The Coin Based Mobile Charging System Based On Atmega 328p

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***Abstract*— The coin based mobile charging system charges the mobile phone when the valid coin is inserted. So the coin acceptor (IR sensor) used recognizes the coin inserted and signals the ATmega 328p for further action.When a coin is inserted, it signals the ATmega328p and starts charging the mobile phone providing a 5V power supply through the charging slot. The ATmega328p starts a reverse countdown timer to display the charging time left for that mobile phone. Further the user adds another coin, the ATmega328p adds to the currently remaining time and once again decrements the countdown.**

***Keywords*— ATmega328p, IR sensor, SPDT relay, Piezo Buzzer, Transformer**

I.INTRODUCTION

The use of mobile phones is increasing day-by-day in many fields. People use cell phones for many purposes like online bank transactions, to keep in touch with business associates, with family members, conducting business and also in order to have access to the telephone in case of any emergency. Some people even carry different mobile phones for different purpose like one for business and other for personal use just to avoid the draining of battery in case of emergency business issue. Cell phones provide the user with the sense of security. However the uses of cell phones go beyond security.

The main purpose of mobile charger is to reduce the wastage of electric power which often arises due to the negligence of user.

The device which is designed by us has some relevance to the power bank which is also used to charge the cell phones by the people.The power bank is basically a portable device that can supply power from its built-in battery through a USB port.

The difference between them is that power banks can be carried by the user anywhere they want and charge their cell phones. Whereas this device is installed in public places and can be used by anyone by inserting the coin.

System Objectives?

The objectives of the system can be stated as follows:

- The objective of this project is inserting the coin to charge your mobile phone in public places and to avoid risk.
- People who are all using mobile phones outside of home or office without charging, the coin based mobile phone charger is very useful for them.
- The IR (infrared) transmitter and IR receiver is used to transmit and receive the IR signal in the receiver side and helps to detect the coin inserted.
- The main purpose of mobile charger is to reduce the wastage of electric power which often arises due to the negligence of user.
- This system helps to avoid many risks as the mobile is charged from time to time.
- The sensor system is used to detect the coin then it may be any type of sensor.(Here: IR sensor).When the signal came from the sensor unit, the ATmega328p activates the charger unit for predefined time .After that it will reset to normal state.
- The major action in this system is controlled by transmitter section. Here we need to generate IR frequency continuously.
- Whenever the light path between the IR transmitter and IR receiver cuts by an obstacle ,receiver signal gives low to high pulse and thus the countdown starts for certain time span.
- The ATmega 328p can calculate the time based on the number of coins inserted.

II. LITERATURE SURVEY

- In recent times, there have been lots of advancements in technologies being developed for charging the mobile phones.
- In most cases solar energy is used for charging the mobile phones. Solar energy converts light energy into DC current that can be used for charging the mobile phones. A fixed solar panel of size 635x550x38mm, 37WP is used to charge the mobile phones up to maximum 2.0 amp.
- It experimentally investigated the working of Coin based mobile charger with solar tracking system by peak power positioning. In this experiment the operational amplifiers can operate the ON/OFF and directional functions of the structured five motors. These motors rotate in two axes. The tracker's sun sensor is mounted. From the output of this device it will check the outputs are all equal, then the collector

structure is nearly perpendicular to the sun and tracking error is reduced.

- One of the main sourceofrenewable energy sources is solar energy. This energy generates more energy because the solar panel is maintained perpendicular to the sun's rays.
- By using an IOT, the mobile phone can be charged. In this scenario, it monitors the solar energy as well as battery power when the coin is inserted in the coin box. Once the coin is detected, it sends signal to the Raspberry pi and it trigger the relay and theLCD display show the countdown time. The Raspberry pi can collaborate with theoutside world. The relay generates the voltage and fed as input to mobile phones.

There are various technologies evolved for charging the mobile phones. Among them there are some systems which are user friendly and cheaper. The system which we designed using ATmega 328p is cheap as compared to other devices. It is easy to install in public places and easy to operate as the user has to just insert the coin in the device and is much more secure to use.

The system is feasible as it is cheaper and easy to install. It is user friendly and secure to use. It reduces the wastage of electricity as the countdown timer is installed.

III. SYSTEM DESIGN

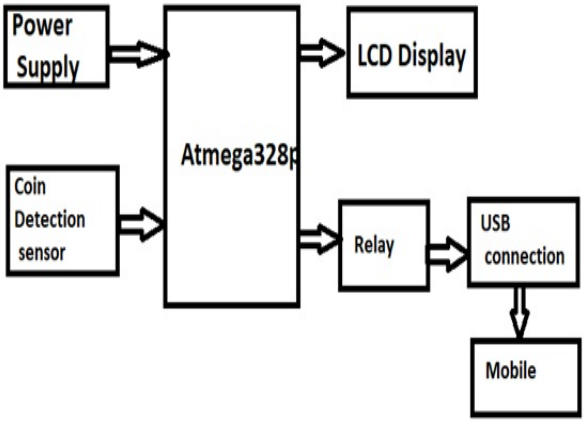

Fig. 1 System design diagram

ATMEGA328P

It has high performance and low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards.

ATMEGA328P is a 28 pin chip as shown in pin diagram above. Many pins of the chip here have more than one function.

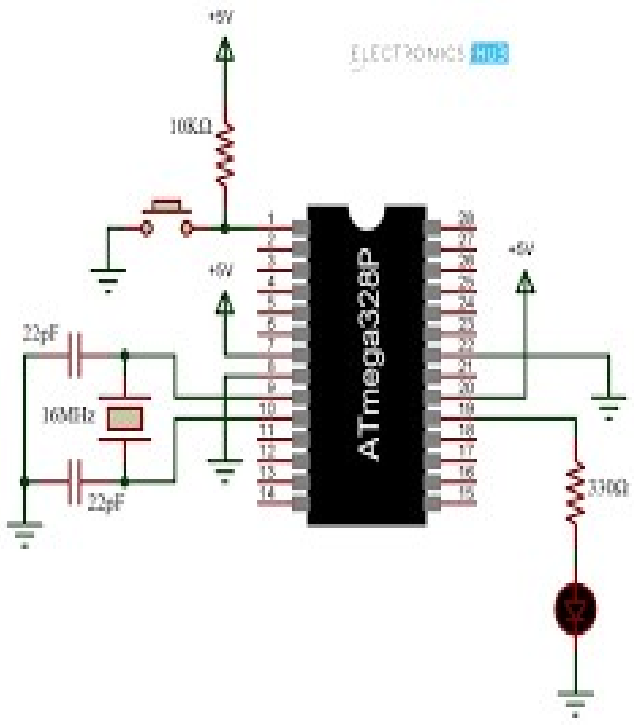

Fig. 2 ATMEGA Pin diagram

LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

LCDs are used in a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays, and signage. They are common in consumer devices such as video players, gaming devices, clocks watches, calculators, and telephones, and have replaced cathode ray tube (CRT) displays in most applications. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they do not suffer image burn-in. LCDs are, however, susceptible to image persistence.

The LCD screen is more energy efficient and can be disposed of more safely than a CRT. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. It is an electronically modulated optical device made up of any number of segments filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in color or monochrome. Liquid crystals were first discovered in 1888. By 2008, annual sales of televisions with LCD screens exceeded sales of CRT units worldwide, and the CRT became obsolete for most purposes.

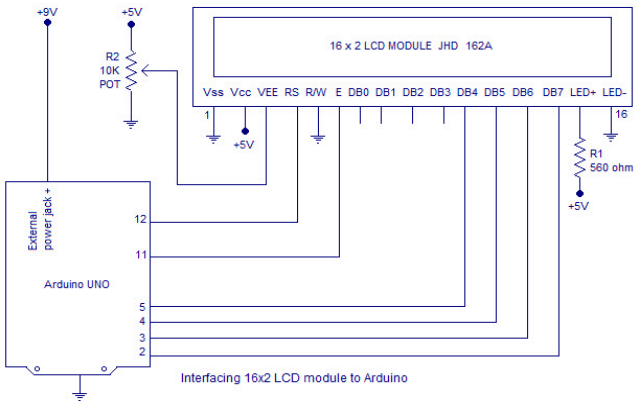

Fig.3 LCD Pin diagram

A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time (as in quartz wristwatches), to provide a stable clock signal for digital integrated circuits, and to stabilize.

Frequencies far radio transmitters and receivers. The most common type of piezoelectric resonator used is the quartz crystal, so oscillator circuits incorporating them became known as crystal oscillators, but other piezoelectric materials including polycrystalline ceramics are used in similar circuits. Quartz crystals are manufactured for frequencies from a few tens of kilohertz to hundreds of megahertz. More than two billion crystals are manufactured annually. Most are used for consumer devices such as wristwatches, clocks, radios, computers, and cellphones.

An IR sensor consists of an IR Receiver and an IR Emitter. IR emitter is an IR LED that continuously emits infrared radiations while power is supplied to it. IR receiver can be thought of as a transistor with its base current determined by the intensity of IR light received. Lower intensity of IR light causes higher resistance between collector-emitter terminals of transistors and limits current from collector to emitter. This change of resistance will further change the voltage at the output of voltage divider. In others words, the greater the intensity of IR light hitting IR receiver, the lower the resistance of IR receiver. Hence the output voltage of voltage divider will decrease.

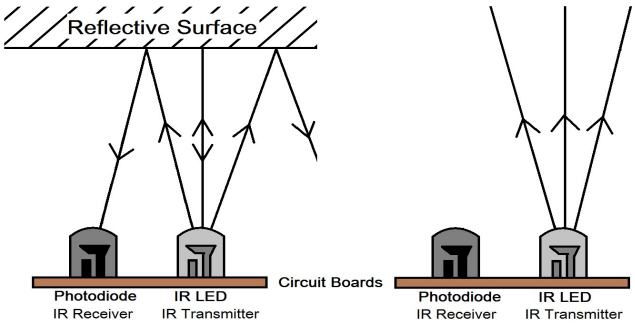

Fig. 4 IR sensor diagram

IR detectors are little microchips with a photocell that are tuned to recognize infrared light. Most commonly used for remote control detection. Every TV and DVD player has one of these in the front to listen for the IR signal from the clicker. Inside the remote control is a matching IR LED. It emits IR pulses to tell the TV to turn on, off or change channels. Therefore the underlying working principle of the IR sensor is: photo-diode's resistance and output voltage change in proportion to the IR light received.

The piezo buzzer produces sound based on reverse of the piezoelectric effect. The generation of pressure variation or strain by the application of electric potential across a piezoelectric material is the underlying principle. These buzzers can be used alert a user of an event corresponding to a switching action, counter signal or sensor input. They are also used in alarm circuits.

The buzzer produces a same noisy sound irrespective of the voltage variation applied to it. It consists of piezo crystals between two conductors. When a potential is applied across these crystals, they push on one conductor and pull on the other. This, push and pull action, results in a sound wave. Most buzzers produce sound in the range of 2 to 4 kHz.

The coin based mobile charger charges the cell phones by inserting the coin for the predefined time. It is basically installed in public places like railway stations, bus stops, hospitals, shops, etc. to avoid the risks and complete the mobile related work on time and to stay connected with family members and be secure while travelling.

In the system designed we used devices which are ATmega328p, LCD display, IR sensor pair, power supply (5V,1A),relay circuit, buzzer, USB cable and other small peripherals required for the design like resistors and capacitors as shown in the block diagram of the system.

As we designed the code for the system the LCD displays to insert 1RS coin. As we insert the 1rs coin between the transmitted and received signal of the IR sensor the countdown starts for the predefined time by the designer. The phone charges for the time given and stops charging after the timer stops. As we insert the coin the system provides certain time to insert the USB cable to the phone and as the phone is connected the charging starts.

The relay is the electromagnetic switch that is used to turn on and off the circuit by low power signal, or where several circuits are used to control by one signal. In this system the relay works the same to control the circuit i.e. to start and stop the device from charging the phone by switching the circuit using low power signal. As the timer starts the phone charges and as the timer is about to stop the buzzer turns on to notify the user that the charging is about to stop. If the user wants to charge more he should insert more coins and as a result the time gets added and the phone charges for the long duration.

This is how the system works though it has certain complexities as we mentioned in the above chapter. We can

overcome these complexities by making changes to the code we designed. We can also make changes to mechanical design to solve issues and can install more peripherals to improve the performance of the device.

IV. CONCLUSION

The coin based mobile charger is used in public places for charging all types of android cell phones just like charging it normally owing to the fact that it relayed the electricity through the coin based mobile charger needed to bring the mobile phone back to life as a result it reduces certain risks and may save life.

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