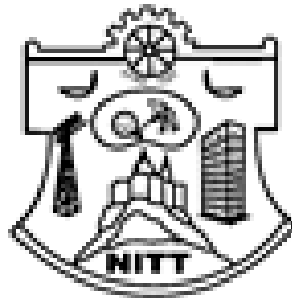


IC 407 – PRODUCT DEVELOPMENT & DESIGN

BATCH OF 2011-15

PRODUCT WRITE-UP



**DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI – 620015
INDIA**

PELTIER BASED VEGETABLE CHILLER

BY **GROUP 1**

GOVIND BABU (110111031)

JAYANTH PARCHURI (110111032)

JOY BARMAN (110111033)

RAHUL SRIVASTAVA (110111064)

SACHIN KUMAR (110111073)

MISSION STATEMENT

To provide an efficient, portable and low cost alternative for retaining the freshness of vegetables and fruits by cooling them in a compact device with potential for further research on vaccine storage in rural medical camps.

DESCRIPTION

When DC voltage is applied to the module, the positive and negative charge carriers in the pellet array absorb heat energy from one substrate surface and release it to the substrate at the opposite side. The surface where heat energy is absorbed becomes cold; the opposite surface where heat energy is released, becomes hot.

The two zero maintenance Peltier modules are connected to a 12 Volt DC supply which results in two opposite hot and cold surfaces. The cold surface is stuck to an Aluminium/ Copper plate to the inside of the chiller chassis in order to maximise heat absorption over a larger and higher heat conductive area from the inside of the system. The hot surface of the Peltier modules is connected to an Aluminium Heat Sink with striated fins for a greater surface area for heat dissipation which is accelerated by fans attached to the heat sink. On the inside of the chassis is a strategically placed fan which maximises convective loss of heat by forcing natural circulation of air at a faster rate. Contacts on both the sides of Peltier Module are made through Thermal Compound Paste which has high thermal conductivity allowing higher heat conduction and transmission across the module.



SOLAR POWERED TYRE INFLATOR

BY **GROUP - 2**

VISWA TEJA PATNAIK VURITY (110111093)

LOKESHWARAN (110111060)

SHASHWAT KUMAR (110111079)

SHRI VISHNU P (110111082)

DEVI HEPZIBAH (110111025)

MISSION STATEMENT

To recreate existing, essential equipment (using conventional energy) to use renewable energy while keeping base cost as minimal as possible targeting off road and rural residents and more importantly petrol stations keeping in mind the inherent limitations of renewable energy sources.

DESCRIPTION

The idea is to construct public booths where people can inflate tyres of their automobiles and cycles. The compressor is solar powered. The proposed product uses a 120w solar panel to charge a Rechargeable Lead Acid battery which will in turn power a 96W electric air compressor. This set up can be used to inflate the tyres of all automobiles and cycles.

This product can be used by general public on their own without the need for a supervisor. The product requires minimalistic maintenance. The setup is completely “green” and is nominal for a campus like ours. This can also be used in petrol bunks and highways.



Solar power is the conversion of sunlight into electricity, either directly using photovoltaics (PV), or indirectly using concentrated solar power (CSP). We intend to drive a tyre inflator from solar power. We have ascertained that the best means of harvesting solar power for conversion into electricity is by using PV cells. This is intended as a replacement for the electric tyre inflators currently deployed in petrol bunks. Since most tyre inflators have wattage upwards of 180W this product is expected to save a lot of energy by converting a major but necessary consumption of energy to a renewable source.

If we assume a perfect sunny day, the compressor can operate at average load for 16hrs and peak load for 3hrs, giving us a total of 19 hours (12 hrs sunlight + 7 dark hours)

WIND ENERGY CHARGER

BY **GROUP - 3**

SRI LAKSHMI (110111050)

SATHISH K (110111076)

DEEPTI CHAUHAN (110111022)

SAI KIRAN P (110111052)

AWIRAL KUMAR DAS (110111012)

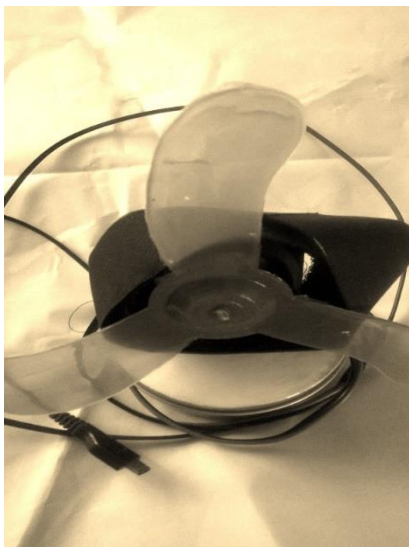
MISSION STATEMENT

To design a multi-purpose charger that uses renewable energy while catering to the needs of general requirements of people.

DESCRIPTION

Today's generation is more mobile than before, having to work longer, farther and smarter for faster results. Mobile phones have become smartphones, and there is a trade-off between the size of the phone and the mobile battery. In an effort to reduce both the consumption of domestic electricity and time spent at a stationary space to charge a mobile phone, we have come up with a wind energy based multi-purpose charger – using a renewable source with abundant presence for everyday need.

A DC generator is attached to the shaft of a rotating wind turbine/fan blade-set. The outputs of the generator are connected to rechargeable batteries. The batteries are connected in parallel to the input pins of a self-boosting circuit. The circuit's output port is a micro USB pin with which any device can be charged.



When there is an impact (of wind) on the blades of the fan, the fan rotates on its axis and hence rotates the rotor of the DC generator. The current produced charges the battery. Whenever required, the device to be charged is connected to this charger and the output switch is flipped ON. The device gets charged via the generator if it is under rotation, or directly by the battery during low or no wind.

This is a compact device that can be used on the move, and for a professional constantly on the move, and shall cost less than a mobile battery bank that itself requires to be charged. It can be used on a train, two-wheelers or cars, and any windy afternoon can now be made electrically profitable.

SOLAR POWERED ROOM COOLER

BY **GROUP 4**

G GOPINATH (110111029)

SATYA RAVI TEJA (110111077)

RAJEEV VERMA (110111065)

AVINIT (110111011)

GAURAV PRAKASH (110111030)

MISSION STATEMENT

To provide an affordable and sustainable solar powered room cooler to a wide variety of common population.

UNIQUE SPECIALTIES

Eco – friendly nature.

Easier maintenance and usability

Cost effective

Need for traditional Cooling system.



SOLAR POWERED PORTABLE AIR COOLER

BY **GROUP 5**

ABHINAV SINHA (110111001)

AKSHAYA RANGARJAN (110111004)

VIKAS RAO (110111006)

RISHABH RAJSHEKAR (110111069)

SHERINE BRAHMA (110111081)

The product is an air cooler which can be transported easily from place to place. The cooler works with a rechargeable Lead Acid Battery which can be charged through solar power. A charge controller was designed in order to supply a controlled and constant voltage to the battery from the fluctuating voltage of the solar panel. Thus the Lead acid battery (charged by the solar panel) supplies energy to the fan which runs at 6V DC. The Fan sucks the air from the surroundings, gets cooled by the ice in the ice compartment of the cooler through conduction. The cooler air is circulated in the room, thus reducing the temperature of the surroundings.

The product is very affordable and can be used in areas where there is no power supply. The aim of the product is to devise an inexpensive and environment friendly alternative to cool the room, instead of the conventional air coolers and conditioners, which are very expensive, consume a lot of power and degrade the environment.



RECHARGABLE POWER BOX

BY **GROUP 6**

ANDREW ABRAHAM (110111008)

D.SAI RAMESHWAR (110111023)

SAMAR VIJAY SINGH (110111041)

KRISHNAN.V (110111088)

PRITHVI RAJ (110111057)

DESCRIPTION

A handy portable power storage device which can be used to recharge Bluetooth headsets, mobile phones etc. through a USB female port installed on the device. It can be recharged by an adapter with comes along with the package or, in case of lack of availability of a plug point in the vicinity, can be recharged by rotating a hand crank attached to the body of the device.

FRONT VIEW



TOP VIEW



BENEFITS

- Green Energy
- Charge your Mobile, ipad etc. while travelling
- Provides additional provision for charging
- Extra features for small change in price

THE THIRD EYE

BY **GROUP 7**

RAVI KIRAN VADLAMANI (110111067)
VARUN CHANDRASEKHAR (110111091)
CHEPURI GOPI KRISHNA (110111017)
KRITHIKA BAXLA (110111039)

MISSION STATEMENT

To provide a cheap and efficient solution to the problem of interruption of work caused by darkness due to power outages.

PROPOSED SOLUTION

A woolen caps/ Skull caps worn over the head are very prevalent and most of the above mentioned people, workers and night watchmen were found wearing them often while they work. A source of illumination over the forehead of a skull cap/woolen cap is the proposed solution under observation.

To meet the requirement during power outages the source of illumination is powered by Li-Ion batteries. And also to increase life span of the battery, LED's that consume less power have been used replacing the old incandescent lights. For the user wearing the product to be able to work comfortably, to provide adequate illumination, an array of 9 LED's has been used. Use of expensive electronics has been avoided wherever possible to reduce the cost of production of the product, to make it available to the poor at the cheapest price possible.

The major features of the product:

- Cheap, robust (much cheaper than a hand held torch light + a skull cap)
- Energy efficient and longer battery life
- Bright enough to perform day to day tasks comfortably, bright enough for reading
- Multiple brightness settings. Different brightness' for different types of tasks.
- Doesn't produce sharp shadows, this keeps the shadowed region adequately bright to be able to see.
- No need to hold with hands. No hassle. One can keep working with both the hands freely.
- Illuminates automatically in the direction wherever the user looks or turns.
- Unfocused beam of light illuminates the entire cone of vision.
- Simple electronics and simple to operate.
- Seamless embedded electronics (all the components embedded in the fabric of the cap).

POTATO PEELER / POTATO SKINNER

BY **GROUP 8**

BALAJI (110111014)

BHARATH (110111015)

HEMANTH (110111038)

SHADAAB (110111078)

VAISHALI (110111089)

The potato skinner is a general purpose device used to peel the skin of soft-skinned vegetables like potatoes, carrots, radishes, etc. It can be used to peel multiple (up to 5) small-sized vegetables simultaneously, saving users the hassle of having to peel them individually, one by one.

It is a device designed and intended mainly for home use and for use by small scale entrepreneurs (potato chips manufacturers). It consists of a simple arrangement with a mixer and a jar fitted with a round brush instead of a blade. The brush must have bristles of moderate sharpness for effective peeling of the vegetables.



VEGETABLE CHOPPER

BY **GROUP 9**

PUSHPAK (110111058)

JIVITESH KUMAR (110111086)

KULDEEP PALIA (110111021)

DEEPAK UNNI (110111021)

SURYA (110111054)

MISSION STATEMENT

To offer the best efficient electronic instrument that is cheap and safe at the same time for chopping vegetables and reducing the human effort to a large extent.

DESCRIPTION

A vegetable chopper is a kitchen appliance used to facilitate repetitive task of cutting vegetables or fruits in the preparation of food. Today, the term almost always refers to an electric-motor-driven appliance, although there are some manual devices also.

The basic principle of working of the chopper is that a set of blades are driven by a high torque motor which chops the vegetables. The vegetables get collected in a container housing the blades. The container has grooves of fixed size, so when the vegetable gets chopped smaller than the size of the grooves they fall in the collection container.



PROJECT HANDLiGHTS

BY **GROUP 10**

K.V. ADITYA PRAKASH (110111035)

LAKSHMI PRASANNA (110111036)

SHIEK CHAND BASHA (110111080)

S. LAKSHMI NARASIMHAN (110111072)

ERWICK FLYNN D'SOUZA (110111028)

MISSION STATEMENT

To create a means to uniformly light up small objects, eliminating the need for external sources of illumination, thereby reducing costs.

MARKETED TO

Students, DIYers, hobbyists, enthusiasts, craftsmen, jewellers, homeowners and any person who works on small objects with their hands.

DESCRIPTION

Project HANDLiGHTs is a hand-mounted device that can illuminate small spaces and objects which cannot be seen properly with conventional lights. The product features super-bright LEDs embedded in strategic locations on the palm of the device. The device features a small disposable A23 battery (12 Volt), multiple modular and flexible LED strips, ergonomic-fitting gloves, pulse width modulation based brightness adjustment, and modular upgrades that can expand on the basic device. A pulse width modulator is used to adjust the brightness level as a pulse width modulation provides significant power savings as opposed to conventional potentiometer which helps to save battery and avoid heating effect.



DISH CLEANER

BY **GROUP 11**

APARNA LATHA VANAPALLI (110111090)

LAKSHMINARAYANAN (110111042)

SANA SAI AVINASH (110111074)

ARAVIND PRASAD (110111071)

RAGHUVARAN (110111063)

MOTIVATION

Science and Technology has made our lives simple and easy. With this in the mind, to integrate innovation and basic science and technology in daily life, an automated Dish-Cleaner is designed. It introduces us to a newer and better way of dish washing. By simply pressing a switch, utensils can be cleaned thereby excluding the tedious task of scrubbing the dishes manually to clean them.

ABSTRACT AND PRODUCT DESCRIPTION

The automated Dish-Cleaner is a portable device to clean utensils in an easier and effective way. The device consists of a brush which rotates on pressing a switch thereby cleaning the utensils.



PORTABLE REFRIGERATOR

BY **GROUP 12**

A. SAI SRIKAR (110111009)

S. SANTHOSH (110111075)

P.V.R. SATHWIK (110111051)

PAUL RANJITH (110111053)

PAVITHRA. S (110111085)

ABSTRACT

The product is basically aimed to serve the purpose of a refrigerator but at a smaller power rating and much lesser cost.

The product is a thermoelectric refrigerator that can be built using simple off-the-shelf components and consumes only about 60W.

MECHANICAL CONSTRUCTION

The overall body of the refrigerator is a thermocol box. Water is used as a coolant because it holds temperature for longer time than air. An opening is created near the bottom of the box on one side which should be a little bigger than the thermoelectric module. An aluminium sheet is mounted over the opening from outside.

The sheet should be firmly fixed in order to avoid any kind of leakage. The thermoelectric module is firmly adhered to the aluminium sheet using either silicone or an adhesive. Care should be taken so that the adhesive doesn't come in between the two. Now a heat sink has to be mounted over the thermoelectric module to dissipate heat from the hot side.

WORKING

The thermoelectric module gets cooled on one side and heated on the other side. As we have placed the module in such a way that the cooler side faces the refrigerator, the water in the refrigerator gets cooled via an aluminium sheet. Water being a very good conductor of temperature transfers the temperature obtained using the thermoelectric module onto the vessel placed over it.

Simultaneously care should be exercised so that the heated side is ventilated sufficiently so as to avoid the heat transfer to the water through the aluminium sheet. For this purpose we use a heat sink and a blow fan.

THE EYE

(SAFETY DEVICE FOR THE VISUALLY IMPAIRED)

BY GROUP 13

NAVYA KIRAN (110111034)

NITESH KUMAR (110111048)

YUTHISH PRABAKAR R (110111094)

R VENKITACHALAM (110111062)

LAXMI NARASIMHA PERUMAL (110111043)

MISSION STATEMENT

"To offer every visually impaired person the ability to move safely and independently by developing an affordable and portable product using technology, overcoming the disadvantages of the existing equipment and thereby improving the quality of their lives"

DESCRIPTION

Legally blind people are those who have the visual acuity of 20/200. It means that a blind person needs to stand within 20 feet to see an object which someone with normal visual acuity can see from 200 feet away.



On taking a survey to develop a product we happened to talk to a group of blind people and enquired about the problems they face while going about their daily activities. This mainly involved being unable to move normally in any new environment or in the event of a change in their natural environment (e.g. crossing a road). Their only accessory for safety was the White Cane which they used to detect obstacles in front

of them. Advanced canes with sensing ability are available in the market but are not affordable by most people.

The product involves an IR Transmitter which emits IR radiation, controlled by a clock pulse and an IR Sensor which will detect the presence of any obstacles which lie had in their path, when the emitted radiation is reflected back. When the sensor detects a signal a Buzzer alerts the user about an obstacle lying ahead. Based on the distance of the obstacle from the sensor, the volume of the Buzzer proportionally increases. 2x9V batteries are used to power the circuit. To avoid stray IR radiation from acting as noise, we have used a TSOP 1738 receiver, which will detect only the particular frequency being emitted by the Transmitter and eventually sound the Buzzer.

(The TSOP1738 is found in any ordinary Remote Control and has a frequency of 37 KHz)

GRAVITY LIGHT

BY **GROUP 14**

ADITHYA SAILESH (110111002)

AMANDEEP JHA (110111005)

CHAYADEEPSAI CHERUKUPALLI (110111018)

DEEPAK KUMAR ARYA (110111020)

RAMARAVIND K M (110111066)

MISSION

To provide affordable, sustainable and reliable light, anytime, that enables people to break free from the economic, health and environmental hazards of kerosene lamps.

PRINCIPLE

Downward motion of the applied load is converted into rotational motion by using a pulley mechanism. This rotational energy is then transmitted to the DC motor through a series of gears that produce a reduction. This reduction is used to increase the number of rotations of the DC motor to power the LED.

- The gravity light employs a gear arrangement that provides a 1:9.25 gear ratio.
- The motor used to power the LED can go up to 45 RPM for 9V but the product uses only 15 RPM for 3V.
- The load bearing gear has an RPM of 1.62. This converts to about 50cm drop in weight.
- The load to be used can be anything between 1-1.3 Kg.
- The current arrangement that generates 3V can be used to power an LED continuously.



APPLICATIONS

The product is targeted as a source of lighting in areas where load shedding is a common affair. Gravity Light will overcome the problem of Load-shedding by producing light without any use of electricity and without any massive physical efforts.

A majority of the population living in rural areas use kerosene lamps as a source of lighting. The Gravity light will be a viable replacement at a comparable cost.

The gravity light can be used as a portable lamp with no operating costs.



PORTABLE ECG MONITOR

BY **GROUP 15**

GAUTHAM V (110111087)

PRAVIN KARTHIK (110111044)

DIVYA M (110111026)

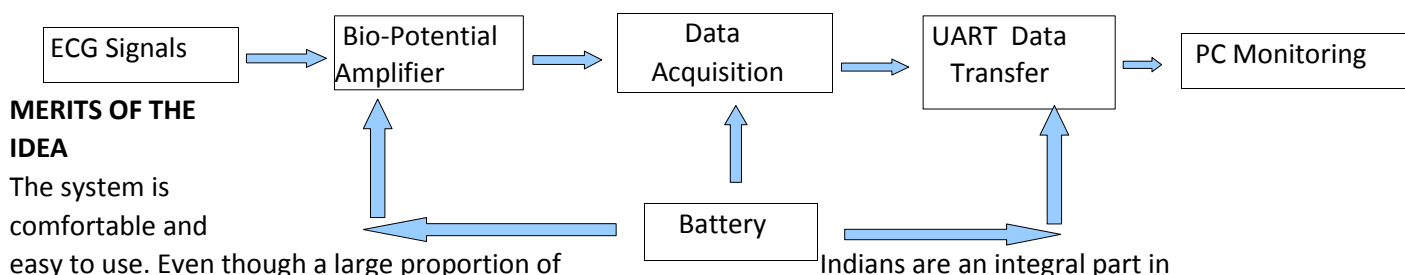
ANUPAMA (110111010)

DWARAGANATH (110111070)

Wearable computing technology will enable virtual and remote care, be a means for collecting more and better data, and provide more meaningful data to clinicians and patients. Management of a large patient population will rely on strategically utilizing an overextended clinician staff, lowering patient contact hours, and managing disease remotely. A crucial success factor will be to accurately leverage data analysis and algorithms to provide the most meaningful way to manage disease states.

OUR IDEA

To make a system wearable, integrating the electronics to textiles is a feasible solution. To meet the energy requirements for long-term, high-quality vital monitoring, the system would be equipped with a battery. An on-board bio-potential amplifier has been proven to be able to measure ECG signals. After acquisition the signal is transmitted to an off-body receiver. The digital design will be emphasized towards solving complex algorithms on-board. The ECG signal is analysed using the documented time period for PR and QRS sine complexes. The peak voltage, the signal time period, the signal amplitudes are a good indicator of any abnormality in the heart. Any deviations from acceptable ranges of the aforementioned factors could result in Tachycardia, Bradycardia or Sinus Arrest, etc. For chronically ill patients they facilitate a comfortable rehabilitation period in a home environment, which is not only beneficial to the patient's well-being but also stimulates cost-effectiveness in global health.



MERITS OF THE IDEA

The system is comfortable and easy to use. Even though a large proportion of the wearable computing revolution, India is yet to catch up with countries like USA when it comes to tapping the potential of wearable health monitoring devices. One major factor that hinders this growth is cost of implementation. The devices as such don't come cheap in the USA. Hence reverse engineering the product is required so that we can implement the project at a much lower cost and still function in a satisfactory manner.

If this system is implemented in a feasible and cost-effective manner, Indian tech-entrepreneurs can take it up as a model prototype and successfully implement our Wireless Vital Sign Monitoring System without great difficulty and help in managing the large patient population efficiently.

CAMERA TRAP

BY **GROUP 16**

ACHYUTHA KRISHNA (110111049)

KANDALA DINESH KUMAR (110111037)

ANAND BABU S K (110111007)

SONAM KUMARI (110111084)

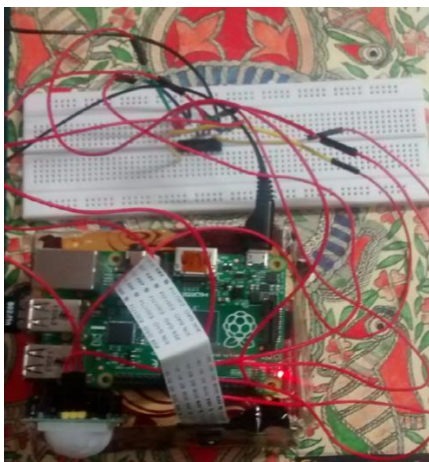
NAVEEN KUMAR (110111046)

PRODUCT DESCRIPTION

- The product designed takes photos and sends it to a remote monitoring unit, when an object in motion is detected.
- The motion is detected by a PIR (passive infrared) sensor.
- The motion that is detected by the sensor, triggers a camera that has been attached a Raspberry Pi board.
- The images taken by the Raspberry pi, is transferred to a remote computer through Wi-fi.

COMPONENTS USED

- Raspberry Pi board,
- Camera,
- PIR (passive infrared) sensor,
- ADC chip – MCP 3008,
- SD card with OS,
- Breadboard and Wires.



TIMER CONTROLLED AC SOCKET

BY **GROUP 17**

VENKATA YUKTAL (110111092)

REGGY WATSON (110111068)

R.K.ARVIND (110111059)

DARWIN.S (110111019)

NEEL TEJ (110111047)

MISSION STATEMENT

A Timer circuit which provides a delay for switching electrical appliances.

DESCRIPTION

Our product is an electronic device which is used to control the time delay of the AC appliances during which it should be switched on. The switch is connected to a circuit operating from mains power, or for lower-voltage circuits, including battery-operated equipment in vehicles. The timer switches the equipment on, off, or both, at a preset time or times, after a preset interval, or cyclically. A countdown time switch switches power, usually off, after a preset time.



To derive the power supply for the circuit, the 230V, 50Hz AC mains is stepped down by transformer to deliver a secondary output of 12V; 500mA. This DC output is given to the micro-controller and the on-board relay circuit. Different ports of the micro-controller are used to connect keypad, LCD display and the relay circuit. Micro-controller is programmed to get the input, load the timer and start the operation for the delay condition to be satisfied. Time is set by the user through the keypad using a switch for decrement and one for increment and indicated on the LCD display. To start timing count-down, start/stop switch is to be pressed. This starts the internal timer in the micro-controller and energises the relay to switch on the appliance.

PORTABLE SOLAR POWERED MOBILE CHARGER

BY **GROUP 18**

PARAMASIVAN E M (110111027)

SHANKAR KRISHNAN R (110111061)

MALOTH DINESH JADHAV (110111045)

CHANAKYA VIR SINGH (110111016)

DEVASHISH NEGI (110111024)

MISSION STATEMENT

“To create an intrinsically low-cost, self-sufficient, energy saving portable handheld device to power electronic gadgets on the go”.

To create a portable handy device that can help charge electronic gadgets (primarily mobile phones, in today’s world). This device would refurbish its charging capability/charge storage battery in a non-conventional manner. It would utilize mini-solar panels to extract solar energy (or any light source, for all practical purposes) and store it as usable electrical energy. It can thus enable the consumer to charge their electronic device on-the-go using charge stored in the mounted battery.

PRODUCT BACKGROUND

The conventional mobile charger is a wall charger that step-downs the conventional power supply of 230V to 5V, and provides 1A current that is the minimum current value to charge a mobile phone. The product that is described has solar panels of 4 inches that produces a variable voltage of 0 to 12V. This energy is converted to the range used for charging mobile phones.

PRODUCT COMPONENTS

The solar panel is connected in series to a voltage regulator that produces 5V and 0 to 800mA. This in turn is connected, in parallel to an 8V rechargeable battery. A micro USB cable is connected in series to the circuit via a switch. The micro USB cable is compatible with most of the mobile phones present today.

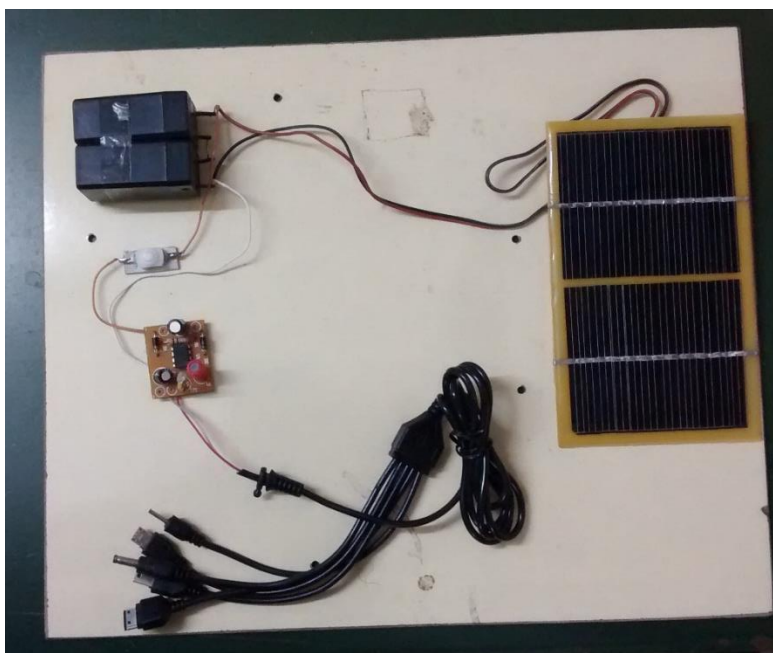


Fig: Product Alpha Prototype Model