

NTU IEEE Student Branch presents

Science Symposium 2004

compendium



President's Message

We started IEEE Science Symposium last year with a hope of reaching out to the student population of Singapore and helping them realize their potential. We were pleasantly surprised by the tremendous response we got from the Junior Colleges. This year we hope the enthusiasm levels resound even higher both at the junior college and tertiary levels.

The Symposium aims to

- Instill application oriented thinking in students.
- Encourage students to develop working models to demonstrate their ideas.
- Create a sense of responsibility for society and role of technology in this aspect.

This compendium provides a brief glimpse to the capabilities of our young talents who will secure a place for Singapore on the global forefront.

Samir Rath
President
IEEE Science Symposium 2005

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Electrical / Electronics

Automated Crop Harvesting System (ACHS)

Current automated aeroponics and hydroponics systems do not have automated harvesting devices and require manual harvesting. The workers in such hi-tech farms are mainly required to inspect and harvest the plants, and since the harvesting is done about two to three times a year only, wastage of manpower and maintenance cost occurs.

This project aims to develop an automated system for harvesting crops in hydroponics farms. Our Automated Crop Harvesting System (ACHS) will reduce the need for manual labour during harvesting and speed up the harvesting process, thus increasing productivity and cutting costs in the long run.

The ACHS can be customized to suit both hydroponics and aeroponics farms. It works by turning the hydroponics or aeroponics trays so that the crops detach from them and fall into a transporting mechanism. The crops are then transported to a collection point where they are sieved from the water, inspected and packaged.

The ACHS is only activated during the harvesting period and requires computers to operate it and technicians to oversee the entire system in case of any unexpected errors. (Ong Wei Guang, Chow Lin Yi, Lim Sheng Yang, Lim Jing Hui computer program for the running of the entire system is not included in the proposal as it is beyond the scope of our project.)

*Done by: Ong Wei Guang, Chow Lin Yi, Lim Sheng Yang, Lim
Jing Hui
Anderson Junior College*

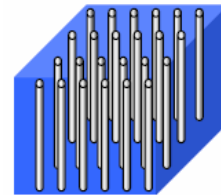
Electrical / Electronics

Design, Simulation and Fabrication of Photonic Crystal on Silicon-On-Insulator and Amorphous Silicon

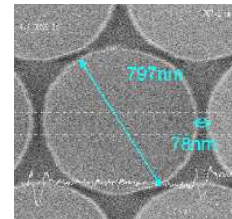
In this project, properties of photonic crystals are studied by both theory and simulation. Based on the simulation, photonic crystal waveguides with square and triangular lattice of air cylinders on silicon on insulator (SOI) as well as amorphous Si are designed and fabricated to work in communication frequency range (λ within 1.3 to 1.55 μm).

Electron beam lithography has proven it can provide reliable and accurate process for fabrication of photonic crystal on silicon-on-insulator and amorphous silicon. A minimum inter-hole separation 55nm in triangular lattice high fill factor photonic crystal on amorphous silicon has been achieved.

For the fabrication process, 100pA small beam current is found to be optimum for better and smooth profile for e-beam lithography. And tight control over beam focus and astigmatism is found to be essential for good pattern profile and process repeatability.



A Schematic image of the slab type of photonic structure used for simulation



Photonic crystal patterned on UV210 resist

Done by: Zhao Hui, Callisto
National University of Singapore

Environmental Sciences

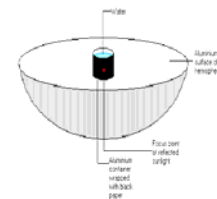
Integrated Water Purification System via Fabric Material Filtration and Solar Heating

Dirty water is made potable by using fabrics to filter it and heating using solar heating. The aim of this project is to design a simple and cost effective water purification that could purify water by means of fabric filtration and solar heating

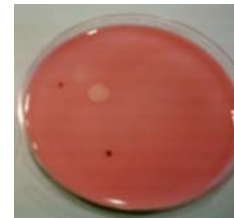
Different types of fabrics are used for filtration. This group decided to use four conventional fabrics, namely woolly cotton (towel), sari, nylon cotton (socks) and this cloth (old t-shirt). By plating onto agar plates the filtrate and counting the bacteria colonies formed, the fabric effectiveness in removing bacteria can be found out. Unfiltered dirty water is also plated to compare the number of bacteria colonies formed in filtered and unfiltered water. An attempt will be made to identify certain bacteria present in the dirty water.

As for solar heating, a parabola can be built to focus light rays to a focal point where filtered water could be heated for several hours. The parabolic property of light is used here. The heated water can then be plated onto agar plates to check how many bacteria colonies will be formed. Using these results of the number of bacteria colonies, the effectiveness of solar heating to eliminate bacteria can be determined.

By combining both techniques, the bacteria in dirty water should be completely or mostly eliminated.



A solar reflector hemisphere



Agar plate of Chromogenic E.coli/Coliform

Done by: Alan Kong , Ang Shi Hui Annie, Ching Kuan Chieh,
Chong Wee Tit, and Lim Zhen Hui
Anderson Junior College

Environmental Sciences

Oil Spills

Currently, a number of different methods of cleaning up oil spills can be employed. But, most of the conventional methods either destroy the oil or have low efficiency in recovering it.

This research projects aims to learn the causes and impact of oil spills as well as to provide a viable and comprehensive alternative to the present methods of containing and cleaning up oil spills, by utilizing quick response and cost effective procedures.

The new alternative method of this project allows both the swift containment of oil spills and the immediate salvaging of the spilled oil. The rapid containment of the oil spill will be done using specially improved booms whereas the salvaging of the spilled oil will be done through a "gravity-Type coalescing" separator which will be followed by centrifugation of the oil contaminated water. The salvaged oil will then be transferred to nearby waiting container ships.

This method holds great promise for the future because with increasing globalization and the world's increasing dependence on oil, international shipping of oil will rise exponentially. Hence oil spill incidents are expected to become more common in days to come. And although methods for preventing oil spills can be developed, but as spills occur during crisis situations such as ship wrecks, it is hard to say that any of these preventive methods will actually work. Thus there is a need for a method which is fast and can be implemented across large distances while being able to reclaim the oil at the same time.

*Done by: Foo Wui Ngiap, Ang Zhu Ming, Ambarish dash, and Rohan Verma
Anderson Junior College*

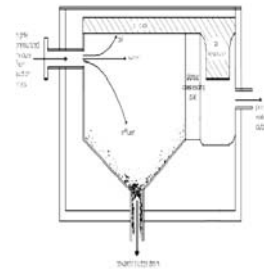


Diagram illustrating the proposed separator

Environmental Sciences

The Rain Harvester- Harnessing Energy and Wafer from Rain

The aim of this project is to create a small scale prototype, the "Rain Harvester" which will harness various resources from the rain. Its principles stem from the Hydro Electric Power (HEP) plant where electricity is generated from the gravitational potential energy of water.

The rain harvester will use the gravitational potential energy of water to turn a water wheel connected to a dynamo in order to generate electricity. The run-off water will also be collected by a container for other purposes like washing.

This system is beneficial to the society as not only does it utilize the abundant resource of rainfall, it also helps to recollect the rainfall that has passed through the system for other uses. In this way, the use of rainwater is maximized.

The rain harvester can be introduced into the rooftops of housing estates. The electrical energy produced by the system can be used to power up lights, streets lamps and signs, all of which requires only low amounts of electrical energy.

*Done by: Bay Guan Hong Leonard, Low Wei Shan, and Marie
Ng Xin Ru
Anderson Junior College*

Avian Influenza

Bird flu has caused great changes to society and the way we look at the outbreak of infectious diseases. It has also changed our way of life drastically. In this report, the way how other countries are affected by it, the measures taken to deal with it and current measures that are considered and being put in place by countries still facing the outbreak of bird flu will be discussed. Analysis of these measures will be given and some ideas that could be put in place to combat bird flu or any other potential viral outbreak in the future will be proposed.

As bird flu caused a great impact globally, we would like to seek alternative solution(s) to prevent such epidemic from happening again. The protection and prevention measures taken by various governments in Singapore, Hong Kong and Canada will be analyzed. Additionally, the generic stringent procedures taken by hospitals to deal with the bird flu situation will be discussed.

One major area of the research involves the measures taken in the import of chickens from other countries and how this can be further enhanced via sample size testing and vaccination of the chickens. These measures not only cut down unnecessary culling of chickens but will also ensure that whatever leaks in checks in the imports can be managed by the vaccines the chicken would have been subjected to. Another proposal is in the area of human vaccinations. The use of RNA interference (RNAi), fusion-protein drugs and neuraminidase inhibitors are new and innovative measures in the area of human vaccinations that are currently being actively pursued to find a robust vaccine for humans against the bird-flu virus.

*Done by: Mabel Neo, Maureen Ngo, Lim Shu Ling, Joraine Choo, and Daisy Khng
Catholic Junior College*

Environmental Sciences

Research on Air Purification System

As urbanisation takes place in most parts of the developing world, the problem of air pollution has become more significant. The long-term and key solution to this problem is of course to reduce the emission of air pollutants such as sulphur dioxide into the air through feasible methods such as fines and taxes. However, for the time being, it is imperative that there is an efficient yet cost effective purification system available for consumers today.

This project would investigate and analyse the various air purification systems in the market today through a step-by-step procedure as illustrated under implementation strategy. They will be rated according to how well they work, their price, etc and study the technology behind how they work. The different ways of different components of the purification system work will be analyzed. Next various advantageous features of the various brands in the industry will be extracted and put together into an ideal working model which will be made if possible.

Through this project, the usefulness of the new air purification device will be learned and hopefully a new model which would benefit the society better on the whole will be made.

*Done by: Bay Ming Jian Jalvin, Chan Wee Xian Eugene, Chong Hui Shan, Low Si Han, and Lai Wai Yee Renie
Hwa Chong Junior College*

Environmental Sciences

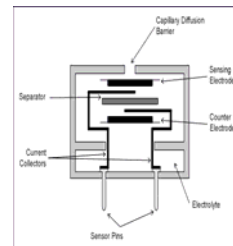
The Study of Gas Detection System

In 1995, a major accident occurred in Singapore due to gas leakage. With suitable gas detectors, such hazards can be prevented and working personnel can take precautionary measures to prevent the reoccurrence of such accidents. This project aims to study how gas detectors work, what their structures are and what their functions are, and what reactions take place in them.

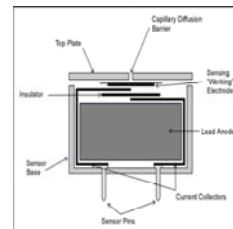
Toxic gas sensors are much like fuel cells. Their simplest form comprises of 2 electrodes. One is the sensing electrode and the other is the counter electrode. Gas enters the sensor through the small hole in its casing. The casing is usually made of plastic.

This project will aim to discover a new or more suitable material that is more chemically inert and corrosion resistant so that the gas detector would not be so easily damaged by the gas and hence hamper its effectiveness.

Hence, this project will also research on various gas detection systems, a detailed study on their structure and applications in different sites. This is done by visiting plants, laboratories, public transportation and places, gathering information on how these various detection systems work assess the reliabilities of the detection systems and suggesting limitation of these detectors.



Toxic gas sensor



Oxygen sensor

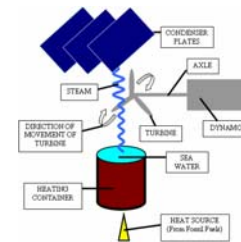
*Done by: Zhao Fenglin, Sze kaiping, Wang Yao, Cai Weihan,
and Jeremy Koh
Raffles Junior College*

Environmental Sciences

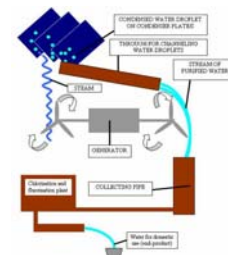
A 2-tier, Energy Generator -cum- Desalinator

Currently, Singapore uses thermal generators to produce electricity. Fuel is burnt to boil water into high-pressure steam. The high-pressure steam is then piped to the turbines. The steam then turns the turbines generating electricity before entering a cooling tower where it is cooled. The cooled water then returns to the boiler to be heated up again. In this process the steam cools at two areas- one at the turbines and finally at the cooling tower. When the high-pressure steam turns the turbine, work is done and the steam loses heat condensing on the blades of the turbine. Water is also formed when the excess steam is channeled into the cooling tower and condensed. The water formed in both cases is distilled water and can be used as a potential water source. Instead of recycling the distilled back into the boiler more water could be drawn up from the sea.

The primary objective of the project is first to access if this volume of distilled water is significant enough to contribute to Singapore's water supply. Part of the project could be to identify some of the potential problems and suggests solutions to them as well. Three offhand problems are how to modify the generator to effectively collect the water, scaling due to the salt forming in the boiler as well as corrosion of the boiler due to seawater. Various methods of protecting the boiler from corrosion such as sacrificial protection as well as using corrosion resistant material could also be researched into. If on the other hand the volume of water is too insignificant to use, then the project could refocus to make designs to increase the water yield instead without affecting the economics and the power output significantly.



Current Singapore's desalination system



Upgraded desalination system

Done by: Ganesh Kudva, Bimal Vora, Darren Chan, Lim Wei Lun, and Clarence Koh
Raffles Junior College

Environmental Science

Culturing Seahorses in Your Own Backyard

Seahorses are extremely fragile creatures. The survival rate of the young seahorses is extremely low; approximately only 5% are able to live to maturity. Their survival is threatened due to over exploitation. Degradation or destruction of habitats also contribute to the drastic decrease in seahorse population worldwide.

The aim of this project is to increase the chances of survival of seahorses so that a greater percentage of the young can live up to maturity under a natural yet cheap culturing environment making it commercially viable to actually farm these animals.

In this project seahorses will be reared in a 2-tier tank comprising corals, which will be filtered by a mangrove system. This replicates the real life situation in the sea whereby the mangrove filters the seawater. pH meters, thermometers and other instruments to monitor the condition of the tank will be used. The seahorses will be weighed regularly to check their growth and the number of seahorses in the tank will be recorded regularly so as to check on their rate of reproduction and the survivability of baby seahorses. The water used in the tank would be natural sea water which will be taken from the East Coast.

If the artificially constructed natural environment proves to be successful for the breeding of seahorses, it can prove beneficial to seahorses and the uses of the seahorse industry in several ways. Most importantly though, with the easy availability of captive bred seahorses, the wild population will be relieved from the stress of being over-harvested and eventual extinction.

*Done by: Lim Cui Xi, Yeo Weilong, Verleen Goh, and Lim Jing Shan
Victoria Junior College*

Application of Expert Systems in Decision-Making

An expert system is a program that uses artificial intelligence (AI) to solve problems that generally require a knowledgeable human. The method used for constructing such systems involves extracting a set of rules and data from expert through extensive questioning. This data is then organized in a format suitable to be used by the computer. Expert systems are usually used for high end purposes that involve huge amounts of data since they are expensive and require regular maintenance and upgrading. Generally high level shells and AI languages such as LISP, Prolog, and CLIPS are used to construct expert systems.

There can be many areas where an expert system can help make choices. Examples include selecting the best junior college based on specific requirements of the student, selecting the best mobile plan suited for individual requirements, etc.

We shall address the problem of making tough decisions when it comes to mobile plans by constructing a 'mini expert system' that will select the best mobile plan for the user based on his requirements and budget. This simple program is designed on C++ and can be easily upgraded by just modifying its database.

Usage of expert system to solve people's everyday problem of selection may help save the precious resources of the society. Even though the expert system can not accept any special requests and the user may not be completely satisfied by its results; the system can definitely help him narrow down his choices. However the expert systems can not replace the human experts completely . This is because the lack of creativity and common sense in machines.

*Done by: Vaibhav Goel, Wilson Foo, Rahul Mehta
Anderson Junior College*

Augmentation of Precision and Run-time in ProtDex2 - Rapid 3D Protein Structure Database Searching

As the sizes of 3D protein structure databases are growing rapidly nowadays, exhaustive database searching, in which a 3D query structure is compared to each and every structure in the database, becomes inefficient.

The ProtDex2 scheme utilises techniques utilised in information retrieval systems in order to perform rapid database searching. Here, the implementation of a distribution sort and frequency-based quantisation while optimising quantisation values is proposed. At the same time, implementation of different relative importance values for different feature vectors as well as a relevance feedback scheme is proposed. This is in a bid to overcome inherent inadequacies in the ProtDex2 scheme.

The new scheme with the proposed changes will not only decrease time complexity but also decreases space complexity. Significant increases in run-time as well as precision and recall values are also expected. This would result in the development of a tool which would help biologists match the newly elucidated 3-dimensional structure of a newly discovered protein against those of proteins stored in protein structure databases such as PDB. This would give them clues and insights into the properties of the newly discovered protein and this has vast implications in fields such as biomedical research and engineering, impacting industries such as the pharmaceutical industry.

*Done by: Joseph Firmansyah
Raffles junior college*

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*Done by: Joseph Firmansyah, Tan Liangzheng, Liang Junjie
Raffles junior college*

Computing / IT

Science Model on Gas Laws

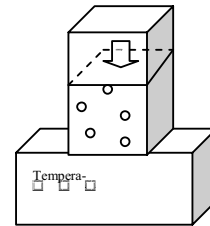
Science can be shown as something interesting and relevant to our daily lives. The project done here makes use of a simple concept and design in order to allow the gas move. Rather than showing off Boyle's law and Charles' law as something theoretical, viewers can appreciate science in a fun and interesting manner. Viewers will be able to learn gas laws by playing with the model and looking at how gas molecules behave. Through that, they can learn first-hand on the concepts which most will otherwise be uninterested in. It is hoped that they will appreciate the benefits of gas laws in different areas of industry such as manufacturing and chemical industry.

The project is based on two parts, the actual working model and the virtual model done using Macromedia Flash.

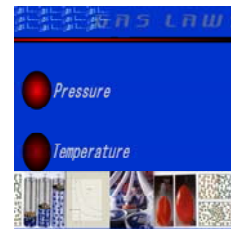
The working model is done using a large rectangular container (32 x 50) with balls in it. There will be a fan attached below in the box to stimulate how gas molecules move with respect to temperature. Also, there will be a piston that can be pushed downwards to stimulate how gas molecules move with respect to pressure.

For the Flash model, it will be an animated version of the working model. It will show gas molecules bombarding each other in more rapid collisions with an increase in temperature and pressure. Here, we can educate the viewer on Boyle's law and Charles' law and provide the equations to those who want to learn more.

Done by: Lee Wai Hoong Joel, Tong Jun Qun, Lim Pin, Ho Kai
Cheng, Cheng Mao Xin
Temasek Junior College



Actual Model



Flash Model

Biological / Life Sciences

Effect of *Bronchionus Plicatilis* on the Growth of Algae

Algae can pose a problem to owners of fish farms when they occur in large amounts. The large quantity of algae competes with the fishes for oxygen, therefore affecting the health of the fishes. *Bronchionus plicatilis*, one of rotifer species is needed to reduce the algae population in the fish tanks.

It is known that the *Bronchionus plicatilis* feeds on algae; therefore the use of the Rotifer species *Bronchionus plicatilis* may solve the problem of excessive algae growth in fishponds

The use of *Bronchionus plicatilis* will result in the fish farms saving on costs of production, which lowers the price of fish. Besides, the *Bronchionus plicatilis* is able to produce cysts, which are capable of surviving harsh conditions for a period of time. This means that the *Bronchionus plicatilis* population is able to replenish itself when conditions are harsh. Moreover, *Bronchionus plicatilis* also provides an alternative food source for the fishes.

The use of *Bronchionus plicatilis* as a biological control is able to benefit society and is viable commercially because it reduces the costs of rearing fishes. The fishes with the *Bronchionus plicatilis* as a biological control will result in a cleaner, less polluted water and therefore the fishes bred will be healthier for the consumption of the public. *Bronchionus plicatilis* to reduce algae is more advantageous than using pumps and filters in both the economical aspect and effectiveness.



Labelled picture of *Bronchionus Plicatilis*

Done by: Chen Cai Li, Goh Wei Jiang, Hoa Kai Feng, and Low Teck Soon Jeremy James.
Anderson Junior College

Biological / Life Sciences

Improved Plumbing System Capable of Removing Food Residue without Manual Labour

Many households use a filter so as to prevent food residue to enter the drainage pipe when washing. Removing the food residue from the filter is not only a manual task; it might also be very messy. Therefore, we have come up with an improved plumbing system that will make clearing of food residue easier.

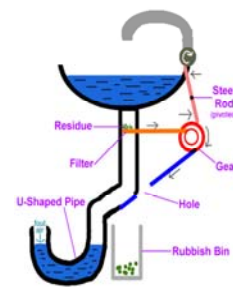
This improved plumbing system is slightly different from the ordinary plumbing system. It is added on with a filter, gears and a special opening. The gears are linked to the tap, (as shown in the diagram).

When the tap is turned on, the gears will activate the filter and opening. The filter is fitted into the drainage pipes. Water and food residue will have to pass through this filter. The filter prevents food residue from being washed into the plumbing system, which might cause a clog. When the tap is turned off, the filter is removed and remaining water pushes the food residue through the opening into a bin. This saves the trouble of having to clear the filter manually.

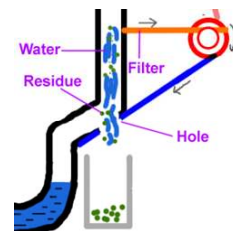
This product is cost effective because the cost of making it is low as all the materials are relatively cheap. Furthermore, if there are any problems, it can be taken apart and fixed back without the need of skilled personnel.

This product is targeted for use mainly in restaurants and food courts where there is maximum usage of the sink. Not only that, this product is also targeting at residents where the sink is used daily.

Done by: *Nicholas Lim Wen Kai, Kelvin Heng Yun Heng*
Anderson Junior College



Labelled picture of Bronchionus Plicatilis



How the residue is removed

Probiotic Candyz

Probiotics are live beneficial micro-organisms that occur naturally in our digestive system and they serve to enhance our health. Probiotics furnish and maintain an optimal intestinal flora environment when the delicate balance of the natural flora is tipped off. This ensures a healthy gut. They help to enhance our health by stimulating the immune system, depriving bacteria and viruses of essential nutrients needed for their survival; and aiding in food and nutrient assimilation.

Currently probiotic supplements are gaining greater prevalence in the arena of health supplements. Examples of these supplements are milk cultures like Vitagen and Yakult as well as pills like the GNC probiotic pill.

Freeze-drying is a method for preserving materials including micro-organisms. In addition, freeze-drying can be used to separate and recover volatile substances, and to purify materials. The purpose of freeze-drying is to remove a solvent from dissolved or dispersed solids.

Freeze-drying was the preferred method to make probiotic candies after performing a series of tests to analyze the effects of the manufacturing processes on probiotics. Since the probiotic candy is packed with freeze-dried Lactobacillus, consuming the candy will reap numerous benefits in the alimentary canal. The candy also addresses the prevalence of diabetes in our society by substituting sugar free substance such as Isomalt in place of sugar.

*Done by: Narendran S/O Koomanan, Surendran S/O Perumallu
Anderson Junior College*

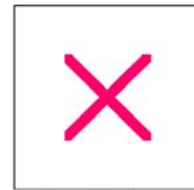


Figure 1: Diagram of the interior of a probiotic candy

Diagram of the interior of a probiotic candy

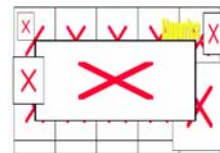


Figure 2: Example of Candy Packaging

Example of Candy Packaging.

Biological / Life Sciences

Cover It Up

Tea tree oil has been proven back in 1923 to be a good and efficient natural antiseptic. By incorporating tea tree oil in our "liquid plaster", the infection of wounds can be prevented and the healing process can thus be speeded up. Shea butter, on the other hand, has been found to contain several anti-inflammatory agents and it also helps to speed up the healing process of small wounds. Moreover, it contains vitamin A and E, which is beneficial to the skin. By incorporating these two natural ingredients in the solution, the process of wound healing could then be speeded up. Furthermore, this solution can be use by adults and young children who have sensitive skin or are allergic to certain antiseptic agents.

These two can be used for replacing 'conventional plaster or bandages'. This "liquid Plaster" works on the concept that silk protein will provide a strong and water insoluble scaffold. This silk protein can be harvested from Escherichia coli expression strain BL21(DE3) pLysS grown to midlog phase in defined salts medium(refer to appendix). The active ingredients can then be incorporated in this silk protein solution.

Upon contact with air, the solution will slowly dry up, forming a film over the wound. The scaffold of silk protein allows the film to form. Shea butter and tea tree oil are the active ingredients used as the former can hasten healing and the latter has antiseptic property. These active ingredients will act on the wound while the plaster is still left on the skin. Water does not have any effect on the plaster due to it being insoluble in water.

*Done by: Ma Shiqi, Yang XinYi Angeline, and Lee Seek Peng.
Hwa Chong Junior College*

Biological / Life Sciences

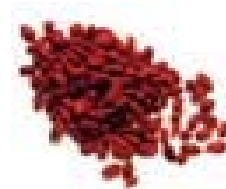
Herbal Power Tapping the Hidden Potential

Herbal medicines such as ginger paste or aloe vera oil are gaining popularity among consumers. It is believed that the most common supposed benefits of ginseng is to boost and regulate the energy or 'Qi' of the human body and thus making us stronger and more alert while Lycium fruit or 'Guo Qi Zhi' is most commonly supposed to improve vision or losing weight. However, the effects of Lycium fruits are very subtle.

Ultimately, both ginseng and Lycium fruit are beneficial to our body and should be promoted as healthy food. However, care should be taken to avoid abusing the usage of herbs, especially ginseng. Consuming a plethora of ginseng products is known to give rise to hypertension, oedema and morning diarrhea. Because of the half-boiled herbal market in today's drug-oriented world, potential natural remedies are still not subjected to rigorous clinical trials.



Ginseng



Lycium Fruit

*Done by: Lim Heng Lip, Allan Ling, Loh Yao Sheng, Janicia Chiew, and Jean Chen.
Raffles Junior College*

Materials

Fabrication of Organic Light-Emitting Diodes on Glass Substrate

Organic Light Emitting Diodes (OLEDs) are light emitting sources which use an organic material as the luminescent layer. The technology is now patented by Kodak & Sanyo, who have made the first OLED display. The need for better displays which are brighter, lighter, have wider angle of view, consume less power and are portable and flexible has fueled the research for OLEDs. Their primary use has been in mobile technology like cell phones.

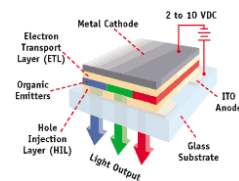
OLEDs are self-luminous displays. They are independent of polarisers and backlighting. This makes them less bulky than LCDs and also less power consuming. The OLED consists of an single organic layer sandwiched between the anode and the cathode. The organic layer used in the experiment was Alq3 (8-hydroxyquinoline Aluminium) with Aluminium metal as our cathode and Indium Tin Oxide (ITO), which is transparent, as the anode. The organic semiconductor Alq3 functions as an electron transport layer, a hole injection layer and an emitting layer. It emits light of wavelength 530nm (approx) which is green in color. To obtain light of other colors, Alq3 is doped to vary the band gap, resulting in different energy levels and different frequencies of light. DCJT is added for red emission, and Perilene for blue emission.

In spite of the disadvantages and problems in manufacturing OLEDs, the future is bright due to the demands of the electronics industry for a flexible, bright, low power consuming display.

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A mobile phone with an OLED screen



OLED Structure

Others

How Far Should It Be?

Every electricity source and line creates Electro Magnetic Field (EMF) around them that come proportionally with the electric energy generated. This EMF can cause harm to the living when exposed constantly at a rate exceeding safe level which is 2 milliGauss (2mG). The EMF around us builds up and may harm us unconsciously when we commute around them everyday as the usage of the appliances such as handphones and computers increased.

Considering the accuracy, usefulness, and also the cost of The EMF tester, we have come up with our own product which more or less serves the same function to the tester.

Advantages:

- Easy and affordable to build and use
- Able to measure the EMF around the house and therefore may warn us about any imminent danger due to EMF
- Would help handphone users decide the model that suits their preference and health needs before buying it.
- At larger scale may help create a more conscious society and society free of EMF threat

Disadvantages:

- May not be accurate due to the simplicity factor.
- Reading could vary due to different environment and temperature

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Others

Recent technological advancements have flooded the market with a wide range of safety products in vehicle. These safety devices aim to keep the passenger in the safest possible position in the vehicle.

Viscoelastic (VE) foam, originally designed for NASA in the '70s, is used as air bags material. This type of foam is better than other because it gets softer under body warmth and pressure, combines any determined softness with an unmatched durability. In a standard test, the thickness loss of a type of viscoelastic foam used in bedding after 80,000 compressions is less than 5 percent compared to approximately 10-15 percent for highly elastic polyurethane foam. This fact displays better height retention after extended use of the VE foam than latex and ordinary foam.

This material can be used as material for airbag and seatbelt in vehicle so as to minimize the result of amount of impact. Sometimes the impact of the accident may cause the seat belt to inflict excess pressure on the body which elderly may find unable to cope with. Thus, by lining the seat belt with this material, this will minimize the amount of injuries inflicted.

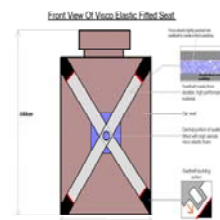


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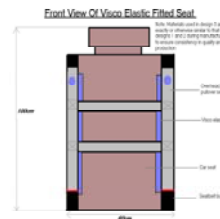


Figure description

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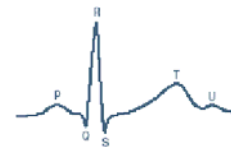
Design and Implementation of an Ambulatory ECG Monitor (AECG)

Ambulatory electrocardiography (AECG) is a widely used noninvasive test in which the electrocardiogram (ECG) is continuously recorded over an extended period of time, typically 24 to 48 hours, in order to evaluate symptoms suggestive of cardiac arrhythmias, e.g., palpitations, dizziness, or syncope. This is also known as Holter monitoring.

However, AECG monitoring will be ineffective if a patient experiences infrequent symptoms. As such, ambulatory event monitors (AEMs) were developed to provide longer periods of monitoring. Commonly used audio devices is used to record the ECG signals and the recorded is analyzed then.

The ECG signals is recorded using Frequency Modulation technique. This simple and improved AECG monitor will consist of an instrumentation amplifier, band-pass filter and FM modulator. After the ECG signals are captured and stored, the FM signals have to be demodulated to obtain the ECG waveforms. They can then be transmitted or sent by email to a cardiologist for analysis. FM demodulation can be done using software similar to the case of a software-defined radio (SDR).

Thus, audio devices together with AECG monitor can work as a Holter or event-driven patient-activated monitor.



A Standard form of ECG

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