

An Idea : Self Charging Smartphone

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Abstract: Smart Phones Users Are Drastically Increasing From 1998 Onwards To Till Date .Various Applications And Tools Are Introduced During This Recent Years For User Comfort. For This Increasing Always Changing Industry. One Common Problem Is Battery Life Of A Smart Phone .Due To Heavy Uses Always There Is A Battery Charging Issue Is Come In To The Picture. So We Proposed One Electronic Based Solution For This Problem. The Solution For This Problem Include Various Sensors And Phototransistors For Temperature, Pressure And Voice Are Used To Get The Analog Signal. Analog To Digital Converter (ADC) And Digital To Analog Converter (DAC)For Conversion Of Signals. Digital Signal Processor Which Processes Only Digital Signals. Those Digital Signal Converted Into Electricity By Using V2I Converter.

Keywords :-Digital signal processor, analog to digital converter(ADC), Digital to analog converter(DAC), sensors, photodiodes, Digital signals, analog signals, Amplifier, Battery, V2I Converter.

I. INTRODUCTION:-

As we know there are rapid development is done in the field of smart phone industry. So supportive to that many users are attracting and using this smart phones for communication .But all users at least ones battery discharge problem. So our motive is either improves battery life or give a good solution to solve the problem of battery discharge completely. So we can energy and time of consumer. Apart from that it saves electricity bill of consumer.

So if we use users voice, room temperature, pressure, light and hand gesture as an analog signal .which can be sensed by using various sensors and photodiodes. These all the sensors is attached on the smart phone itself .after that there is a need of ADC to convert that analog data to digital signal.

Then DSP comes into the picture and he can processes that signals deliver to amplifier for amplifying those signals .amplifier then forward that signals to DAC. DAC converts those digital signals to analog signals which later passed through V2I converter. That converted analog signals (voltage) then converted into electricity (current).

This generated electricity then forwarded to battery of mobile so battery getting additional supply and improves battery performance or rather saves energy consumption also gives relief from battery discharge issue.

I. RELATED WORK:-

Light sensor : Photo sensors or photodetectors are sensors of light or other electromagnetic energy. A photo detector has a p-n junction that converts light photons into current. The absorbed photons make electron-hole pairs in the depletion region. Photodiodes and photo transistors are a few examples of photo detectors. Solar cells convert some of the light energy absorbed into electrical energy.

Barometer : A barometer is a scientific instrument used in meteorology to measure atmospheric pressure. Pressure tendency can forecast short term changes in the weather. Numerous measurements of air pressure are used within surface weather analysis to help find surface troughs, high pressure systems and frontal boundaries.Barometers and pressure altimeters (the most basic and common type of altimeter) are essentially the same instrument, but used for different purposes. An altimeter is intended to be transported from place to place matching the atmospheric pressure to the corresponding altitude, while a barometer is kept stationary and measures subtle pressure changes caused by weather. The main exception to this is ships at sea, which can use a barometer because their elevation does not change.

Air humidity sensor : A hygrometer is an instrument used for measuring the water vapor in the atmosphere, in soil, or in confined spaces. Humidity measurement instruments usually rely on measurements of some other quantity such as temperature, pressure, mass or a mechanical or electrical change in a substance as moisture is absorbed. By calibration and calculation, these measured quantities can lead to a measurement of humidity. Modern electronic devices use temperature of condensation (the dew point), or changes in electrical capacitance or resistance to measure humidity differences

Photodiodes : A photodiode is a semiconductor device that converts light into an electrical current. The current is generated when photons are absorbed in the photodiode. Photodiodes may contain optical filters, built-in lenses, and may have large or small surface areas. Photodiodes usually have a slower response time as their surface area increases. The common, traditional solar cell used to generate electric solar power is a large area photodiode. Photodiodes are similar to regular semiconductor diodes except that they may be either exposed (to detect vacuum UV or X-rays) or packaged with a window or optical fiber connection to allow light to reach the sensitive part of the device. Many diodes designed for use specifically as a photodiode use a PIN junction rather than a p-n junction, to increase the speed of response. A photodiode is designed to operate in reverse bias..

Voice sensor : Voice activity detection (VAD), also known as speech activity detection or speech detection, is a technique used in speech processing in which the presence or absence of human speech is detected. The main uses of VAD are in speech coding and speech recognition. It can facilitate speech processing, and can also be used to deactivate some processes during non-speech section of an audio session: it can avoid unnecessary coding/transmission of silence packets in Voice over Internet Protocol applications, saving on computation and on network bandwidth.

VAD is an important enabling technology for a variety of speech-based applications. Therefore, various VAD algorithms have been developed that provide varying features and compromises between latency, sensitivity, accuracy and computational cost. Some VAD algorithms also provide further analysis, for example whether the speech is voiced, unvoiced or sustained. Voice activity detection is usually language independent..

Digital signal processor : Digital signal processor (DSP) is a specialized microprocessor (or a SIP block), with its architecture optimized for the operational needs of digital signal processing. The goal of DSPs is usually to measure, filter or compress continuous real-world analog signals. Most general-purpose microprocessors can also execute digital signal processing algorithms successfully, but dedicated DSPs usually have better power efficiency thus they are more suitable in portable devices such as mobile phones because of power consumption constraints. DSPs often use special memory architectures that are able to fetch multiple data or instructions at the same time.

Amplifier : An amplifier, electronic amplifier or (informally) amp is an electronic device that can increase the power of a signal (a time-varying voltage or current). An amplifier uses electric power from a power supply to increase the amplitude of a signal. The amount of amplification provided by an amplifier is measured by its gain: the ratio of output voltage, current, or power to input. An amplifier is a circuit that has a power gain greater than one. An amplifier can either be a separate piece of equipment or an electrical circuit contained within another device. Amplification is fundamental to modern electronics, and amplifiers are widely used in almost all electronic equipment. Amplifiers can be categorized in different ways. One is by the frequency of the electronic signal being amplified. For example, audio amplifiers amplify signals in the audio (sound) range of less than 20 kHz, RF amplifiers amplify frequencies in the radio frequency range between 20 kHz and 300 GHz, and servo amplifiers and instrumentation amplifiers may work with very low frequencies down to direct current. Amplifiers can also be categorized by their physical placement in the signal chain; a preamplifier may precede other signal processing stages, for example. .

Analog to Digital converter (IC) : Convert In electronics, an analog-to-digital converter (ADC, A/D, or A-to-D) is a system that converts an analog signal, such as a sound picked up by a microphone or light entering a digital camera, into a digital signal. An ADC may also provide an isolated measurement such as an electronic device that converts an input analog voltage or current to a digital number representing the magnitude of the voltage or current. Typically the digital output is a two's complement binary number that is proportional to the input, but there are other possibilities.

There are several ADC architectures. Due to the complexity and the need for precisely matched components, all but the most specialized ADCs are implemented as integrated circuits (ICs).

Digital to Analog converter(IC) : In electronics, a digital-to-analog converter (DAC, D/A, D2A, or D-to-A) is a system that converts a digital signal into an analog signal. An analog-to-digital converter (ADC) performs the reverse function.

There are several DAC architectures; the suitability of a DAC for a particular application is determined by figures of merit including: resolution, maximum sampling frequency and others. Digital-to-analog conversion can degrade a signal, so a DAC should be specified that has insignificant errors in terms of the application.

DACs are commonly used in music players to convert digital data streams into analog audio signals. They are also used in televisions and mobile phones to convert digital video data into analog video signals which connect to the screen drivers to display monochrome or color images. These two applications use DACs at opposite ends of the frequency/resolution trade-off. The audio DAC is a low-frequency, high-resolution type while the video DAC is a high-frequency low- to medium-resolution type.

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V2I Converter : A common use of the voltage converter is for a device that allows appliances made for the mains voltage of one geographical region to operate in an area with different voltage. Such a device may be called a *voltage converter*, *power converter*, *travel adapter*, etc. Most single phase alternating-current electrical outlets in the world supply power at 210–240 V or at 100–120 V. A transformer or autotransformer can be used; (auto)transformers are inherently reversible, so the same transformer can be used to step the voltage up, or step it down by the same ratio. Lighter and smaller devices can be made using electronic circuitry; reducing the voltage electronically is simpler and cheaper than increasing it. Small, inexpensive, *travel adapters* suitable for low-power devices such as electric shavers, but not, say, hair driers, are available; travel adapters usually include plug-end adapters for the different standards used in different countries. A transformer would be used for higher power..

DSP MATAMETICAL MODEL:-

Nyquist Theorems

To collect information from the external world into the computer we must convert it from analog into digital form. This conversion process is called sampling and because the output of the conversion is one digital number at one point in time, there must be a finite time in between conversions, Δt . If we use SysTick periodic interrupts, then this Δt is the time between SysTick interrupts. We define the sampling rate as

$$f_s = 1/\Delta t$$

If this information oscillates at frequency f , then according to the **Nyquist Theorem**, we must sample that signal at

$$f_s > 2f$$

Furthermore, the **Nyquist Theorem** states that if the signal is sampled with a frequency of f_s , then the digital samples only contain frequency components from 0 to $\frac{1}{2}f_s$. Conversely, if the analog signal does contain frequency components larger than $\frac{1}{2}f_s$, then there will be an aliasing error during the sampling process (performed with a frequency of f_s). **Aliasing** is when the digital signal appears to have a different frequency than the original analog signal.

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Photodiode and other tools basic images inserted in this work.

II. PROPOSED SYSTEM :

For battery charging 230 V / 5 - 10 Ω electricity is required. For generation of this amount of electricity we are using various sensors who may be producing required amount of analog data. The data generated by sensors will be processed and converted by using converters and amplifiers. So using this data sensors and photodiode battery may get required amount of voltage for charging without having external input.

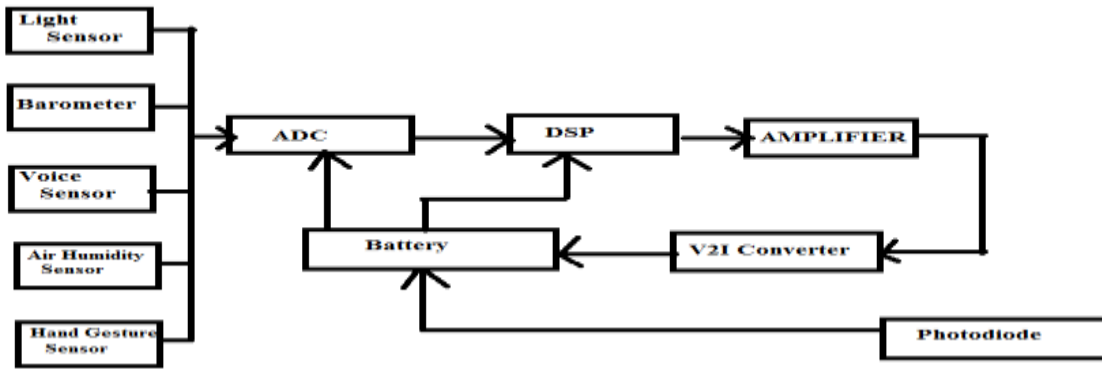
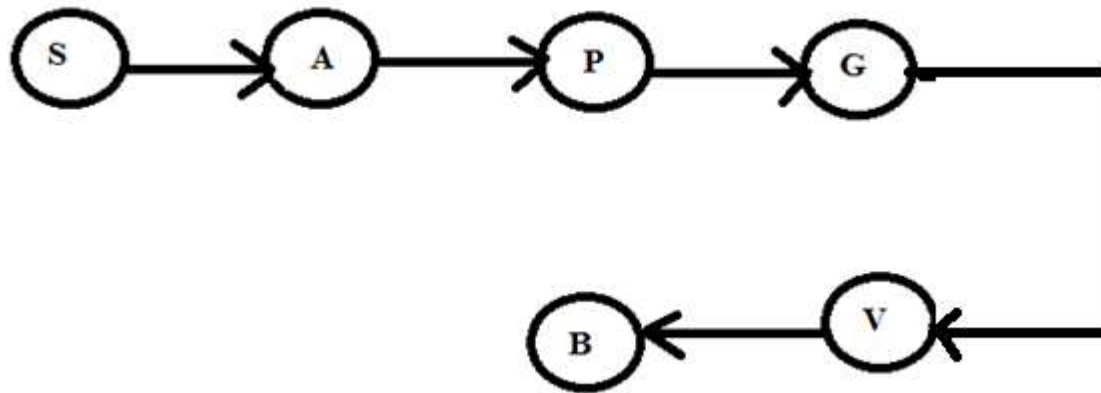


fig.1 structural model of proposed system

As per above model the various sensors as shown having the data, like ambient light is gathered by light sensor. Barometer collecting data like movement of device. Voice sensors getting data in forms of sound of all types. Air humidity sensor having data like change of temperature. And hand gesture sensors having data about gesture components.

All this data is present in the form of analog signal. This data is forwarded to analog to digital convertor for converting analog signal to digital signal. Then Digital signal processor will process the digital signal coming from ADC and remove the noise. Then processed digital signals will amplify by using amplifier. And then by using V2I converter i.e. voltage to current converter will convert it to current. And that generated current is forwarded to the battery for charging without having external input.

MATHEMATICAL MODEL :



$E = \{ S, A, P, G, V \}$

- S : Sensor Input data
- A : Analog to Digital Converter
- P : Digital Signal Processing
- G : Amplifier
- V : V2I Converter
- B : Battery
- E = Electricity

CONCLUSION. The basic purpose of this paper is to solve the problems regarding battery charging issues of smart phones and apart from that restore energy or electricity in an efficient manner .Which indirectly helps environment users are benefitted that they are feel relaxed about their battery discharge issues apart from any major problem or accident about battery.

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