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Design of a Cell phone Based Solar Powered Electric Vehicle

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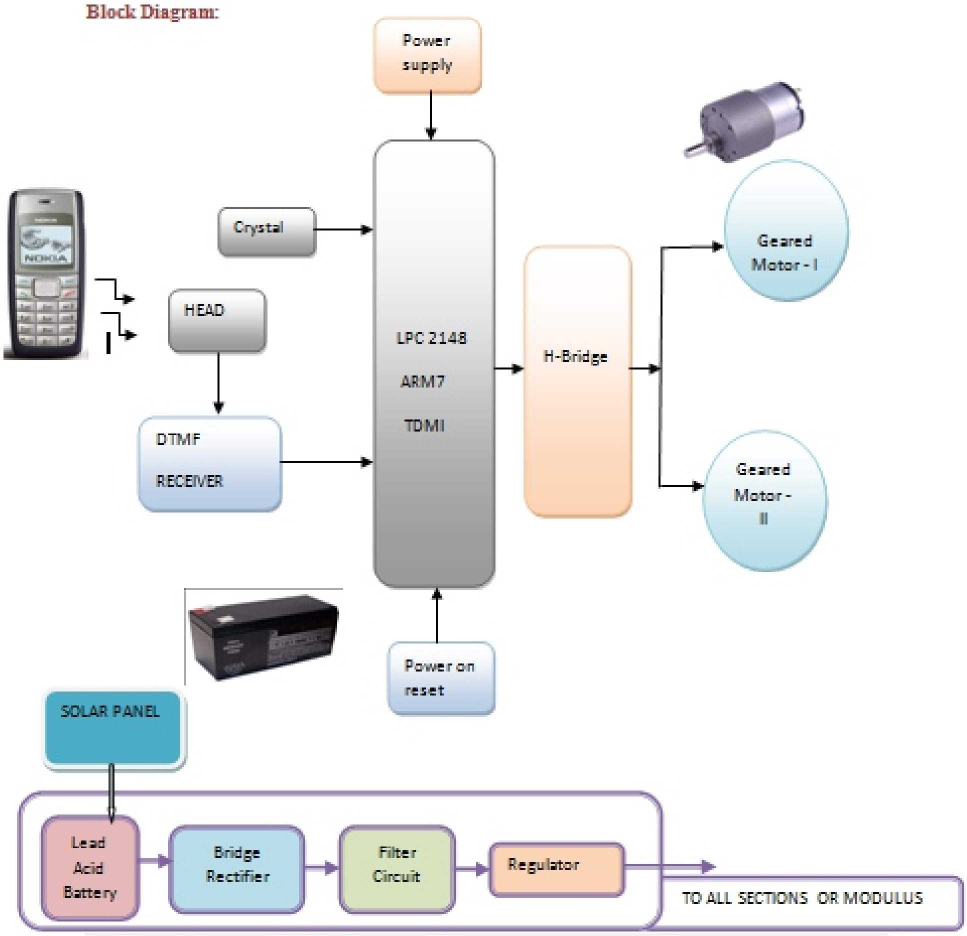
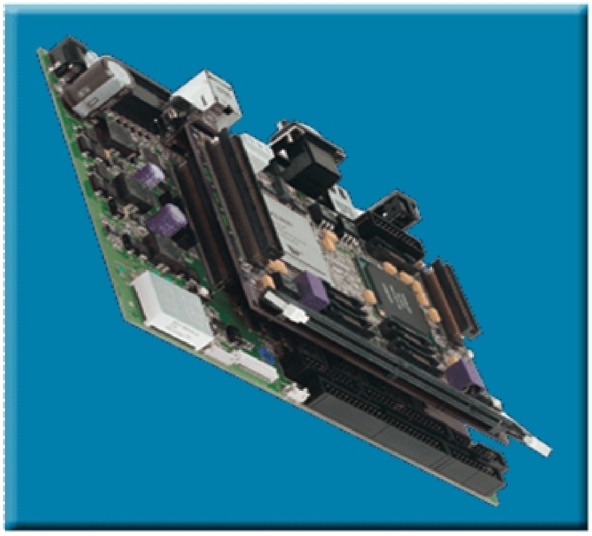
Abstract:

In recent years, the definition of a robot is generally used to mean an unmanned system or automation, as often seen in industrial applications, deep sea planetary probes. Historically speaking, a robot used to be shaped like humans, and referred to as machines and electric systems that were capable of performing similar actions as humans. It is these robots that play active roles in comic magazines, animation and science fiction. Because they are artificially created, they are called "artificial man". And since they look like humans in appearance, they are often called "androids" or "humanoids." This robot is controlled by a DTMF decoder. Robot can be moved forward and reverse direction using geared motors of 60RPM. Also this robot can take sharp turnings towards left and right directions. This project uses LPC2148 MCU as its controller. To control the devices from remote place we are using a DTMF technique. DTMF (Dual Tone Multi Frequency) is used which converts the desired frequency in to analog signals which is received by DTMF Decoder and given to LPC2148 microcontroller. The microcontroller is used for controlling the robot according to the frequency received by the DTMF receiver. Simultaneously the images around the robot will be transmitted to remote place. This project uses regulated 5V, 500mA power supply. Unregulated 12V DC is used for relay. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

Block Diagram:



SOLAR PANEL:



ARM PROCESSOR:

ARM7TDMI Processor Core

•Current low-end ARM core for applications like digital mobile phones
•TDMI
oT: Thumb, 16-bit compressed instruction set
oD: on-chip Debug support, enabling the processor to halt in response to a debug request
oM: enhanced Multiplier, yield a full 64-bit result, high performance
oI: Embedded ICE hardware
•Von Neumann architecture

SOLAR PANEL:

A solar panel (photovoltaic module or photovoltaic panel) is a packaged interconnected assembly of solar cells, also known as photovoltaic cells. The solar panel can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications.Because a single solar panel can only produce a limited amount of power, many installations contain several panels. A photovoltaic system typically includes an array of solar panels, an inverter, may contain a battery and interconnection wiring.Solar panels use light energy (photons) from the sun to generate electricity through the photovoltaic effect. The structural (load carrying) member of a module can either be the top layer or the back layer.

The majority of modules use wafer-based crystalline silicon cells or thin-film cells based on cadmium telluride or silicon. The conducting wires that take the current off the panels may contain silver, copper or other conductive (but generally not magnetic) transition metals.The cells must be connected electrically to one another and to the rest of the system. Cells must also be protected from mechanical damage and moisture. Most solar panels are rigid, but semi-flexible ones are available, based on thin-film cells. Electrical connections are made in series to achieve a desired output voltage and/or in parallel to provide a desired current capability.Separate diodes may be needed to avoid reverse currents, in case of partial or total shading, and at night. The p-n junctions of mono-crystalline silicon cells may have adequate reverse current characteristics that these are not necessary. Reverse currents waste power and can also lead to overheating of shaded cells. Solar cells become less efficient at higher temperatures and installers try to provide good ventilation behind solar panels.

Some recent solar panel designs include concentrators in which light is focused by lenses or mirrors onto an array of smaller cells. This enables the use of cells with a high cost per unit area (such as gallium arsenide) in a cost-effective way.[citation needed]Depending on construction, photovoltaic panels can produce electricity from a range of frequencies of light, but usually cannot cover the entire solar range (specifically, ultraviolet, infrared and low or diffused light). Hence much of the incident sunlight energy is wasted by solar panels, and they can give far higher efficiencies if illuminated with monochromatic light. Therefore another design concept is to split the light into different wavelength ranges and direct the beams onto different cells tuned to those ranges. This has been projected to be capable of raising efficiency by 50%. The use of infrared photovoltaic cells has also been proposed to increase efficiencies, and perhaps produce power at night.[citation needed]

Sunlight conversion rates (solar panel efficiencies) can vary from 5-18% in commercial products, typically lower than the efficiencies of their cells in isolation. Panels with conversion rates around 18% are in development incorporating innovations such as power generation on the front and back sides. The Energy Density of a solar panel is the efficiency described in terms of peak power output per unit of surface area, commonly expressed in units of Watts per square foot (W/ft2). The most efficient mass-produced solar panels have energy density values of greater than 13 W/ft2.

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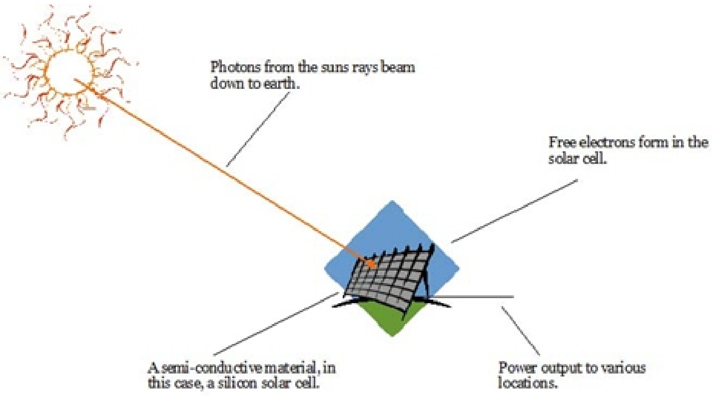
The solar panel diagram below shows how solar energy is converted into electricity through the use of a silicon cell.



The below image is not a solar panel wiring diagram, if you need access to a wiring plan, you could consult a specialist electrician, or solar installer.In the diagram below, you can see how a solar panel converts sunlight into energy to provide electricity for a range of appliances.This energy can be used for heating, through the use of solar hot water panels, or electricity through the use of regular solar cells.

The Use Of Electricity From Solar Panels:

As the solar panel diagram shows, you can see how power is sourced out to various locations, this depends on how you plan to use the energy harnessed by a solar cell.Possible uses of solar electricity could be to incorporate the current into an existing power supply, provide a separate power supply dependent upon the solar panel, to charge solar batteries for the storage of solar electricity, or even to sell back to the national grid. Solar panels can even be used to heat water in different designs. Some home swimming pools also use solar energy to heat the water, however this can usually be a very expensive option.

Solar energy has a huge advantage for providing electricity in remote locations due to the simple running requirements (i.e. no fossil fuels need to be transported the location).A remote solar panel system can provide electricity for vital tasks where the laying of electricity cable is not practical, a working example of this is on satellites.

DTMF Decoder:

Dual-tone multi-frequency signaling (DTMF) is used for telecommunication signaling over analog telephone lines in the voice-frequency band between telephone handsets and other communications devices and the switching center. The version of DTMF that is used in push-button telephones for tone dialing is known as Touch-Tone. It was first used by AT&T in commerce as a registered trademark, and is standardized by ITU-T Recommendation Q.23. It is also known in the UK as MF4.Other multifrequency systems are used for internal signaling within the telephone network.

The Touch-Tone system, using the telephone keypad, gradually replaced the use of rotary dial starting in 1963, and since then DTMF or Touch-Tone became the industry standard for both cell phones and landline service. The DTMF keypad is laid out in a 4×4 matrix, with each row representing a low frequency, and each column representing a high frequency. Pressing a single key (such as ‘1’) will send a sinusoidal tone for each of the two frequencies (697 and 1209 hertz (Hz)). The original keypads had levers inside, so each button activated two contacts. The multiple tones are the reason for calling the system multifrequency. These tones are then decoded by the switching center to determine which key was pressed.

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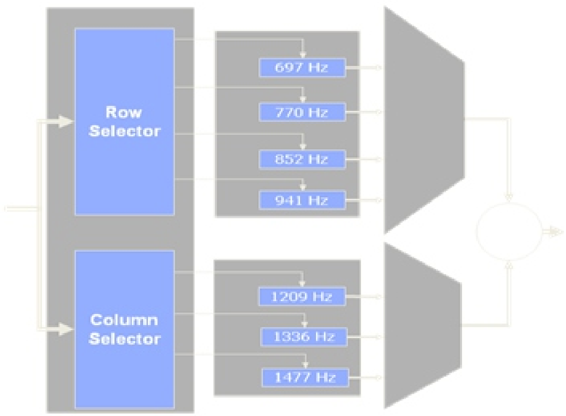
DTMF keypad frequencies (with sound clips)

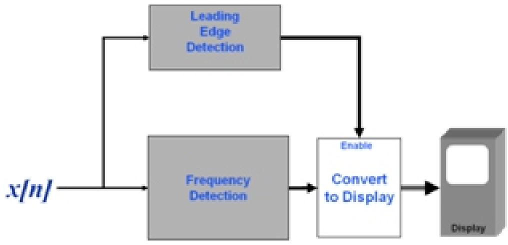
	1209 Hz	1336 Hz	1477 Hz	1633 Hz
697 Hz	1	2	3	A
770 Hz	4	5	6	B
852 Hz	7	8	9	C
941 Hz	*	0	#	D

•The DTMF is a popular signaling method between telephones and switching centers
•DTMF is also used for signaling between the Telephone network and computer networks
•The DTMF signals are Transmitted over a telephone line
•Uses speech frequency signals
•DTMF signals are the superposition of 2 sine waves with different frequencies

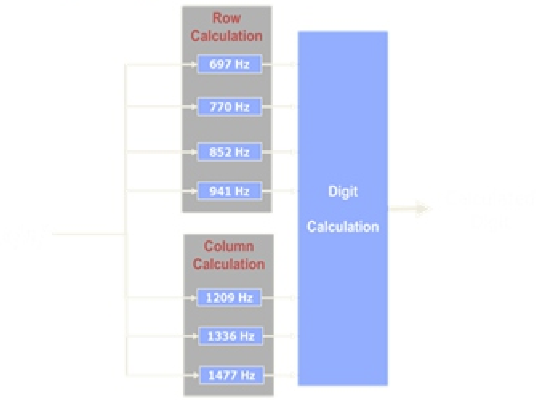
DTMF Generation



DTMF Detection



Frequency Detection



Features

- Complete DTMF Receiver
- Low power consumption
- Internal gain setting amplifier
- Adjustable guard time
- Central office quality
- Power-down mode
- Inhibit mode
- Backward compatible with MT8870C/MT8870C-1

DC MOTOR:

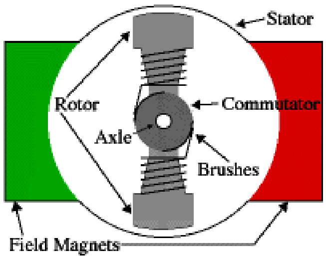
An electric motor is a machine which converts electrical energy into mechanical energy.

Principles of operation:

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel.

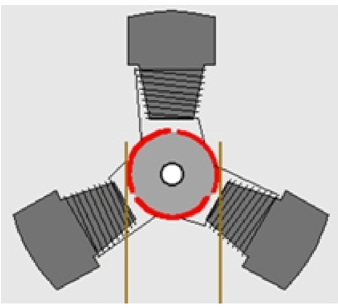
The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization).



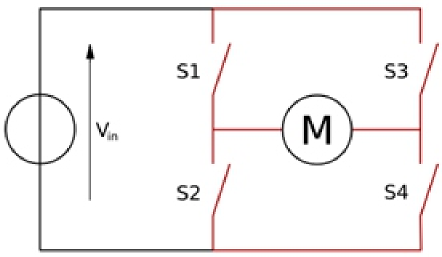
Every DC motor has six basic parts -- axle, rotor (a.k.a., armature), stator, commutator, field magnet(s), and brushes. In most common DC motors (and all that BEAMers will see), the external magnetic field is produced by high-strength permanent magnets1. The stator is the stationary part of the motor -- this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotor (together with the axle and attached commutator) rotate with respect to the stator. The rotor consists of windings (generally on a core), the windings being electrically connected to the commutator. The above diagram shows a common motor layout -- with the rotor inside the stator (field) magnets.

The geometry of the brushes, commutator contacts, and rotor windings are such that when power is applied, the polarities of the energized winding and the stator magnet(s) are misaligned, and the rotor will rotate until it is almost aligned with the stator's field magnets. As the rotor reaches alignment, the brushes move to the next commutator contacts, and energize the next winding. Given our example two-pole motor, the rotation reverses the direction of current through the rotor winding, leading to a "flip" of the rotor's magnetic field, driving it to continue rotating.



H-BRIDGE:

An H-bridge is an electronic circuit which enables DC electric motors to be run forwards or backwards. These circuits are often used in robotics. H-bridges are available as integrated circuits, or can be built from discrete components.



The two basic states of a H-bridge. The term "H-bridge" is derived from the typical graphical representation of such a circuit. An H-bridge is built with four switches (solid-state or mechanical). When the switches S1 and S4 (according to the first figure) are closed (and S2 and S3 are open) a positive voltage will be applied across the motor. By opening S1 and S4 switches and closing S2 and S3 switches, this voltage is reversed, allowing reverse operation of the motor.Using the nomenclature above, the switches S1 and S2 should never be closed at the same time, as this would cause a short circuit on the input voltage source. The same applies to the switches S3 and S4. This condition is known as shoot-through.

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