as it is automatic.GSM has included in our project to control the devices wirelessly. Both Renewable and EB source are used in this project to provide the supply to bell to supply the power to the bell when the time of power cut also.

I. INTRODUCTION

Mostof theeducationalinstitutionsinIndiaandother developing countries have their college/school bell rung manuallyaftereachhourof class.Manuallycontrolledbellmay causesomeproblemswhichincludethelackof accuracyintime andthepersonwhoisinchargeofringingthebellmightforget. If we consider the automated bell system (No human interventionneeded),itworks throughouttheday.Butitshould benoticed that,thereiswastage ofpower. Wehaveanalyzed thisproblemandhavecomeoutwith agoodsolutiontoreduce thepowerconsumption intheautomated bellsystem withthe'SLEEP'mode.Onemoreadvantageofthissystemisthatitalso hasaclock Display whichexactlydisplaysthetimeandringsat theexacttime.

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Theinitialpartofthepaperdescribesthebasicconstruction andworkingprincipleofthesystem.Thesecondpartexplains thebasicsoftheRealTimeClock(RTCDS1307).Thethirdpart ofthepaper discusses thetimer modules ofthePIC16F877A. Thefinalpartof thepaperdealsaboutcoding,testingandthe hardwareimplementation ofthebellwiththetimedisplay.The circuitthathasbeenimplementedisalsodiscussedinthepaper.

II. WORKINGPRINCIPLE

The block diagram of the automated bell system.The heart of the circuit microcontroller. The microcontroller we have used is PIC16F877A which is the master device. The slave device is the RTC IC DS1307, 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 (6 seconds in our implementation) which is also mentioned at the time of programming. The circuit is implemented by enabling the I2C interface of the PIC microcontroller. This is interfaced with the I2C interface of the RTC IC DS1307. The interfaces of the two ICs are explained in the section V of the paper. It is through this serial interface that the exact time is read into the PIC 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 display, which gets automatically updated every minute. The GSM modem communicates with the microcontroller through universal asynchronous trans-receiver pin of IC PIC16F877A which is used for serial communication. The controller is supplied with the standard character set containing alphabets, symbols, numbers and special characters through programming.

III. HARDWAREMODULE

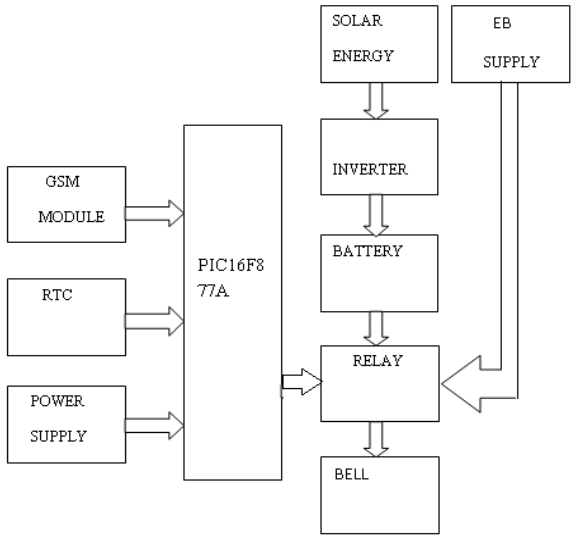

Fig.1Block Diagram

A. *GSM Modem- SIM300*

Mobile Equipment – The mobile equipment, sometime know as mobile station are the cellular phones. These are the devices handled by the users that generate and consume signals. The mobile equipment's has components to process and generate signals at the frequencies set by international GSM standards. There are basic components such as a microphone, a speaker, LCD display and a keypad. Newer generation phones have antennas that do not need to protrude out of the phone to transmit the generated signal.There are digital signal processing (DSP) chips and different types of memory to store phone numbers in address books and save SMS messages. Each phone has an International Mobile Equipment Identity (IMEI) number that is unique to it. Once a phone is bought and the activated, the IMEI is recognized by the GSM network and is read every time the phone contacts the network. This is also a feature that helps identify .and report stolen equipment and make them dysfunctional. The GSMModemcanacceptany GSMnetwork operator**SIM** (Subscriber IdentityModule card andactjustlike a mobile phone with itsown phone number.Andcanbe used tosend SMS,makeandreceive calls,itthroughsimpleAT commandsfrommicrocontroller and computers.

B. RealTime Clock

A **real-time clock** (**RTC**) is a computerclock (most often in the form of an integrated circuit) that keeps track of the current time.56-bytenonvolatileRAMfor data storagewithbattery backup.Itisalso have thecapacity of detecting the power off henceautomatically switches to batterysupply.

C. *Relay*

Relay is electro-mechanical device that is employed to isolate one electrical device from another. It permits a coffee current negative feedback circuit to form or break AN electrically isolated high current circuit path. Total isolation is provided by the relay between the triggering supply applied to the terminal and therefore the output. This total isolation could be a feature that produces relay totally different from alternative integrated circuits and is additionally necessary in several digital applications. it's a feature that bound semiconductor switches (e.g. Transistors, diodes and integrated circuits) cannot offer. during this circuit a 12V magnetic relay is employed. In magnetic relay, insulated copper wire coil is employed to magnetize and attract the plunger .The plunger is often connected to N/C terminal. A spring is connected to draw in the plunger face. once output is received by relay, the plunger is attracted and therefore the buzzer is on.

D. *Alarm Unit*

Whenthe realtimeandalarm time becomesequal,thealarmunitisinvoked.It consistsofarelay andabuzzer.Whenthetime becomesequal,therelay isswitchedandbuzzer sounds.

E. PowerSupply Unit

Apowersupply of+12V and +5V is required for circuitoperation. A supply of+12Visrequired by therelay.+5V supplyis requiredbythemicrocontroller, RTC andthe pull-upresistors.A step-down transformer of 12V ratingand PowerregulatorICLM7805is used.TheACmainspowersupply of230V,50Hz isstep-down usingthetransformerto+12V. A bridgerectifier circuitusingdiodesisconnectedat thesecondaryofthetransformer.Thisisfedtothe relayand power regulator.

F. *Inverter*

An inverter is basically a device that converts electrical energy of DC form into that of AC. The purpose of DC-AC inverter is to take DC power from a battery source and converts it to AC. For example the household inverter receives DC supply from 12V or 24V battery and then inverter convert sit to 240V AC with a desirable frequency of 50Hz or 60Hz. These DC-AC inverters have been widely used for industrial applications such as uninterruptible power supply(UPS), AC motor drives. Recently, the inverters are also playing an important role in various renewable energy applications as these are used for grid connection of Wind Energy System or Photovoltaic System. In addition to this, the control strategies used in the inverters are also similar to those in DC-DC converters. Both current-mode control and voltage-mode control are employed in practical applications.

G. PIC Microcontroller

PIC is a family of modified Harvard architecture mi crocontrollers made by Microchip Technology, derived from the PIC1650 originally developed by General Instruments Microelectronics Division.The name PIC initially referred to Peripheral Interface Controller. PICs are popular with both industrial developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory)capability.PIC has only 35 single word instructions. All are single cycle instructions except for program branches, which uses two-cycle. The Operating speed of PIC in DC is 20

MHz and clock input in DC is 200 ns instruction cycle. The PIC has 8K x 14 words of flash Program Memory, 368 x 8 bytes of Data Memory (RAM).

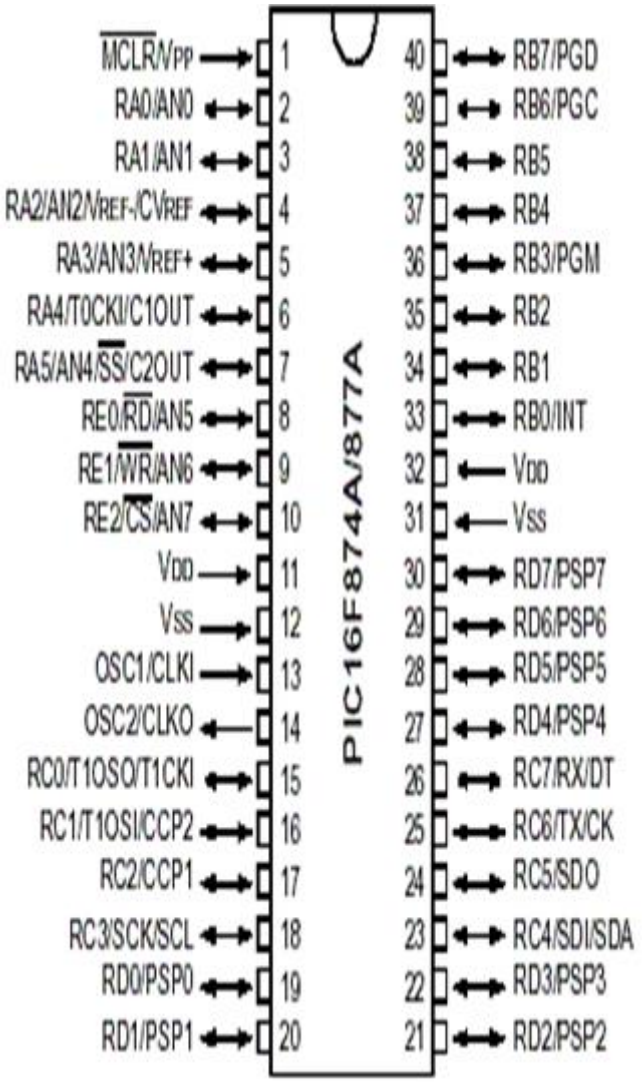

Fig.2 Pin Details of PIC16F877A

H. *Solar Energy*

Solar energy is radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaic's, solar thermal energy, solar architecture, molten salt power plants and artificial photosynthesis. It is an important source of renewable energy and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light-dispersing properties, and designing spaces that naturally circulate air.

IV. CONCLUSIOON

Successfully save the electricity by exploitation renewable energy and conjointly management the devices wirelessly exploitation GSM module. we have a tendency to projected this idea primarily to school labs seminar halls reception halls. we have a tendency to projected this idea primarily to school labsseminarhallsreceptionhalls. It ensures that our work won't solely be usable within the future however conjointly provides the pliability to adapt and extend, as wants amendment. gift day ringing the bell in colleges or colleges area unit dispensed manually. the most disadvantage of this can be that one person has got to be alert for this. At a similar time throughout that point he couldn't be have interaction in another task. to beat from this, we've got determined to arrange the circuit can which is able to} be operated mechanically and therefore the ringing of bell will begin by its own time. The time input will be altered as per needs. This circuit is straightforward to arrange and straightforward to put in. we will say
that it'll be abundant helpful for schools or colleges or alternati ve instructionalestablishments.

V. REFERENCES

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