Secondary Backup Battery

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Abstract- *In the modern era, with the wide use of smart phones, the battery drains out within a blink of the eye. Hence, it has become crucial to have phones with secondary backup battery, which can be used to make an emergency call or save a document even when all the charge in the primary battery has drained out. Thus, we come with the idea of a phone battery backup to solve the above problems.*

In this project we have two areas of interest namely:
1) *A phone (either ON or OFF) and running out of battery and using a backup battery to overcome this problem.*
2) *In case the phone is lost, irrespective of it being switched ON or OFF, tracking or tracing the phone.*

Keywords- Secondary Backup, IC (Integrated Chip), Switching over, Backup Switching, GPS and RFID.

I. INTRODUCTION

With the development of basic phones to smart phones, the power consumed by the phone has also increased due to the advancement of technology in these smartphones. Hence, they run out of battery faster than expected. To overcome this problem seen in our daily lives, we were motivated to come up with a solution for this problem, where once the phone battery goes below a specific battery charge level (ideally down to 15%- 16% of the primary battery level), the user is alerted and a backup battery is used. This is the brief idea about the solution.

II. WORKING METHODOLOGY

For implementing our solution, we have used the IC S-8425, specifically called the "backup switching" IC. The advantage of using this IC is that, firstly, being small in size it can be easily embedded into the device of interest. Next, it has inbuilt voltage regulators and a switching circuit, which can be configured using its respective datasheet. The voltage regulators are designed to maintain a constant voltage level to protect the device from the fluctuations of the main supply. This IC has 3 inbuilt voltage regulators which corresponds to pins 2, 6 and 8, which are VCH, VRO and VOUT respectively. This IC also has two voltage detectors, namely the CS (pin 4) and the reset (an active low detector which is pin 5); which checks for the presence of a voltage. The IC is as shown in Fig1.

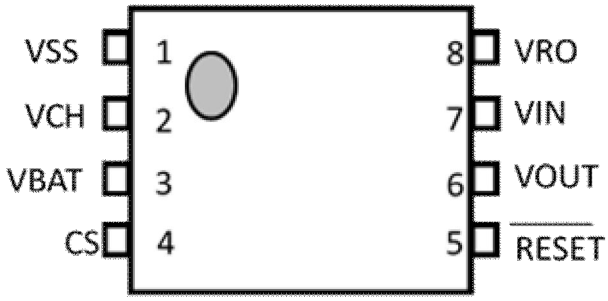

Fig.1: IC-8425 pin

Figure 1.

The circuit connections in Fig. 2 and Fig. 3 shown below is an application circuit which we have implemented and has been taken from the datasheet and is used to verify the switching over.

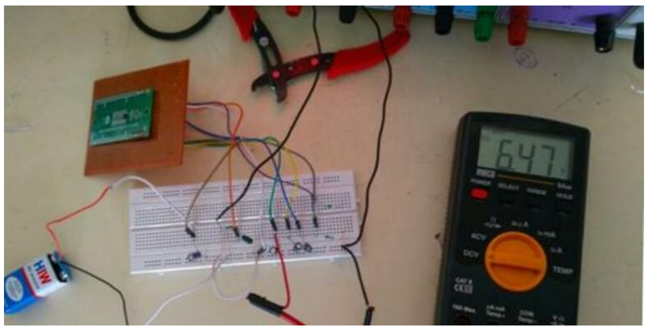

Figure 2.

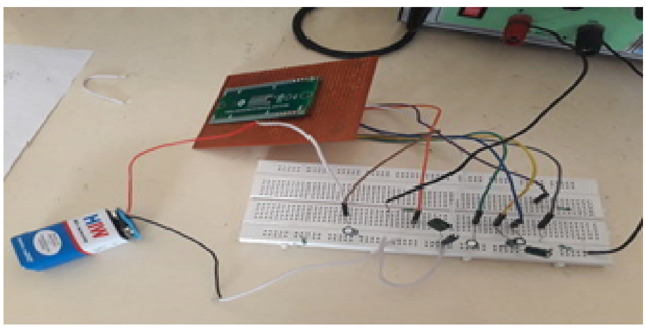

Figure 3.

Here, the switching circuit has the detectors Vsw1, Vsw2, a switch controller, the voltage regulator 2 (the output of which is taken from the VOUT pin) and a switch transistor. Vsw1 Detector: This monitors the power supply voltage VIN and the result is sent to the switch controller. The detection voltage, which is Vsw1 is ideally set to 85 plus or minus 2% of CS voltage (Vdet1) as per the IC datasheet. Vsw2 Detector: This monitors the VOUT pin voltage and keeps the CS voltage output low until the VOUT pin voltage rises to Vsw2 voltage.

Thus, the voltage regulators are used to provide stabilized outputs. Here, Vdet1 is the CS voltage and this monitors the input voltage VIN, while the RESET voltage Vdet2 monitors the output voltage from VOUT pin. The Switch controller controls the voltage regulator 2 and also the transistor M1. After a setting the voltages of CS and RESET as 4V and 2.2V (the values were set after calculating the averages of the series of outputs for the given range, and taking the corresponding input for the obtained average output); the following outputs were observed:

Table 1.

V_{sw1}			V_{sw2}		
Min.	Typ.	Max.	Min.	Typ.	Max
4*0.83= 3.32V	4*0.87= 3.48V	4*0.85= 3.4V	6.47*0.93 = 6.14V	6.47*0.95= 6.14V	6.47*0.97= 6.27V

Thus, the following can be observed:

Table 1.

Power supply Vin	Voltage regulator 2	Switch Transistor M1	VOUT pin voltage
Vin> Vsw1 **Vin>3.4V**	On	Off	VOUT **(6.47V)**
Vin< Vsw1 **Vin<3.4V**	Off	On	VBAT-Vdif **(3V-2.16mV=2.99V)**

Hence, with these observations we were able to study how the IC was switching which can be extended to switching between a primary and secondary battery.

Hence, switching has been successfully achieved with the help of this powerful IC S-8425. The block diagram shown below summarizes the above theory in a clearer fashion

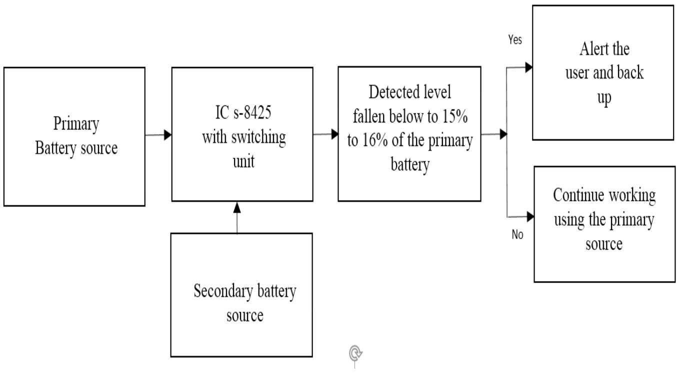

Figure 4. BLOCK DIAGRAM

III. SCOPE

Though this was initially designed for a mobile phone, it could be extended to other devices as well. The idea behind using a CMOS lithium ion battery, like CR2032, is that, it is almost as compact as the IC used. The average life of the cell is about 6.5 years before it completely drains out of charge, which is an added bonus. Additionally, the CMOS battery used supplies power to the system only when it's shut down, thus retaining any data that might be lost due to the absence of power supply.

The second part of the project, such as the tracking of the phone can be implemented using a GPS and an RFID system and is given as a proposal. The CMOS battery aids in this as well.

REFERENCES

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