ABSTRACT BOOK

Indian Science & Engineering Fair

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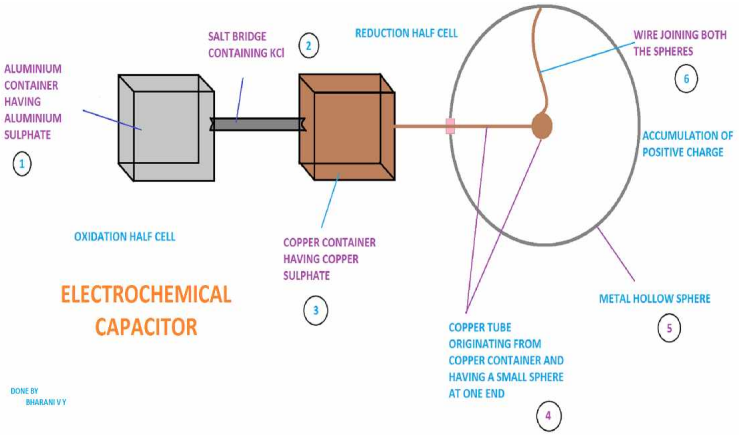
ELECTROCHEMICAL CAPACITOR

Online ID: 1530
Author: BHARANI. V.Y, Std: 10th
Guide: SANDEEP PRAGALLAPATI
School: Sri Seshaas International Public School, Salem, Tamil Nadu

Abstract:

It's an attempt to produce considerable E.M.F in an electrochemical cell without the completion of the circuit, using the principle of Van de Graaff generator.

The advantage in my model is that, you are able to produce E.M.F with an open circuit in an electrochemical cell. In general electrochemical cell, if the cathode and anode are not connected, the redox reaction would stop within a fraction of a second at both electrodes. But to overcome this I have used the principal of Van de Graaff Generator, which tells us about the potential difference between two concentric spheres, and has sustained the redox reaction in the cell even without any circuit completion.



PRINCIPLES USED:

- -The principle of electrochemical cell is used.
- -The principle of Van de Graaff is also used.
- -Redox Reaction Used: $2Al + 3Cu^{2+} \rightarrow 2Al^{3+} + 3Cu$

Potential difference between the two sphere: $v = q/u\pi\varepsilon_0 \left(\frac{1}{r} - \frac{1}{R}\right)$

PROJECT DESCRIPTION:

In this set up we have two half cells, one of Cu and the other of Al each containing its own sulphate solutions. In the aluminium half-cell oxidation takes place and in the copper half-cell reduction takes place. This reaction may stop with in fraction of seconds but in this model we have introduced the concept of Van de Graaff generator. The potential difference between the small sphere and the large sphere drives the charge produced by the redox reaction to the large sphere in a non-stop manner. The redox reaction is continued without stopping. By this manner we can make the redox reaction to occur even without the completion of the circuit in the cell.

Laser technology to determine position velocity direction path displacement and size

Online ID: 1526
Author : VIGNESH KUMAR. S, Std: 12
Guide: DINESH KUMAR. S
School: Sri Seshaas International Public School, Salem, Tamil Nadu

Abstract:

Introduction: Modern digital technology has made it possible to manipulate multi-dimensional signals with systems that range from simple digital circuits to body such as size, velocity, direction, displacement, path, distance with the usage of simple electronic component LED(as photodiodes) and lasers.

Proposed system:
The key behind this technology is the simple laser alarm system, where laser focused upon the photo sensor will detect the presence of the objects and sends information to the microcontroller. I involved to enlarge my idea on Laser to build smart traffic management system, Touch screen and a 3-D scanner. All these variants are obtained by making an array of laser alarm modules and thus we end up getting a multipurpose device.
When used as a smart traffic management system, it can provide all the details of a body such as size, velocity, direction, displacement, path, distance, etc. of multiple objects. i.e. vehicles and even pedestrians. Customization of this model gives you a cost effective security system that could detect sand mafia and may be a boon to stop the sand mafia problems of Tamil Nadu and other places too.

The Laser Technology can act as a touch sensor that could fit into a mobile phone, laptops and tablets. And would be a preferable touch sensor for holographic monitors. It can adapt to be a very large size touch sensor (maybe a football ground size and even more). Modification of touch sensor with higher order algorithms can turn it into a 3-D scanner. Thus it opens the door for a boon in technology, a 3-D scanning smartphone by using its touchscreen. It can be used in security systems and national defense, the lasers can be encrypted such that no other laser can fake the system. In national defense, details about the enemy troops entering through national borders, or restricted areas can be computed and a defense plan can be planned even before the enemy arrives. Other uses are found in research field, toys, videogame consoles, face recognition, medical, etc.
Laws followed and ideas implemented
Snell's law – To reduce the number of lasers used to make it cost effective.
Cylindrical lens - used in the above process.
Toggling sensors – using transistors and logic gates, a single input port can read values from multiple sensors.

Conclusion: Our results show a faster and reasonably high percentage of accuracy in the intraoperative diagnosis. However, there are some limitations.

Study to Increase the Power Output of Photovoltaic Cells through Simple and Affordable Methods

Online ID: 1231
Authors: Aryan Poonacha & Madhumati Seetharaman, Std: 9th
Guide: SRS Rao Settigunte
School: Sishu Griha Montessori and High School, Bangalore

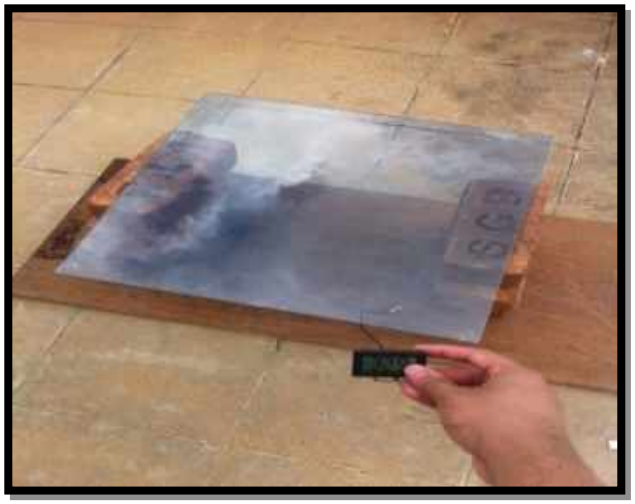
Abstract:
The aim of our project was to increase the power output of solar photovoltaic cells through affordable and simple methods.
The power output improvement depends on 2 factors: reduction of temperature of the cell and increase in the light intensity of sunlight. Our initial method was using bubble wrap in a setup as shown here with the cell inside the setup. However, due the greenhouse effect caused by the bubbles, the temperature increased and the experiment had a negative result.

Our next idea was to use a specially designed heat shielding film provided to us by the 3M Company. We used a setup as shown to measure the power output, light intensity and temperature and compare it to the same values of the solar cell by itself. After a series of experiments, it was observed that it caused a reduction in temperature but also decreased light intensity, thus ultimately decreasing power output albeit a decrease in temperature. However, this was a step in the right direction and created a base for further experiments.

To increase light intensity, we decided to use mirrors and 'Litre of Light' bottles. After experimenting with the two, we concluded that the mirrors alone had the best effect. We were able to reduce temperature with the film and concentrate light on the PV cell. The results obtained with the mirrors were almost the same as those obtained with plain glass. We concluded that on a larger scale, there would definitely be an increase in power output when larger mirrors are used.

Thus, our experiments show that increase in power output of the photovoltaic cell is possible when the temperature felt by the cell is reduced while maintaining or increasing the incident light or light intensity.

Bubble Wrap Setup



Heat-Shielding Film Setup

Novel way to use vibrations for Power Generation

Online ID: 1482
Author: Harsh Kumar, Std: 9th
Guide: S. Natarajan
School: Delhi Public School (South), Bangalore, Karnataka

Abstract:
Vibrations generated in places like railway stations, market places, vehicle and aircraft movements and sound energy can be harnessed to produce power. The aim of the project is to demonstrate that vibrations can be harvested to produce useful electricity for immediate use. A piezo electric array is used as a transducer. The array is actuated by vibrations produced by an electro dynamic shaker. The electro dynamic shaker and the crystal array are tuned to generate maximum power. The current output is then connected to a charge pump circuit and the voltages are monitored by a micro-controller. The circuit uses Super Capacitor instead of batteries thus producing Green Energy. MOSFET, microprocessor and specific components are used to minimise losses. Protection circuits are used to ensure that the charge pump circuit doesn't overcharge the system and also prevents damage and output fluctuations. Experiments have proved that sufficient amount of electrical energy can be harvested using piezo electric transducers. I have designed a test bench demonstration to show that power can be generated using piezo electric array and the power can be stored in a super capacitor as Green energy and used appropriately.

I have also designed a prototype mechanism for fixing the piezo electric array under a vehicle's seat so that the piezo crystal array can withstand the large pressure/vibrations generated due to the movement of the vehicle. The prototype if refined further can be made as a standard accessory to vehicles thereby generating power for basic uses in the vehicle. I have also designed a hand held piezo generator through which it can be demonstrated that with minimal pressure also power can be generated and stored in capacitors.

The novelty of my project is that the charge enhancing circuit has a feedback mechanism to get uninterrupted and regulated voltage. The batteries have been replaced with a super capacitor to produce Green Energy.

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3. Large-scale vibration energy harvesting - Lei Zuo and Xiudong Tang
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MULTIPURPOSE ECOFRIENDLY BUOY WITH RECTENNA

Online ID: 1522
Author: Gautam.S. Patil & Omkar .G .Murgali, Std: 10th
Guide: Shrutika Patil.
School : Bensons English Medium High School , Belgaum , Karnataka.

Abstract:

We have made a multipurpose buoy (a device which floats on water ,which serves for many purposes) . Our buoy is known for its efficiency in producing electricity ..it produces electricity from 2 means , one is from the waves n other from solar ..we have used a new technology in the field of photo cells which produces 20 times more electricity than normal photo cells , it would be a revolution in the future if this technology is used .
our buoy is not only known for producing electricity but also
detects tsunami , fishery , transportation also it can be used.
it is equipped with a camera to know the spots where spaceshatters, comets usually fall in oceans.

Our buoy is equipped with a laser communication device to transmit data , sound , etc to underwater power stations via laser instead of cables , it also transmits the produced electricity wirelessely instead of cables so that aquatic life should not face any problem due to cables.its aerodynamic shape protects itself from the storms in oceans.our central idea of project is to protect the aquatic life . and benefit the humans too by making a device which produces a large amount of electricity and also serves many purposes

HIGHLY EFFICIENT, STABLE, FEASIBLE AND NOVEL WIND TURBINE

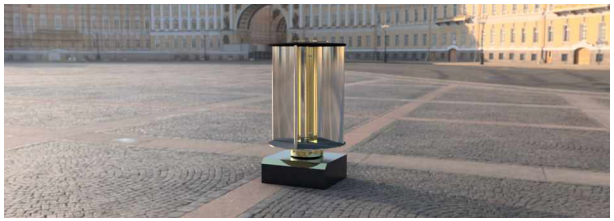
Online ID: 1516
Author: DILEEP DASARI, Std: 12th
Guide: Mr. Anil Kumar Paritala
School: FIITJEE LTD., Visakhapatnam, Andhra Pradesh.

Abstract:
The purpose of this project is to design a Wind Turbine which is highly Efficient, Stable and Feasible to harvest Wind Energy effectively at domestic scale (Houses/Individual uses).

This Wind Turbine is designed with four blades (Deep Cambered airfoils), right angled to each other in a vertical axis. So, when two blades produces lift the other two blades produces resultant force due to drag difference. To allow the air flow to the blade on the other end, a Rotatable air guider with self Yaw-mechanism is affixed in the middle. To calculate the efficiency of the wind turbine, a 3-D printed model is tested in a small wind tunnel. By calculating the tangential velocity of the wind turbine and resultant force produced the efficiency is calculated.

The Efficiency observed after the experiments is 22%. The start-up speed (Speed of wind at which wind turbine starts rotating) is observed to be 4m/s. Tip speed ratio (Ratio between the tangential speed of the tip of the blade and the actual velocity of the wind) is 3.2.

Therefore, this design can harvest wind energy effectively with the Efficiency of 22%. The Cut-in speed of ~3m/s is optimal for using at cities and towns. As it is Vertical axis wind turbine, no Yaw mechanism is required. The optimal constant Tip speed ratio of 3.2 says that it stable and feasible.
This design can be successful when used at harvesting wind energy effectively at domestic scale (Houses/Individual uses) and cities and towns, where the wind is inconsistent.



DETACHABLE DEVICE SET FOR THE BICYCLE ENABLING USER TO RIDE ONE LEG

Online ID: 1136
Author: Shubh Dholakiya, Std: 9th
Guide: Mitubhai Dholakiya
School: Shri G.K. Dholakiya School Rajkot

Abstract:
Usually, handicapped person (whose leg is lost or not working) faces some problems while riding tricycle such as: Tricycle needs more time to go through the traffic, needs more space to park and in tricycle handicapped person have to give effort; which is more uncomfortable for them .To overcome these problems I have made 2 device for the bicycle, so the handicapped person can ride bicycle which is more comfortable for them.

1).Detachable Device:
To make this device first we have to take a piston like cylinder of length 240mm, a spring of length 456mm and its spring constant is 00.667N/m. I had used clamp to join the detachable device. Then I took shaft and fabricated it inside the cylinder .Then I have to put the cylinder and shaft between the spring. Then I have cap up the upper of cylinder and lower part of the shaft with cap. So the spring doesn't come out. Then I attached this device's upper part on the horizontal pipe below the seat and its lower part to the pedal.
In these bicycle handicapped person (whose leg is lost or not working) have to give a half pedaling energy and remaining pedaling energy will be produce by the device. We can attach and detach this device in very few minutes. We can attach this device on the either side of the bicycle i.e. right or left; as per the requirement of handicapped person. This device can be attached to any bicycle. This device does not need any maintenance, it only needs oiling. To attach this device to the bicycle we do not have to make any change or modifications in the bicycle.

2) Hand operated portable side stand:
To make this side stand I took a wheel, side stand, a handle, etc. we have to attach this side stand on side where the person's leg is lost or not working. When handicapped person lose their balance they have to pull the handle,the wheel will come down and when they gain their balance they have to push the handle so the wheel will come up. So, they can ride the bicycle comfortably and safely. They can use this side stand when they start cycling, at traffic post and at parking place. We can say this side stand as the 'Heart' of the P.H. person because it works as their 2nd leg. That's why we have made it a heavy duty side stand. This side stand can be attached on any side of the bicycle. To attach this side stand we don't have to make any change or modification in the bicycle. It needs only oiling. So, we can say that any handicapped person can ride bicycle comfortably and safely.

CONCLUSION:
So we can conclude that by using this both device any P.H. person can ride bicycle very easily, comfortably and safely.

AUTOMATIC & FLEXIBLE PESTICIDE PUMP WITH LESS HUMAN EFFORT

Online ID: 1088
Author: MOHIT PANCHASARA & TAPAN MADHAK Std: 10th
Guide: Mrs. Charu Goswami
School: SHRI G.K.DHOLAKIYA ENG. HIGH SCHOOL RAJKOT

Abstract:
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Our main aspect of this project is to make a pesticide pump which can be applicable with less human effort and consumes less time. For that we have made use of cylinder, pesticide tank, spraying nozzles, pipes, metal frame and bicycle wheel. For constructing a pesticide pump, first we have to join bicycle wheel with the metal frame with bicycle wheel through gear system. Then we attach piston & cylinder with small gear. Finally we attach four spraying nozzles at the end of the frame which can be adjust as per our requirements. As we run the trolley, the bicycle wheel rotates the small gear through a chain and oscillates the piston and start pumping in the tank. So due to the pressure, the water comes out at the nozzle and sprays in the field. There is only one nozzle in the normal pump but there are for nozzles so it can spray four lanes of crops at a time. It can easily run with the force of 60 Newton on any surface. The angles of spraying mode can be adjusted according to the height of crops. The height of sprayer can be reduced or increased for small & big crops. It can spray horizontally and vertically both.

By this we can conclude that any farmer can easily run the sprayer with-out any hard work. It pumps automatically, so there is no need to pump and there is no need to carry load of tank on the back of any person.

A Novel, robust e-voting machine

Online ID:1170
Authors: Chirag .S & Sindhushree.M, Std: 9th
Guide: Sai Venkata Raman.T
School: Agragami Vidya Kendra , Bangalore, Karnataka

Abstract:
In the project, it is taken care that only one person is allowed to cast his vote at a time. A person can cast a vote only when voting has been enabled by the booth in charge. Also one person can cast only one vote. Once the card and the password has been entered, it is stored in the voting machine and if the person tries to use his card again, the vote would not be accepted and a buzzer would be sounded. A person can cast his vote to any of the available candidates and after a person has casted his vote a confirmatory message is displayed on the LCD screen and the buzzer sounds. For such a thing to actually take place, a database has to be created in the voting machine of a specific area.

Password compatibility has also been added to the project. Only an authorized person who knows the password can know the result or the total number of votes for each candidate. the result for each candidate is thus displayed on the 7 segment . Once the voting machine has been reset, the data witin it is deleted and is again ready to use
Biometric Finger print devices are used in the Electronic Voting machine for voter verification. We have designed a finger print based voting machine where there is no need for the user to carry his ID which contains his required details. The person at the polling booth needs only to place his Finger on the device, thus allowing the acquisition of an on-spot fingerprint from the voter which serves as an identification. This Finger print reader reads the details from the tag. This data is passed onto the controlling unit for the verification. The controller fetches the data from the reader and compares this data with the already existing data stored during the registration of the voters. If the data matches with the pre-stored information of the registered fingerprint, the person is allowed to cast his vote. If not, a warning message is displayed on LCD and the person is barred from polling his vote. The vote casting mechanism is carried out manually using the push buttons. LCD is used to display the related messages, warnings and ensuing results.

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Novel Instrument to detect learning disability in children

Online ID: 1381
Author: Vaishali Tikoo, Std: 11th
Guide: Dr. Deepika Tikoo
School: Amity International School, Sector-46, Gurgaon

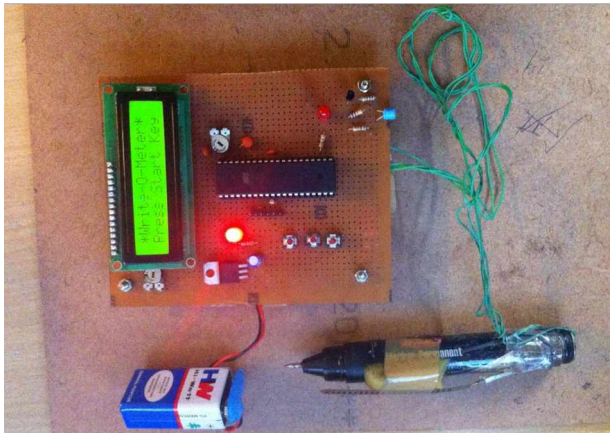
Abstract:

I have devised an instrument, namely “The-write-o-meter”, which is in the form of a Pen, and has sensors to monitor grip-patterns and number of times pen lifted when writing. The 2 parameters were based on the principles influencing learning disability, majorly, concentration and impulsivity factors. The hypothesis was to detect learning disability on these 2 parameters.

The instrument consists of a flexi sensor-to monitor the grip pressure and a metal conducting end, to monitor the number of time the pen is lifted. For the experimentation, the instrument was made to be used on normal children and on the ones, having learning disability. Piaget’s pre-operational stage was selected as the target age group.

Two groups of children (LDs & Normal, n=10 in each group) in age-group of 6-7 years were given common specific sentences to write. Purposive sampling was done. As sample size was small, non- parametric, Man-Whitney- U test was used.
Findings showed significant-difference between two-groups, with Mann-Whitney-value of.030 for lower-pressure, .007 for upper-pressure and .022 for lifting of pen respectively; significant at .05 level of significance.

The significant difference between 2-parameters indicate difference in grip patterns and lifting of pen between two groups. Thus, accepting the hypothesis. Thus, further implying detection of learning disability, which has not been diagnosed.
The Write-o-meter is cost-effective (Total cost = 800-INR), lowers expenditure in comparison to other methods used to detect LD. At times L.D. is not detected in children for long, but with this pen parents can use at home and counselors/teachers in class so that early detection is possible. As parameters used are applicable for all age groups, they can further be extended to video-game remotes, other consoles involving-grip/speed. Thus, write-o-meter enables detection of LD in an easy, efficient and time saving manner.



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Hydrophobicity of Colocasia as a wall protector

Online ID: 1105
Author: Aneesha Nayak, Std: 9th
Guide: Sadhana Hebbar
School: Sudana High School, Mangalore, Karnataka.

Abstract:

To create hydrophobicity on exterior walls by using *Colocasia* extract. Since it stops water from getting into the wall, it prevents water seepage and also makes the wall anti-fungal. I have used colocasia leaves which are widely available, the cost of the liquid (if it goes commercial) will be less.

Add 150ml of chloroform to 110gms of *Colocasia esculenta* leaves in a bowl and cover it up. After an hour approximately 125ml of extract is obtained. Among the various propotions tried this worked the best. The viscosity of the bio-wax solution is 0.44Pa. I have tried with two methods of application being a top coat and a spray on the wall and have got satisfying visual results. Out of curiosity I have top coated mud brick, whitewashed brick, painted brick, cotton cloth, nylon cloth, glass, bandage cloth and on paper. All the visual results have been positive. All the surfaces showed hydrophobitcity to superhydrophobicity with contact angles 920 to 1550.The TLC was done and Rf values were obtained showing the presence of policosonal with Rf value 0.56.

The lab results proved its antifungal activity against the common fungus growing on the walls, Apsergillus Niger showing a moderate zone of inhibition.

The walls normally come under fungal attack especially during rainy season and spoil the look. They eventually cause leak in the walls. This liquid when applied externally will not only give it a better look but also protect it from fungus. The aesthetic look of the wall will be maintained.

A novel process to create eco-friendly and composite material by using maize peel and sugarcane fiber

Online ID: 1141
Authors: Doshi Noopur Mehul & Vaghani Prakruti Alkeshbhai, Std:9th
Guide: Ms. Apeksha Joshi
School: Shree G. K. Dholakiya High School, Rajkot, Gujarat

Abstract:
To decrease environmental degradation it is important to reuse waste materials and put them to good use. We have developed a novel uses of maize peel, sugarcane fiber and guar gum to create a composite sheet that has variety of applications.
First we make simple dishes from maize peel but it strength is very low. Then we used sugarcane fiber and fevicol in different proportions like 70-30, 60-40, 80-20, and 90-10. We also experimented with various natural binders such as aloe vera gel, natural gum, guar gum and finally found that guar gum is the best binder of all. We check which proportions is best binding capacity we used sugarcane fiber and guar gum in different proportions like 50-50, 60-40, 70-30, 80-20,90-10. Then we spared maize peel. The base composite sheet created was tested for water absorption, biodegradability & oil absorption, Tensile strength, Total Ash, Moisture. It is light-weight and strength full. Our optimization experiments showed that 80% sugarcane fiber and 20% guar gum forms the best combination for creating the base sheet.
Collect the sugarcane fiber and washed, dry in sun it for one day. Take the guar gum powder with drained fiber and crush in mixture grinder and required amount of water and make a sheet and speared on maize peel. The overall process done easily and does not require any heating.
Thus, our sheet is ready to use. It can be used in various applications.
The composite sheet created can be used for variety of application such as disposable plates and glasses, plates, toys etc. We also made germination pot using our material. Once the seeds germinate in our pot, it can be directly put in the ground-pit without the need to transfer the germinated mud block into the soil separately. Unlike plastic germination bags, our germination pot is natural & bio-degradable.
We did a detailed comparison of the physical properties, biodegradability, Microbial activities, toxicity and user experience of plates made from maize peel and sugarcane fiber composite and standard commercially available paper plates. From the measurements of tensile strength, water and oil absorption, degradation time in soil etc. we find that our composite plates provide an eco-friendly and cost-effective alternative to the standard plates used. Initial filed trials of our product at local restaurants suggest satisfactory user acceptance of these products.

Test	Our Product	Standard Product
Water absorption After 10 hours	26 g	100 g
Oil absorption After 1 hour	6g	19g
Max. strength Average	4 Mpa	2 Mpa
Bio-degradability	4 days	6 days
Total Ash	2.80%	5.30%
Moisture	12.95%	15.36%
Food pH after 30min.		
Milk	6	6
Lemon juice	2	2
Water	7	7
Colour Migration	Nill	Nill
Over all Migration	3.11 mg/dm2	4.15mg/dm2
Surface of the Material	1.1 mg/dm2	1.5 mg/dm2
Stimulant	12 mg/liter	15mg/liter

Eco-friendly solvent for Ink using Agricultural waste that can be used in different colour pens.

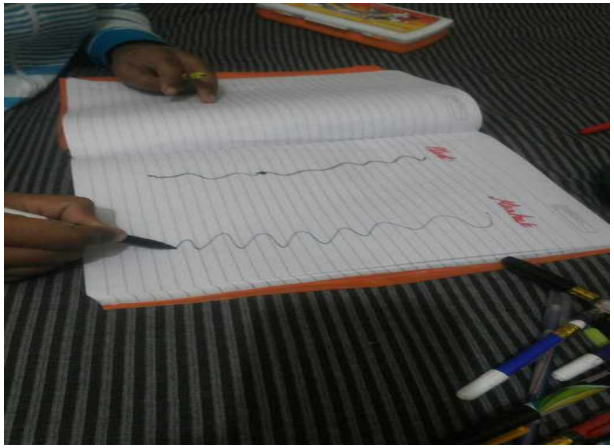
Online ID: 1144
Author: Yashvi Ramani & Nikita Rathod Std: 10th
Guide: Yogitaben Sonagar
School: Matushree L.G. Dholakiya School,Rajkot,Gujarat

Abstract:

We are using different pen in daily life, ink is main element in pen. new era chemicals are using in making in ink. this ink may be harmful to our body and increase chemical pollution. As we get this idea we make solvent for ink., this solvent is made up from agriculture waste like husk of dry oinions, husk of garlic, husk of ground nuts, dry alsotonis scholaris branches, alstonia scholaris, glycerine and water.

Than we extracted different coloured pigments. from different flowers [Red colour:- May flower+ Shoe Flower, Black colour:-Black Plum, Purple colour:- Bringel Flower.] With distill water. then we add glycerin to make it dense & viscos as per requirement.
We also checked its physical & chemical characteristic like density, viscosity, toxicity, fading test, plate count, spreading test.

Hence if the eco-friendly ink is used in different types of colour pens like sketch pen, marker pen, micro tips and fountain pens it will not only be safe for children.



AN ECOFRIENDLY MATERIAL FOR PAPER- WATER HYACINTH

Online ID: 1107
Author: AJEYA SHYAM BHAT, Std: 10th
Guide: Vasanti Kedila
School: Bala Vidya Mandir Sen. Sec. School, Chennai, Tamil Nadu

Abstract:
The project is about preparing an eco-friendly and cost effective paper from the water hyacinth. The water hyacinth is called the world's worst aquatic weed due to its ability to rapidly cover whole water ways. When not controlled, the water hyacinth covers lakes and ponds entirely. This dramatically impacts the water flow, blocks sunlight from reaching native aquatic plants, and deprives the water of oxygen thus often killing fish. The plant also creates a prime habitat for mosquitoes, the classic vector of several diseases like malaria and dengue and a species of snail known to host a parasitic flat worm which causes snail fever. The water hyacinth is often problematic in man-made ponds if not controlled. Thus, instead of trying to unsuccessfully eradicate these weeds, I aim to convert them into paper to replace the paper made from trees.

The water hyacinth paper is quite strong and also eco-friendly. It consumes less chemicals than the regular paper, and is also very easy to prepare. One novelty of the weed is that it forms paper with any organic fiber binding agent; but to get the best quality, Fevicol is a good fibre binding agent. Starch also gives good results.

The water hyacinth is easily available in polluted waters; it can also be cultivated in freshwaters. About 80% of the 39,000 tanks in Tamil Nadu are infested with the water hyacinth and tapping this resource is very feasible. The paper can be prepared quickly, hence it does not consume time and so can be prepared in great amounts to meet the current demands. We will also save a lot of energy and water as the energy and water required for making this paper is much less than that which is required for a conventional paper.

The plant can be used to make any kind of paper from art paper to cardboard, writing sheets to decorative pieces. The plant has a cellulose content more than that of trees. Therefore, it is easier to process the cellulose of the water hyacinth. The best papers made from the water hyacinth are hard to tear, but others are more easily torn. The water hyacinth can be used to make any kind of paper, all of which blots ink.

FOAM ERASER (A Sensible solution foam removal in lakes)

Online ID:1241
Author: Dhanushree.P & Lavanya Hemanth, Std:11th
Guide: Anitha Sukhdev
School: Vagdevi Vilas School, Bengaluru, Karnataka

Abstract:

In the present world, in some of the developed cities the major problem is that the only available surface waters for the population, lakes are highly polluted and covered with foam. Formation of foam can be either naturally by algal bloom and sewage water by increasing the amount of dissolved organic compounds some of which containing surface-active agents or surfactants which lessen the surface tension. This diminished surface tension allows air bubbles to persist at the surface which leads to the formation of foam on vigorous mixing of surface water due to flow of water or water currents.

Some foam is caused by synthetically produced surfactants released to surface waters. The chemicals released by the factories into the water bodies also lessen the surface tension.
The chemical analysis of the nearby lake, Varthur Lake, showed results of high contamination, BOD and COD level more than the normal range and high electrical conductivity showing high concentration of various salts.

The sensible solution [FOAM ERASER] which we have prepared using 0.5% of Calcium Oxide solution, 0.5% of Gypsum solution, 0.5% of Sodium Carbonate Peroxyhydrate solution,0.5% of Polydimethylsiloxane (PDMS) and 1% of Aluminium Sulphate solution clears foam on the surface waters and increases the surface tension of the water to stop further production of foam. The solutions used for the preparation has its own individual effect on the treatment of water. Parameters like temperature, dissolved heavy metals, BOD, COD, DO, chemicals dissolved and TDS are also considered.

The solution prepared is sprinkled into bunds constructed in lakes at regular intervals and the purified water is let out the other side of the lake.

The precipitate or sewage sludge formed is further sent for treating which is used to produce electricity and as a fertilizer.

Before treating with foam eraser

After treating with foam eraser

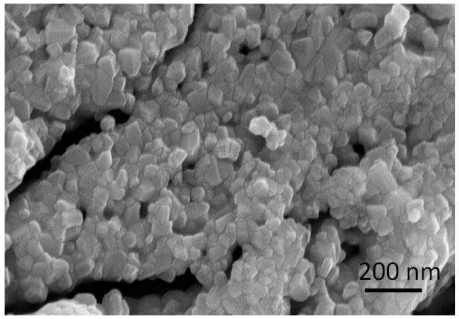
References (if any):

-Articles on the formation of foam in lakes.
-Articles on water pollution and its effects.
-Environmental Pollution, and Health - V K Ahluwalia

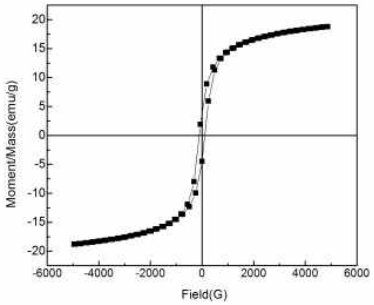
Novel and Cost Effective Method to treat Waste Water of Textile Industries: Magnetic Nanocomposite in Action to Remove Dyes

Online ID: 1374
Author:Sarthak Sharma, Std 10th
Guide: Ms. Ekta Soni
School: Amity International School, Ghaziabad, Uttar Pradesh

Abstract:
India is country with varied traditions and states like Rajasthan are very colourful, the clothing style of these states comprises of very bright colourful dresses. These dresses when prepared in big colour dye factories or industries, release a large amount of unbound dyes, which is generally untreated. These dyes are directly released in water bodies and pollute the rivers and ground water.
In the past decade, research and development in the area of water remediation processes using novel materials has gained tremendous momentum. The large specific surface area, surface containing functional groups and well developed porosity of various carbon based nanomaterials have inspired innovative solutions to meet environmental challenges in water purification.
In this work, carbonized poly-urethane (PU) foam as nanocomposite with immobilized silver and iron nanoparticles was used to treat the dye polluted water. These nanocomposite have been prepared by functionalization of PU foams utilizing their porous networks as beds for the adsorption of impurities from the water. In proposed model, silver and iron nanoparticles were embedded after carbonization of PU foam whicytth imparts magnetic and antibacterial properties. SEM, TEM and XRD techniques were used to characterize prepared nanocomposite. Adsorption studies were optimized using simple batch experiments. Using Methylene Blue as model dye pollutant in water, the carbon nano composite showed high adsorption capacity of 120mg/g, exhibiting excellent characterization desirable for the application in adsorption of dyes and easy separation under an external magnetic field. The magnetic properties of nanocomposite have been characterized by Magnetic Hysteresis (MH) loop with a maximum magnetization curve indicate that Iron-nanoparticles are superparamagnetic, which is very much desirable for the application of dye adoption and separation under external magnetic field. Regeneration studies signify that nanocomposite can be used successively upto 6 cycles of adsorption/ desorption.
The results of the studies are expected to have great implications in addressing two major societal problems of India, (i) effective solution to treat waste water of textile industry and (ii) waste management.. These structures can further be tested for oil spills and other decontamination of waste water which coincides under the Indian government initiative of “Swatch Bharat Abhiyaan”.



SEM



Nanocomposite in Action

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A Novel Eco-friendly product to control Coconut rhinoceros beetle from Arachis hypogaea fermented solution and Tinospora cordifolia leaf extract

Online ID:1249
Authors: SAGAR M & GAUTHAM B, Std: 11th
Guide: VASANTHI KEDILA
School: St.Philomina Pre-University,College,Puttur

Abstract:

Coconut rhinoceros beetle has been a pest of coconut and other palm trees .It damages the plants by boring into the center of the crown for its breeding,where it injures the young growing tissues and cut the developing leaves. So in this project we tested Peanut–*Arachis hypogea* powder to control the dangerous coconut beetle.

We took 2kg of Arachishypogea powder,added 5 litres butter milk and stirred well in a container and 1litre of *Tinospora cordifolia* sollution is added.Then it is kept for 5 days fermentation.then the fermented solution is kept in the infected coconut form.With in 3 days we observed the fall of Coconut rhinoceros beetle into the solution. We observed it for more than 10 days where the attraction of the beetle into the solution increased day by day.Totally, there were 17-number of beetle in it. The reason is that the Pungent smell released from the fermented solution attract the beetle just like some perfumes attract flies.The pungent smell is due the lower hydrocarbons(with alcoholic property)from the fermented solution.

Thus,this method of controlling beetle may help the farmers in an easy way to increasing coconut crop production by 90%,increase soil nutrients and save labour charges.

Coconut tree effected from coconut rhinoceros

Fermented solution kept under coconut tree

Fomes fasciatus(Mushroom) for medical use and tocontrolmoth on Solanum melongena (Brinjal)

Online ID:1459
Author: Shivarama Bolunjadka, Std: 9th
Guide: Vasanthi Kedila and Sri Shankar Bhat P Badanaje
School: Sri Ramakrishna High School, Puttur, Puttur, D.K., Karnataka

Abstract:
Fomes fasciatus (Mushroom) (Sw.) Cooke is a wood decay fungus belonging to the family Polyporaceae, which grows on tree trunks. Here the Fomes fasciatus' moth controlling property on Solanum melongena is studied.
In the preparation of the extract, Fomes fasciatus was collected, shade dried and powdered. Water was added in the ratio 1:3 and it was boiled for 2 hours. Thus the extract to control moth on Solanum melongena was prepared.
The field work has been done by giving the product to 15 local farmers to control moth on Solanum melongena. The field work was compared with the commercial product (Super Killer) as the positive control and water as negative control. According to the observation the pests on Solanum melongena were controlled within 12 day whereas Super Killer took 10 days.

To study the properties and find out the active component ethanolic extract of Fomes fasciatus was done through massiration method .
The phytochemical test showed the presence of tri-terpenoids, steroids, tannis and phenolics. Phenolic content of the sample was 1420.32 µg equivalents of gallic acid. This was compared with that of commercial pesticide (Super Killer) which contained 10 % w/v of cypermethrin, which is a synthetic pyrethroid, a neurotoxin. ATR test results showed the presence of Amines, Aliphatic amines, Carbonyl, hydroxyl groups. TLC test, HPLC test, LCMS test, NMR tests has been done. Rf values corresponding to 0.57 and 0.46 be attributed to the presence of phenolic compounds- salicylic acid and tannic acid respectively. Toxicity test was done as per OCED guidelines on Swiss albino Mouse up to maximum dose of 2000 mg/kg body weight and no toxic effects were found. Anti- bacterial and anti-fungal property tests were done through disc diffusion method and the ethanolic extract of Fomes fasciatus inhibited 4 bacteria namely Pseudomonas aeruginosa, Klebsiella pneumoniae Staphylococcus aureus and Bacillus subtilis with Streptomycin as standard. The extract of Fomes fasciatus also inhibited 2 fungus namely Aspergillus niger and Candida albicans with Nyastatin as Standard. The pH of the extract was 5.83 where as pH of Super Killer was 3.0. So due to all these results and observations the pesticide prepared using Fomes fasciatus is the best alternative to control moth on Solanum melongena.

Fruiting body of Fomes fasciatus

Extract

Aqueous Extract of Fomes fasciatus (Spray)

Pest attacked Solanum melongena

Spraying the extract

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Rathi MJ, Gopalakrishnan S. Insecticidal activity of aerial parts of Synedrella nodiflora on Spodoptera litura. Journal of Central European Agriculture. 2005; 6(3): 223-227.

Development of Plant antihistamine ointment for curing skin allergies

Online ID: 1250
Author: P Venkata Sesha & Reddy Jai Tiwari, Std: 9th
Guide: Raghu N
School: Vagdevi Vilas School, Marathahalli, Bangalore

Abstract:

Histamine is a chemical, which is involved in our local immune response as well as regulating physiological function in the gut, acting as a neurotransmitter. During the time of seasonal allergies, the body's immune system sees pollen as an invader. In an allergic reaction, our body produces histamine, as a defense mechanism. This inflammatory chemical attaches the cells in our body and causes irritation. It is the deficiency of this enzyme that triggers an allergic reaction as histamines gathers in the synapses. An antihistamine serves to reduce or eliminate the effects brought on by histamine, a chemical mediator released during allergic reactions.

Antihistamines are commonly used for allergic rhinitis, allergic conjunctivitis, contact dermatitis, urticaria (hives), angioedema and pruritus (atopic dermatitis, insect bites). There are hundreds of plants used all over the world, which are used in herbal medicine as treatments for histamine attacks. Here we used Ficus religiosa leaves (F. religiosa) (L.). Fresh leaves of F. religiosa were obtained from shanthipura village, Bangalore, and dried to obtain powder. In in vivo study, the aqueous extract of F. religiosa leaves at different concentrations of paste was made with water and 30% ethanol like 10mg/ml-1000mg/ml and applied on the allergy induced mouse models (skin). It can be concluded that Ficus religiosa leaves is effective on histamine producing cells and helps in curing the allergy within few minutes of time.

Novel and Eco Friendly Ant Chalk and Mosquito mat from Cocos nucifera L.

Online ID: 1474
Author: Anvith A Hebbar, Std: 9th
Guide: Dayanand Patwardhan
School: Sharada Vidyanikethana Public School, Talapady, Mangalore

Abstract:
The mosquito repellents and ant chalks available commercially are made of toxic chemicals, especially made of pesticides. Though they are effective, but extremely harmful to human being. In this context, as an alternative, we used the natural and organic blackish brown liquid extracted from coconut (Cocos nucifera L.) inner shell to prepare Mosquito coil and Ant chalk. The coconut shell oil was tested in the laboratory and indicated the presence weak Phenolic Acid group and Phenolic compounds.
The Ant Repellent Chalk was prepared using following method- The extracted Coconut shell oil was thoroughly mixed with Lime powder, Clay and water to get a consistent mix (2 part Shell Oil, 10 part Lime powder, 1 part fine clay, 10 part water).The mix was then rolled to shape of chalk pieces and dried for 3 days. These chalk pieces were distributed to different households for testing. The results were extremely encouraging. The following method was used to prepare Mosquito Coil - The shell oil is mixed with Cow dung, powdered Fenugreek and water (5 Part shell oil, 10 part cow dung, 1 part Fenugreek powder, 10 part water). Initially the mix was dried for 2 days and rolled to coil form. The coils were again allowed to completely dry for 3 more days. The Fenugreek enhanced the binding property of the mix. The cow dung assisted the burning of the coil. The coils were distributed to the residences and hospitals for testing. No reports of eye irritation during burning. It was also tested using electrical burner with less amount of smoke. The results were equally good. The proportions of the various ingredients mentioned above indicate optimized quantities. Dummy Mats and ant chalks without shell oil were also produced and tested in households. They were found to be not effective. This ensured the role of shell oil in the repellence action. The optimization was achieved by trial and error method. Many trials of mixing various ingredients in different proportion were required to arrive at the best combination. Toxicity test confirmed that it was not harmful. In another field test, the dilute slurry of raw materials of mosquito mat clearly showed the death of larva.
Hence, it can be concluded that the both products exceeded the performance of the commercially available Mosquito coils and Ant chalks. Moreover, they were cheaper, safe and eco friendly. Their effect lasted longer. They can be prepared using simple and easily available materials.

Coconut Shell

Shell oil Extraction

Ant Chalks

Chalks, Mats and Sticks

Mats and Coil

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Unique use of rice husk in building products

Online ID: 1296
Author: Darshi M.Panara Std: 7th
Guide: Milanbhai Panara
School: Shri G.K.Dholakiya School, Rajkot,Gujarat

Abstract:

One of the many challenges faced in developing world is the issue of waste management. Rice husk is by-product of rice milling industry and abundantly available in rice producing countries. Such type of agricultural waste has properties of insulating which is useful in building materials as well as acting as a strengthening agent. Amorphous Rice Husk Ash is chosen due to high pozzolanic property. Fly ash is waste product of thermal power plant, which makes a lot of pollution to the environment due to its fineness. Due to its silica contain property & low cost it can be used as a replacement for natural sand. Micro silica is an ultra fine powder collected as a byproduct of the silicon and ferrosilicon alloy production. Because of its extreme fineness and high silica content it gives good compressive strength to product. By using all above materials along with lime and gypsum & other admixtures in different proportion, I achieved 4 to 10 N/mm2 strength at 14 days.

Our product is innovative building materials which are cost effective, light weighted, thermal & acoustic insulator as well as durable materials. As products are free from natural sand & clay, it does not harm the ecology and deplete river beds. Because of insulation property from heat & cold it saves substantial energy. Our invention help to reduce environment waste thus eliminate pollution and conserve natural resources which create better world.

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Mandar floss lightweight composite board

Online ID:1465
Authors: Master David Johnson& Gautam Diwakar Ramsumer, Std: 9th
Guide: Mrs.Sitalakshmi.Parameswaran
School: JAI BHARAT ENGLISH SCHOOL DOMBIVILI

Abstract:
Plastics takes around 450 years to decompose in the environment which will contribute to the earth's waste disposal problem. HDPE/pp is the most recognized recyclable plastic and is used to make detergent bottles, shampoo and conditioner bottles ,and many other non-food items. The initial idea was to recycle waste materials into a green project which can increase the environmental friendliness. This project is designed as an alternative to replace wood .
Mandar seed floss is rich in cellulose ,relatively inexpensive and abundantly available has the potential for polymer reinforcement. This project was started by collecting Mandar seed and waste bottles from houses . The seeds of mandar plant was collected and carded to separate the seeds and the floss. HDPE /pp bottles were shredded to make a fine powder . The floss were cut to small size . Internal mixer machine was used to mix the materials well . The materials were then placed between two aluminum foils and then compressed with help of screw Jack press at 180o c . After heating, the press was immediately cooled with cold water and the composites were collected. The composites were conditioned at room temperature .
Increasing the density improved the strength and modulus for composites reinforced with both40 and 60% mandar floss. As for the flexural properties, increasing the density decreases the voids and therefore provides better tensile properties.
The low density of Mandar floss allows larger amounts of the fibers per unit weight of a composite leading to fewer voids and hence better flexural and tensile properties. The research presented shows that low-density reinforcing materials are preferable for developing lightweight composites

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NOVEL, ENVIRONMENTAL FRIENDLY, ECONOMICAL WATER PURIFIER FOR REMOVAL OF DYE, LEAD, CHROMIUM, ARSENIC AND MICROBES FROM INDUSTRIAL WASTE WATER

Online ID:1441
Nishant A. Isloor and Aman P. Shetty, Std: 6th
Guide : Dr. Arun M. Isloor
School: NITK English Medium School, Surathkal, Karnataka

Abstract:
We hereby are proposing a novel, unique kind of multistage, environmental friendly purifier for the effective treatment of waste water from chemical/dye industries. Organic dye as well as heavy metals like arsenic, lead and elements like chromium are the hazardous chemical compounds produced from the chemical based industries. Release of such hazardous compounds in the water may lead to harmful effects on human beings, mammals, plants and also on the surrounding environment. It can cause harmful diseases like cancer, skin allergies, eye irritation and other health disorders. Hence it is very essential to treat this waste water effectively and economically.
This set up was developed indigenously using locally available low cost materials based on scientific reasoning. Initially, dye waste water is treated with Polymer membrane, which is composed of carbon nano particles, and it can adsorb most of the dye present in water. The top compartment is composed of fine sand particles, which can remove any suspended particles present in water. Next compartment is composed of acid treated laterite grains, which can adsorb arsenic, lead and chromium present in the water. Further, water passes through the layer of activated charcoal, which can adsorb any of the remaining dye, chemicals and smell causing agents present in the water. At the later stage, water comes in contact with the Chitosan (a polysaccharide obtained from the exoskeleton of prawns), by which most of the microorganisms get destroyed. Further, again water comes in contact with mixture of sand and charcoal for the removal of any left out traces of chemicals and odour present in water. Finally, UV lamp kills any of the remaining microorganisms present in the water.
This unit does not require any harmful chemicals and works on gravitational flow. Another advantage of this unit is that, the adsorbed membranes and laterite can be desorbed and can be reused again and again. It can effectively remove dye/pigment, arsenic, lead, chromium, and any odour which cannot be removed by the commercial water purifiers. UV lamp can kill the microbes upto 100% and thus makes the water potable.

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- Production of antimicrobial chitosan nanoparticles against food pathogens Journal of Food Engineering, Volume 167, Part B, December 2015, Pages 210-216 Ana Raquel Madureira, Adriana Pereira, Pedro M. Castro, Manuela Pintado

Extraction & Screening of Antimicrobial Properties of Orange Fruit Peel Oil

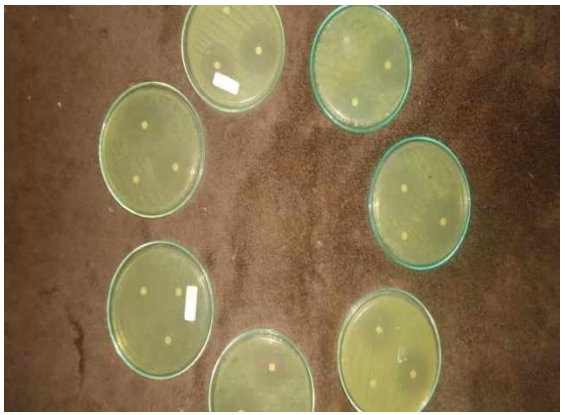
Online ID: 1085,
Author: Shivani. Gavimath,Std: 7th
School: Divine Providence School Tilakwadi Belgaum, Karnataka
Guide: Dr. Chidanand Gavimath

Abstract:
Citrus sincensis is commonly known as orange fruit. This plant belongs to the family Rutaceae. The medicinal properties of oil present in the peel of orange fruit is due to the essential oil produced by the secondary metabolism in plant. Hence the present study was carried out to extract & evaluate the antimicrobial potentials of orange peel oil on pathogenic Bacteria. This drug molecule solves the problem of Mutidrug resistance of pathogenic microorganisms.

Orange peel oil produced by steam distillation. We have also developed very simple method using pressure cooker, by this method orange peel oil can be produced even in home also. The antimicrobial property was screened on different bacteria using Nurtrient agar & Whatmann filter paper discs of 6mm diameter size were aseptically loaded with 0.01ml of Orange peel oil as test sample, 0.01ml of Streptomycin as positive controls & 0.01ml of sterile water as negative control. The plates were incubated in the incubator at 370C for 24 to 48 hours, and then the zone of inhibition was measured in mm. Our results revealed that the Orange peel oil exhibited substantial antimicrobial effect in comparison with standard antibiotics.

Applications of Orange peel oil: It is a good medicine for Cold, cough, fever (antipyretic agent), painkiller, anti-inflammatory agent, it improves immune system by increasing absorption of 'Vitamin C' in the intestine', it is good drug for Respiratory & Urinary tract infection, it is good antioxidant, It is a natural food preservative, it can be used for killing germs, worms, insects and their eggs & larvae present in stagnant water bodies including overhead tank, It is a good natural food & grain preservative and good cleaner for cut vegetables and flesh, it can be used in bathing soaps, detergents & shampoos, it is a good natural sanitizer that kills microorganisms as well as repels insects. It control termites still it has many more application farmers, etc

Note: 1) We have designed another our own method of extraction using pressure cooker, it is under process of optimization. 2) We have designed our own incubator for conducting this project. Hence we claim that our project is totally innovative & more over we used waste to produce valuable medicine to combat against the diseases of plants, animals & human beings without any side effects.

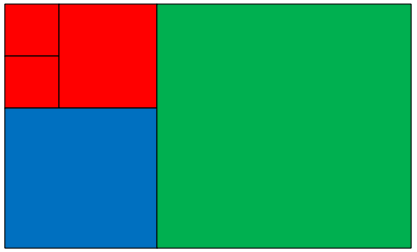


An Alternative digital clock based on number theory with time resolution 1 minute

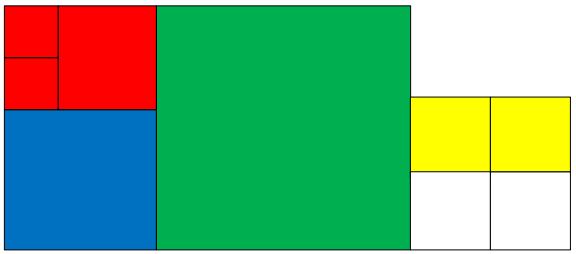
Online ID: 1264
Author: Shreyans Jain & Shubham Ghoshal Std: 10th
Guide: Mr. Shubham Chakraborty
School: Amity International School, Ghaziabad, Uttar Pradesh

Abstract:
The alternative digital clock, with much improved time resolution of 1 minutes instead of available 5 minutes and based on number theory uses PYTHON PROGRAMMING LANGUAGE AND GASP (Graphical API for Students of Python) to create a time piece.
It also has a colour combination of Red, Green and Blue where red stands for Hours; Blue for Minutes and Green represents both Hour and Minutes. This kind of clock is originally has a time resolution of 5 minutes whereas our clock gives a time resolution of 1 minute, thus making it more accurate.
To read time from the clock one needs to add the values of all Red boxes and Blue boxes to get HOURS while to get MINUTES one needs to the values of all Green and Blue boxes. The clock can be displayed as a foreground application on Linux and Windows machines with Python support and GASP module installed.

The comparison shown on the right clearly outlines the difference between the 2 clocks as well as the advantage of our clock over the previous one. The older clock displays time in intervals of 5 minutes. On the other hand, our addition i.e. the 4new squares, help in reducing the time resolution and bringing it down to 1 minute. This is because with every minute, each yellow square lights up, indicating passage of one minute, and after all 4 squares have lit up, with the passage of the fifth minute, the parent clock changes its colours.



OLD CLOCK: TIME IS 9:40



OUR CLOCK: TIME IS 9:42

References:
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New Formulae for Circumcentre and Orthocenter

Online ID: 1298
Participant name: Arpit Jain, Std: 11
Guide: Mr. V.S. Rawat
School: Amity International School Mayur Vihar, Delhi

Abstract:

I have created 2 new formulae for finding circumcentre and orthocentre. Earlier their formulae were not available and they had to be calculated by a longer method. These formulae make it easier to find the circumcentre and orthocentre if three points of a triangle are given in coordinate form.

I have used the basic concepts of straight lines in finding the formula and some concepts of determinants to make the formula simpler. Earlier those points were found out by first finding the lines and then solving them (to find out their point of intersection). I have directly solved the lines by cross multiplication method and the formula to which I arrived was much simpler. The formulae have been verified and are completely new.

The final result obtained was:

Circumcentre (x,y):-

$$\left(\frac{I}{2K},\frac{J}{2K}\right)$$

Orthocentre (x,y):-

$$\left(\frac{A}{C},\frac{B}{C}\right)$$

Where I, J, K, A, B, C are 3x3 determinants which includes the ordinates and abscissas of the points of triangle.

$$I=\begin{vmatrix}1&1&1\\y_1&y_2&y_3\\x_1^2&x_2^2&x_3^2\end{vmatrix}+\begin{vmatrix}1&1&1\\y_1&y_2&y_3\\y_1^2&y_2^2&y_3^2\end{vmatrix}\qquad J=-\begin{vmatrix}1&1&1\\x_1&x_2&x_3\\x_1^2&x_2^2&x_3^2\end{vmatrix}-\begin{vmatrix}1&1&1\\x_1&x_2&x_3\\y_1^2&y_2^2&y_3^2\end{vmatrix}$$

$$K=-\begin{vmatrix}1&1&1\\x_1&x_2&x_3\\y_1&y_2&y_3\end{vmatrix}\qquad A=\begin{vmatrix}1&1&1\\x_1&x_2&x_3\\x_1y_1&x_2y_2&x_3y_3\end{vmatrix}+\begin{vmatrix}1&1&1\\y_1&y_2&y_3\\y_1^2&y_2^2&y_3^2\end{vmatrix}$$

$$B=-\begin{vmatrix}1&1&1\\y_1&y_2&y_3\\x_1y_1&x_2y_2&x_3y_3\end{vmatrix}-\begin{vmatrix}1&1&1\\x_1&x_2&x_3\\x_1^2&x_2^2&x_3^2\end{vmatrix}\qquad C=\begin{vmatrix}1&1&1\\x_1&x_2&x_3\\y_1&y_2&y_3\end{vmatrix}$$

The formula obtained can be remembered and used to find the circumcentre or orthocentre of a triangle. Also, this formula can be used as an algorithm to create a computer program for finding the circumcentre or orthocentre of a triangle if 3 coordinates of a triangle are given. This formula can be used by programmable calculators to find the circumcentre or orthocentre of the triangle.