CHARGESPOT

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Abstract : Nowadays, Mobile phone plays a vital role in human life. Power consumption by mobile is a big issue faced by the people. Everyday depending upon the usage of mobile phone multiple times charging is needed which requires power source wherever go. The coin based mobile charging system charges the mobile phones when the coin is inserted. People who are using mobile phones outside their home or office without charging condition, the coin based mobile phone charger is very useful to that person for using coin to charge that mobile. This is designed based on Arduino UNO R3 micro controller that does the countdown timings for a period of 5 minutes with LCD displays showing the actual time left. During the timing period a relay output is latched and finishing timing in progress. In this project we are implementing more application by using the same concept like water filling and emergency alert to nearby hospitals and police stations by using the IOT concept. The relay will on to activate the charge and water pump, we will use charger to charge for our mobile phone and for refilling water bottles, respectively. It also uses solar energy as an alternative power source.

Keywords — Coin, Arduino UNO, LCD display, Charger, Relay, Water Pump, Solar Panel.

I. INTRODUCTION

The mobile phone market is a vast industry, and has spread into rural areas as an essential means of communication. This project may not seem as lucrative business for people residing in urban areas but may prove to be a major boon to people travelling from rural areas to urban areas, everyday. Also on highway streets, many times battery becomes flat in the middle of conversation particularly at inconvenient times when access to a standard charger isn't possible. They have become a major source of communication, be it with regards to the business aspect or personal communication. IoT-ChargeSpot, can work with some of the biggest brands in the world to provide free and secure cell phone charging to consumers. The fully-customizable charging stations can be installed in retail stores, malls, casinos, hospitals, and arenas. Consumers love that they never have to worry about a dead phone battery. Clients love that customer who charge shop longer and spend more.

Mobile phone charger is new business milestone because many people are attending business conventions and forgetting their charger at home or in hotel rooms. Students and many people use the public transportation and may not be aware of energy level of their mobile phone battery power. Such people are customers for mobile phone charger service. The IOT mobile battery chargers are designed to solve this problem.The user has to plug the mobile phone into one of the adapters and insert a coin then the microcontroller unit analysis the number of coin dropped on the coin box and according to that the controller decides the time of charging. The phone will then be given a limited amount of time for charging. It does not bring a mobile from dead to fully charged state but can help you in case of emergency. It is, of course, possible to continue charging the mobile and filling water by inserting more coins. The source for charging can be obtained from direct power grid or solar energy in case of non availability of grid power.

This proposed mobile phone charging project is also designed to use renewable energy. In this we are using a solar panel to generate electricity from sun light which will help to save electricity and cost. This system is designed to detect sun light automatically and switch the source of energy to solar and to electricity during night time. A LDR is used to detect sun light and the output of the LDR is given to the microcontroller as input. Based on the input signal from the LDR, the microcontroller switch energy source to solar or electricity with the help of driver and relay. The IOT prepaid mobile battery charger can be quickly and easily installed outside any business premises.

II. LITERATURE SURVEY

Literature survey is mainly carried out in order to analyse the background of the current project which helps to find out flaws in the existing system & guides on which unsolved problems we can work out. So, the following topics not only illustrate the background of the project but

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also uncover the problems and flaws which motivated to propose solutions and work on this project. A diverse amount of research has been done on power aware scheduling.

Especially in India, people use coins on a daily basis , be it banks, supermarkets or grocery stores, etc. They have become an integral part of transactions in our day to day life. Thus there is a basic demand to find a accurate and efficient automatic coin recognition system. A system will be useful if it supplies the requirement of the end user with the availability. That's why coin based system is chosen as the concept in the proposed research work. Many of the existing systems are more centered on coin detection rather than the charge it spot. In addition, the incorporation of IOT is not made possible.

R. Bremananth et al.; In 2005 proposed a system that focuses only on the numerals rather than the use of other images presented on the front and rear side of the coin. For experiment they used 1-rupee, 2-rupee, and 5-rupee Indian coin. The system used neural pattern analysis to recognize numerals with a 92.43% success rate of our test data.[1]

Saranya Das. Y.M et al.; In 2013 proposed a system to classify Indian coins discharged recently.[2]

This system is based on Advanced Harris -Hessian Algorithm, used the parameters such as size, weight, surface, etc of coins and additionally used the concept of rotation invariance. It is a highly cost efficient system having recognition rate near to 100% .

Deepika Mehta et al.; In 2013 proposed a system to discover and acknowledge the Overlapped coins using Otsus algorithmic program supported by the Hough transform technique.[3]Most of the existing project unit doesn't fulfilled the voice of the end user. In the proposed implementation, the working conditions of ChargeSpot with IOT is to make sure of the efficiency in charge allocation based on coin as well as prepaid recharge.

III. PROPOSED SYSTEM

In this proposed system, a slot sensor is used to insert the coin . The sensor senses and sends the corresponding electrical output signal to microcontroller. The microcontroller unit analysis the number of coin dropped on the coin box and according to that the sensors operates.

- Utilization of renewable solar energy.
- Helps public to charge mobile and get drinking water.
- Assurance of public safety.
- Helpful for emergency communication.
- As a useful aid for Students, tourists and people utilizing public transportation would become the prospective customers for the proposed public mobile phone charger service.
- IOT charge it spot brings a very wonderful solution for commuters and travelers who need to charge their mobile phones and gadgets immediately.
- Providing multi sub goals to the intended IOT charge it spot like renewable energy usage, emergency switch for medical and police emergencies etc.
- The primary objective of the proposed battery charging system is designed to resolve the problem of low battery. This could also be useful in the event of unpredictable grid power and availability of abundant solar.
- Incorporation of IOT makes it more profitable as the data related the coin input/recharge input is stored in the database.
- Inclusion of the water vending makes it more attractive.
- System unit with emergency switch for medical and theft/misconduct scenarios.
- Use in public places like bus stand, railway stations etc.

IV. ARCHITECTURE

In this system, a slot sensor is used to insert the coin. The sensor senses and sends the output signal to microcontroller. The microcontroller unit analysis the number of coin dropped on the coin box and according to that the controller decides the time of charging or amount of water to be dispensed.

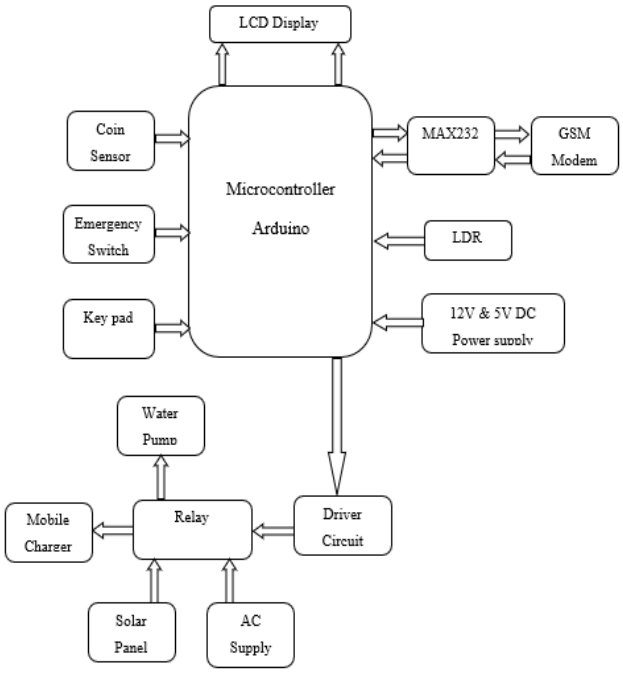

Figure: System Design

The people can also charge their mobile phones using mobile recharge. The GSM modem in the system will receive the recharge message and gives the signal to the

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microcontroller. The controller processes the signal and decides the time for charging or amount of water. Then the microcontroller display message on the LCD display to select option whether people want to do mobile recharges or water. Based on the option selected, the microcontroller activates the mobile charging point or water pump with the help of driver circuit and relay. The system is also fitted with an emergency switch which can be used by people in case of emergency or if they need any help. The emergency key is used for security purpose, here 2 keys are used one for hospital and another for police stations for any theft any materials, By using IOT concept the particular data will stored in the specified server what we mentioned and then it will sends to the nearest police station and the hospital by using the GPRS. In future if we need any information we can easily access the data by the help of server and GPRS.

A. Objectives

- Recharge battery on the go
- Water dispenser
- Emergency switch for any situation
- Online recharge when hard cash is not available
- Saving power through renewable energy
- Incorporation Image processing in coin sensor.

V. FEATURE ENHANCEMENT AND APPLICATIONS

The idea of the implementation is from the machine to wait for the command and provide the required resources. The coin sensor detects the coin and then provide the amount of resource fixed during the programming phase. The on the go recharge system help people to get there phone charged or refill water bottles if required or emergency switch. The solar panels used for renewable source and will help during the power blackout. It is also multifunctional. It provides you with water facilities and emergency switch. It also consist of prepaid recharge through the GSM model.

A. Application to real World

A new machine for the recharge can be placed throughout small shops or venders for quick recharge and it will be convenient for the person to charge their phones by coin or by e-money. It will decrease the dependability on power banks and will increase the source of income in someways. It will be great to save electricity as the source of energy is replaced by solar power. It can help in safety especially for women as it has a safety switch connected to police and as well as fire station/hospitals.

VI. FIGURES/TESTING RESULT

A. LDR Sensor

A light-dependent resistor, alternatively called an LDR, photoresistor, photoconductor, or photocell, is a component that is sensitive to light. When light falls on it then the resistance changes. Values of the resistance of LDR may change over many orders of magnitude the value of the resistance falling as the level of light increases.

Light Dependent Resistor (LDR)

How an LDR works?

An electrical current consists of the movement of electrons inside a material. Good conductors have a large number of free electrons that can be drifted in a given direction. Insulators with a high resistance have very few free electrons, and therefore it is hard to make the free electrons move and hence a current to flow.

A LDR or photoresistor is made of any semiconductor material with a high resistance. It has high resistance because there are very few electrons that are free and able to move - the vast majority of the electrons are locked into the crystal lattice and unable to move. Therefore, in this state there is high LDR resistance.

As light falls on the semiconductor, the light photons are absorbed by the semiconductor lattice and some of their energy is transferred to the electrons. This gives some of the electrons sufficient energy to break free from the crystal lattice so that they can then conduct electricity.

Types of photoresistor:

Light dependent resistors, LDRs or photoresistors are of two types:

- **Intrinsic photoresistors:**
  Intrinsic photoresistors use an un-doped semiconductor materials including silicon or germanium. The electrons are free to conduct electricity. The more light that falls on the device, the more electrons are liberated and greater will be the level of conductivity, and this results in a lower level of resistance.

- **Extrinsic photoresistors:**
  Extrinsic photoresistors are manufactured from the semiconductor of materials doped with impurities. These impurities or dopants creates a new energy band above the existing valence band. As a result, electrons need less energy to transfer to the conduction band because of the smaller energy gap between them.

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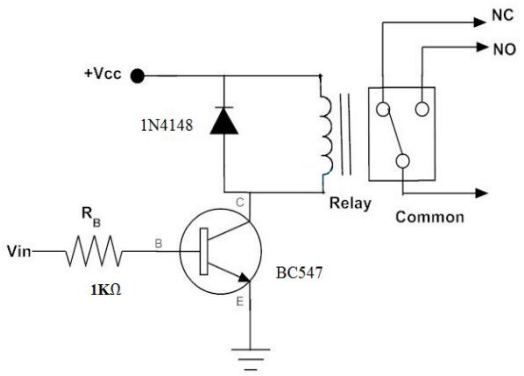
B. Relay Driver Circuit

While designing electronics projects the loads are controlled (switched ON or OFF) by using microcontroller block. But, for this purpose the circuit requires the relays, acting as controlled switches. Depending on the signals received from the microcontroller or other control circuits, the relay controls the load. The relay consists of a continuous power supply and whenever it gets driven or gets control signal then the relay gets activated and loads can be turned ON or OFF.

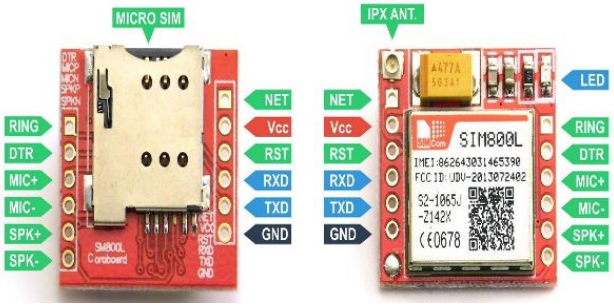
Relay Driver Circuit Diagram:



The circuit which is used for driving a relay can be termed as a relay driver circuit and it can be designed using various integrated circuits. These relays are needed to be driven for activating or to turn ON. So a relay require some driver circuitry to turn ON or OFF (based on the requirement). This is about relay driver circuit using BC547 Transistor.

C. SIM800L-RC5100 GSM Modem

It is a miniature cellular module which will allow for GPRS transmission, sending and receiving of SMS and making and receiving of voice calls. After connecting, the power module boots up, searches for cellular network and login automatically. This module is consist of two antennas. First is made up of wire (which solders directly to NET pin on PCB) - very useful in narrow places. Second - PCB antenna - with double sided tape and attached to pigtail cable with IPX connector. This one will have better performance and antenna is outside.



Pinout (bottom side - left):

- RING (not marked on PBC, first from top,square)– LOW state while receiving call
- DTR - Sleep mode. Default, in HIGH state (module is in sleep mode, serial communication disabled). After setting it LOW,the module will wake up.
- MICP, MICN - is microphone (P + / N -)
- SPKP, SPKN -is speaker (P + / N -)

Pinout (bottom side - right):

- NET - antenna
- VCC - supply voltage
- RESET - reset
- RXD - serial communication
- TXD - serial communication
- GND – ground

D. Water Pump

Micro Submersible Mini Water Pump is consists of following specification:

- Operating Voltage: 3V to 12V Dc
- Power Consumption: 0.4W to 1.5W
- Maximum Lift: 40 ~ 110 mm
- Flow Rate: 80 ~ 120 L/H
- Load rated current: 0.18A
- Type: Submersible
- Dimension: 45 X 24 X 30 (Lxhxb)mm
- Material: engineering plastics
- Use of fluids: tap water, ground water, seawater
- Water temperature: -20 ° C ~ 50 ° C
- Environmental humidity: 45% to 90%
- Motor: brush motor

E. Power Supply Unit

The circuit needs 2 different voltages, +5V & +12V, to work. The dual voltages are supplied by this specially designed power supply. The main object of the 'power supply' is, as the name itself implies, to deliver the required amount of stabilized and pure power to the circuit.

Every typical power supply contains the following sections:

1. Step-down Transformer: The traditional supply, which is generally available to the user, is 230V AC.

It is necessary to step down the mains supply to the required level because , for proper working of the regulator IC (say KIA 7805) it needs at least 2.5V

more than the expected output voltage

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2. Rectifier stage: The step-downed Alternating Current is converted into Direct Current. The rectification is achieved by using passive components such as diodes.If the power provide is designed for low voltage/current drawing loads/circuits (say +5V).

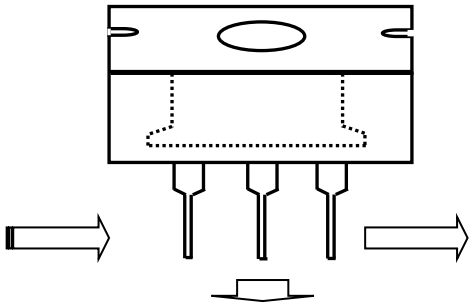
3. Filter stage: This rectified output contains some percentage of superimposed AC ripples. So to filter these AC components filter stage is built around the rectifier stage. This capacitor (electrolytic) has polarities, take care while connecting the circuit.

4. Voltage Regulation: The filtered DC output is not stable. It varies in accordance with the fluctuations in mains supplies varying load current. The variation of load current is observed due to voltage drop in transformer windings, rectifier and filter circuit.

Circuit Description: A DC power supply which maintains the output voltage constant regardless of AC mains fluctuations or load variations is understood as regulated DC power offer.

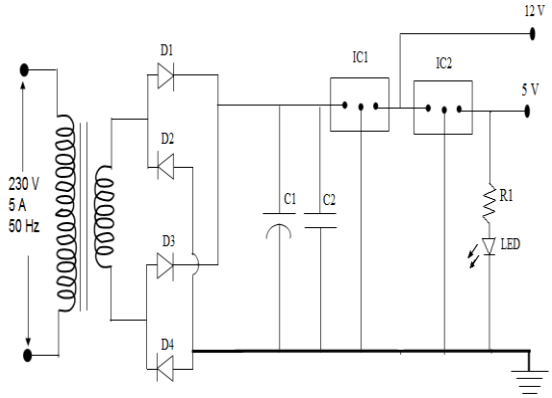
This laboratory power supply offers excellent line and load regulation and output voltages of +5V & +12 V at output currents up to 1 amp.

KIA 78xx Series



1 2 3

CIRCUIT DIAGRAM OF +5V & +12V BRIDGE RECTIFIER REGULATED POWER:

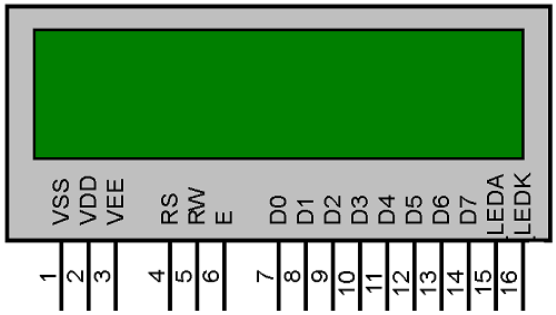


F. 16×2 LCD Display

We come across LCD displays everywhere around us. Computers, calculators, tv sets, mobile phones, digital watches use some quite display to show the time. An liquid crystal show is associate electronic display module that uses liquid crystal to provide a visible image. The 16×2 LCD display is a very basic module ordinarily utilized in DIYs and circuits.

The 16×2 translates a display 16 characters per line in two such lines. In this LCD every character is displayed in a 5×7 pixel matrix.

16X2 LCD pinout diagram



RS(Register select): A 16X2 LCD has 2 registers, namely, command and data. The register select is used to switch from one register to another. RS=0 for command register, whereas RS=1 for data register.

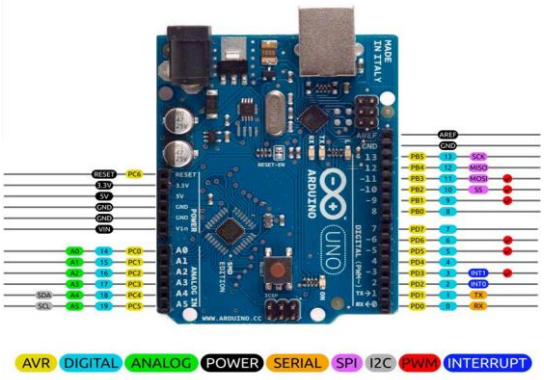
Command Register: The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to try to a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc.

Data Register: The data register stores the information to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the liquid crystal display. When we send data to LCD it goes to the data register and is processed there. When RS=1, data register is selected.

G. Arduino Uno R3 Microcontroller

The Arduino Uno R3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of that 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Pin Diagram:



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Input and Output:

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead()functions.

They operate at 5 volts. Each pin can offer or receive a most of 40 mA and has an internal pull-up resistor of 20-50 kOhms.

Power:

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

The power pins are as follows:

VIN: The input voltage to the Arduino board when it's using an external power supply .

5V: The regulated power supply used to power the microcontroller and different components on the board.

3V3: A 3.3 V supply generated by the on-board regulator. Maximum current draw is 50 mA.

GND: Ground pins.

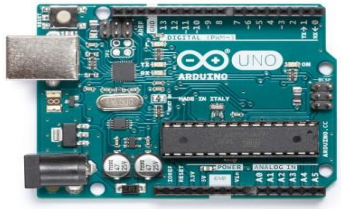
Memory:

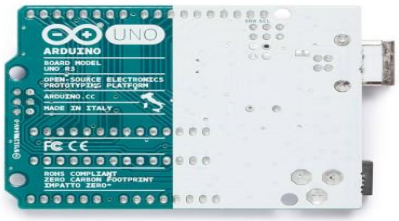
The ATmega328 has 32 KB.

It also has 2 kilobyte of SRAM and 1 kilobyte of EEPROM.

Physical Characteristics:

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes permit the board to be hooked up to a surface





VII. CONCLUSION

After understanding the related articles, literatures and analysis of a few similar projects, the current design strategy was selected. Various development stages are planned and finally the whole system is implemented. In entirety, the developed system is able to attain the primary objectives such as charging unit allocation for mobile phone users based on coin input as well as the prepaid recharge from the mobile phone. Numerous sub goals is achieved like, emergency switch for police department and fire department in concerned with women safety and child safety, usage of renewable energy source i.e. solar power etc.

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