Coin Based Solar Mobile Charger

Aparna D. Pawar

Abstract— We all know this era is mobile phone era. Almost 70-80 percent people having mobile phone. Communication is more important in all fields. Today's smart phone having much more facilities, due to that facilities mobile phone required more charging. Sometimes our call may cut in mid-way due to lack of charging. This system gives charging to that mobile phone which need immediate charging.[1][2] Once we connect the mobile to charging slot we required to put the coins in this system . After inserting coin it will compare with database, and if the coin insertion is exact then mobile will charge. This charging system is depend on the solar. Using solar panel the sun energy(photons) is converted into electrons(current). We know much of sun energy is wasted on earth and we need to use that energy. That's why in this system use the solar energy. And the coin detection is using MATLAB so that duplication of coin is avoided.

Index Terms— solar panel; MATLAB;solar tracking system;TDMI; keil.

I. INTRODUCTION

Mobile phones have a great value in today's market, as well as mobile phone is a great communication media for personal and industrial purpose. This system that is coin based solar mobile charger give the charging to mobile phone. Sometimes battery becomes flat in the middle of conversation particularly at in convenient times when access to a standard charger isn't possible. The coin-based solar mobile battery chargers are designed to solve this problem. This system is like coin based phones which was famous in beginning of 20'th century. Initially when we inserted the coin into coin insertion slot, it will compare the image of coin which is stored in the database. If the new image and stored image is matched then it will show on the LCD. Then we can connect our mobile to the charging plug and charging will start. Charging is depend on the coin. Accordingly coin charging will increase means if we insert 1Rs coin then it will charge up to some time. In this system I use the 1,2,5,10 Rs coin. Usually solar panel is placed at only one direction but in this system use the LDR's. This is rotate according to the sun energy and gets the full sunlight. For programming of this system keil software. Programming is like C which is called as embedded C. Once programming is done then it is download into microcontroller. For downloading the program use Flash Magic. For coin detection part MATLAB is used. Mainly this system is used for that area where grid power is not available that is rural areas. At night time or sometimes in rainy season sun energy is not available that time we can connect external power supply also. So that for both condition this system will work.[1]

In this paper (1) first introduce the system, how it works briefly introduce. Then which are the basic assumptions of system. (2)After that block diagram of the system and explanation of each block is given. (3)Then the hardware and software specification and then result shows. (4)Finally conclude the total system as well as future scope.

II. BASIC ASSUMPTIONS

To design Solar Activated coin Based Mobile Charger basic assumptions is as follows.[1]

1. Charging Current is required up to 4.8AH@ 6VDC
2. Solar Panel having size 650x565x40 mm, 38WP capable of supplying up to 3.0 amp is used.
3. Web-Cam; which is used for coin detection using image processing.
4. LDR (Light Dependent Resister) for getting maximum sun energy.
5. Microcontroller; ARM7-LPC2131/32/34/36/38 family is used.
6. Battery; for power storage.

III. ARCHITECTURE OF PROPOSED SYSTEM

This proposed system is solar activated coin based mobile charger, which charges the mobile phone according to the coin. for charging of mobile phone we need to insert the coin in to the coin insertion slot. Once we insert the coin in to slot, it will check or compare the coin with already stored image. For comparing the coin the image processing is used. Using MATLAB software coin detection is done. Once coin detection part is complete means the coin is exactly detected then it shows message on display is "plug the mobile phone". If we inserted 1Rs then It will charge approximately 10 %. Likewise 2Rs, 5Rs, 10 Rs coins charge the phone according to software. And if the incorrect coin is inserted then it will go to refund box. The proposed system block diagram is as shown in fig. 1.

Microcontroller is the heart of this system. All system run through uC(Microcontroller). In this proposed system the ARM 7 TDMI uC is used which having large storage capacity. Battery gives the power to the microcontroller and uC work on that solar energy.
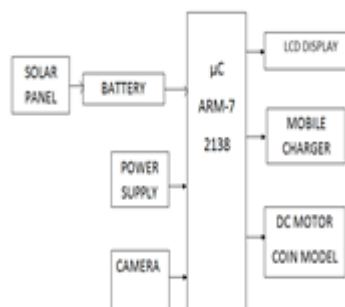

Fig.1. Architecture of coin based solar mobile charger

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IV. System Specifications

Hardware specification

ARM7-LPC2131/32/34/36/38

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high-performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC).[5] This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously.

Solar panel

Solar panel refers either to a photovoltaic module, a solar hot water panel, or to a set of solar photovoltaic (PV) modules electrically connected and mounted on a supporting structure. A PV module is a packaged, connected assembly of solar cells. Solar panels can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 320 watts.

Web-cam
LDR(Light Dependent Resistors)
Motor Driver
LCD Display
Power Supply
Battery

Software specification

For programming of this system Embedded C is used. Following software is used for the programming.

Keil μ Vision

The μ Vision IDE from Keil combines project management, make facilities, source code editing, program debugging, and complete simulation in one powerful environment. The μ Vision development platform is easy-to-use and helping you quickly create embedded programs that work. The μ Vision editor and debugger are integrated in a single application that provides a seamless embedded project development environment.

Flash Magic

Once we complete the programming in keil. We need to download the program into microcontroller. For downloading the program the Flash Magic is used. The Hex file which is download in to the microcontroller.

MATLAB

It is the software which is used for coin detection in this system. It avoids the coin duplication also. Result from MATLAB is as shown in figure 2, 3 and 4. Figure 2 shows the

MATLAB Figure after simulate the program when we click on get live we can take the live image
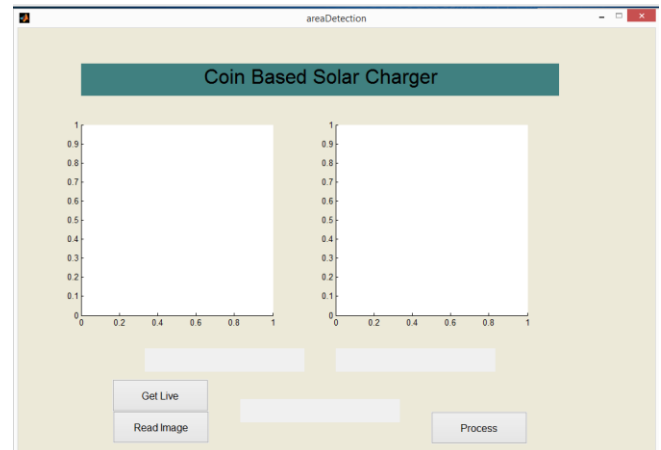

Fig. 2.Input Image
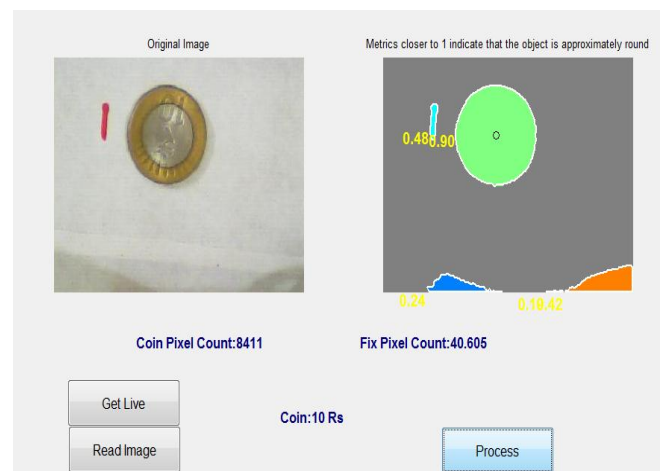

Fig.3.Original Image Taken By Camera

Fig.4. Edge Detection of coin and exact detection of coin.

from web-cam. And after that we click on process then we get the output of the process as shown in figure 4. It fix the pixel count and then give the result.

V. Solar Tracking System

Controlling the mechanical movement of solar panel by stepper motor. On architecture of this system LDR's are placed. Intensity of LDR will be varied according to the sun movement. If sun light intensity is more, LDR intensity will be less. When LDR intensity is less stepper motor rotates according to that so that found maximum energy of sun. According to that solar panel also rotates.[1]

In this system LDR's are used because LDR having low power consumption. LDR reads maximum when surrounding light intensity is less. The ADC shows the reading according to the value of LDR. The diagram for solar tracking system is as shown in figure 5.[1][3]
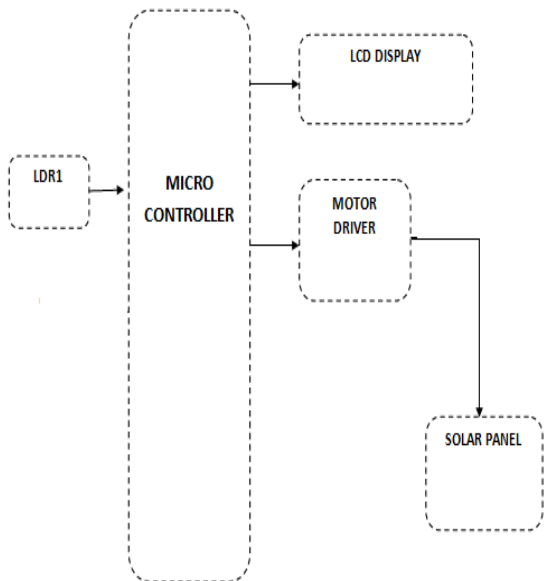

Fig. 5. Solar tracking system architecture.

CHARGING REQUIREMENT OF MOBILE BATTERIES

Below shows the table which gives the battery requirement for various mobile companies.[1]

TABLE I Charging Requirement Of Mobile Batteries

No.	Type of Mobile	Charging (Maximum) Voltage(V)	Charging (Maximum) Current(Ah)
1	Nokia	4.8	1500
2	LG	5.5	2100
3	HTC	5.5	1800
4	Panasonic	3.7	1200
5	Black Berry	3.7	1300
6	Samsung	5.7	3400
7	Sony	4.8	900

VI. ALGORITHM FOR COIN BASED SOLAR MOBILE CHARGER

Flow diagram of this system is as shown in figure 6. And steps of the algorithm as shown bellow.

1) *Start*
2) *Enter the coin*
3) *Once enter the coin it shows coin is correct*
4) *If coin is not exact then on LCD display"please insert the exact coin*
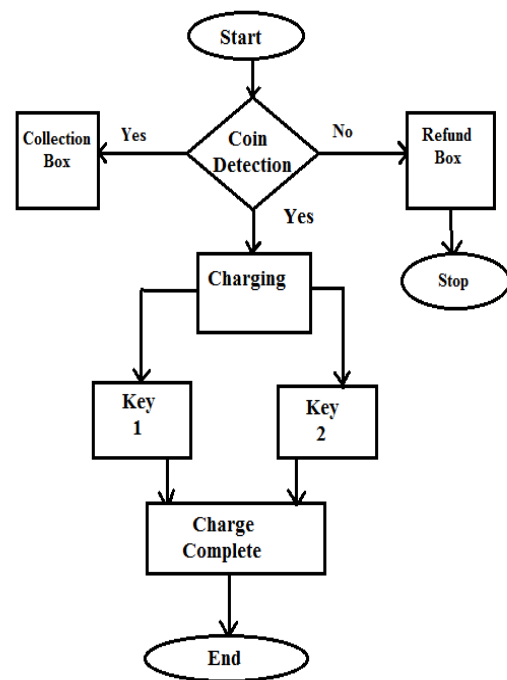5) *If coin is exact then charge your mobile phone*
6) *End*

Fig. 6. Flow Chart Of Coin Based Mobile Charger.

VII. EXPERIMENTAL RESULT

The hardware of this solar activated mobile charger is as shown in figure 7. This one is the complete coin based mobile charger. Which is totally depending on solar hence it is more useful in today's life. This system effectively receives maximum energy from sun towards earth rotation. only one drawback is that it will not used in all night because sun energy is not available. But some percent of battery will charge so that for some time this charging system can use.

VIII. FUTURE SCOPE

As we know this system is depend on the solar energy so it is effective, like mobile phone this system is also used for television in future. Also we can use solar energy for other home as well as industrial purpose.

IX. CONCLUSION

This system is useful to save energy from sun and intelligent tracking solar energy. Also having Low power consumption. Use of sun energy is essential at that time so this solar activated system is also essential in today's life. This system is particularly significant throughout the summer season with its long days of sunshine readily available to capture and no energy will be lost. In rural areas electricity is not available all time but communication is one of the need of people, so this solar based mobile charger helpful for those areas. In this proposed system the coin recognition is also one of the important part. MATLAB is used for avoiding coin duplication. So this system is useful from all ways.

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Fig. 8. Experimental setup.

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