CHRIST JUNIOR COLLEGE
BANGALORE - 29

ABSTRACTS OF COSMOS PROJECTS

PHYSICS

TO CHARGE AN IPOD WITH FRUITS AND TO PRODUCE AN ELECTROSTATIC GENERATOR

The experimental setup has a reservoir with two holes that drip water (or other liquid). The streams of dripping water each pass through a conducting ring, and land in a bucket. The buckets must be electrically isolated from each other and from their environment. Similarly, the rings must be electrically isolated from each other and their environment. The left ring is electrically connected with (wired to) the right bucket. And the right ring is wired to the left bucket. It is essential that each ring be placed around the point at which the stream of water passing through it first breaks into drops. If the buckets are metal the wires may be attached to the buckets. Otherwise, the bucket-end of each wire can just sit in its bucket, as long as it is contacting the water in the bucket.

I PCMB G

AUTOMOTIVE AERODYNAMICS

This project aims at developing highly cost effective, eco friendly automobiles by minimizing drag (air resistance) and preventing undesired lift forces and other causes of aerodynamic instability at high speeds. This air resistance poses the greatest obstacle for automotive speed and mileage economy. Reduction of drag is essential for improving fuel consumption and driving performance. The idea has been successfully tested and a working prototype has been developed. Automotive Aerodynamics is the study of aerodynamics on road vehicles. The forces acting on a car are drag, lift or down force. Drag is produced by the air creating certain frictional resistance. Downforce is another aerodynamic force and is same as the lift experienced by airplane wings, only it acts to press down instead of lifting up. Drag Coefficient (Cd) also plays a significant role. Essentially, this is how easily a vehicle moves through the air. The underlying principles are - Bernoulli's Principle of Pressure, Newton's Third Law of Motion. Cd and aerodynamic drag have an inextricable link as most of the efforts at reducing aerodynamic drag in cars must be directed at improving the Cd.

I PCME I

RELATIVISTIC HEAVY ION COLLIDER

The Relativistic Heavy Ion Collider (RHIC) is one of only two operating heavy-ion collides, and the only spin-polarized proton collide ever built. Located at Brookhaven National Laboratory (BNL) in Upton, New York, and used by an international team of researchers, it is the only operating particle colluder in the US. By using RHIC to collide ions travelling at relativistic speeds, physicists study the primordial form of matter that existed in the universe shortly after the Big Bang By colliding spin-polarized protons, the spin structure of the proton is explored.

II PCMB E

SOLAR POWERED RC CAR

Energy, environment and associated global warming concerns are the focus of raging debates as the global climate system impacts the political climate. The impending energy crisis and the soaring oil prices have their roots in the fast depleting non-renewable source of energy: petroleum. Petroleum takes the spotlight as the world's primary energy resource as the petroleum industry produces indispensable gasoline and other fuel derivatives.

With the depleting sources of petroleum, there is a need for something more long lasting and dependable for our daily use. This is where solar power comes into the picture. Our model of a working solar powered RC car is to show how efficient, cheap and eco-friendly solar powered cars are.

II PCMB C

CHEMISTRY

DECOLORISATION OF TEXTILE EFFLUENTS USING BAGASSE AND SAW DUST AS BIOADSORBENTS

Waste water from textile industries pose a threat to the environment as large amount of chemically different dyes are used for various industrial applications such as textile dyeing and a significant proportion of these dyes enter environment via waste water. The degradation products of these textile dyes are often carcinogenic. The present project is to explore the feasibility of utilizing bagasse and sawdust as adsorbent to remove the dyes from effluent. Different dyes which are used in the textile industry for dyeing is taken and their solutions are treated with bagasse and sawdust. Parameters like residence time of adsorbent and dye, mass etc are evaluated to optimize the conditions for effective adsorption.

I PCMB 'C'

QUANTITATIVE ANALYSIS OF FAT CONTENT IN VARIOUS EDIBLE OILSEEDS

Obesity is is one of the serious health problems faced by us. One of the main causes for this is the fat content present in our daily diet. Our aim is to make people aware of the fat content present in various edible oilseeds like groundnut, sunflower, mustard, walnut and almond. Extraction of fat from different oilseeds using Carbon tetrachloride as solvent is carried out .The percentage of fat present is calculated.

I PCMB 'E'

QUANTITATIVE VARIATION OF ASCORBIC ACID CONTENT IN STAGES OF CITRUS FRUIT RIPENING AND IMPLICATIONS ON ITS NUTRITIVE VALUE

Vitamic C or Ascorbic acid is a major vitamin required for the maintenance of healthy bones and teeth gums, a deficiency of which causes the much dreaded disease called scurvy. The project is to ascertain if a significant relationship (correlation) exists between the quantitative variation of the amount of Ascorbic Acid content in fruits with respect to their nutritive value during stages of citrus fruit ripening and in samples grown in different plantations to deduce any nutritive implications if any. The principle employed is the quantitative analysis of Vitamin C carried out using redox titration employing Iodine complexed with iodide to form triiodide and titrated using starch as the indicator.

II PCMB 'A'

HOME MADE HERBAL SHAMPOO

Our market is flooded with different variety of shampoo. Each brand boasts about the power of their product in nourishing hair. However it is a plain fact that shampoo in the market is costly and contain a lot of chemicals. Our project aims at making a shampoo which is cheap, containing only natural ingredients and can be easily made at home. For this the project team investigates the components essential for nourishing hair and identifies plants which have those components. They aim at preparing four different varieties of shampoo which increases hair growth, darkness, smoothness and removes dandruff.

II PCMB 'H'

MATHEMATICS

3D PAPER SNOWFLAKES IN NATURE

To appreciate the way math and nature correlate in complex structures. Mathematics involved in making a 3d snowflake is when we cut the papers in pieces, square shapes, triangle shapes, symmetrical in shape, cross sections and also which was used in designing shapes in ancient times. These paper snowflakes are an inexpensive and placed everywhere from windows to stages where they tumble down on dancers as stand-ins for real snow

I PCMB 'B'

MATHEMATICS IN FINDING THE CRIME CULPRITS

Fighting crime — perhaps not the first thing that springs to mind when you think of Mathematics. Ask someone on the street what they think about Mathematics and unfortunately their answer may well be:" Mathematics is boring", "Mathematics is exact", "Mathematics is irrelevant", or even "Mathematics is scary". Apart from the last point, Mathematics may seem very different from the confused, unpredictable and highly relevant business of fighting crime. It is integral to many of the methods police use to solve crime, including dealing with fingerprints, accident and number-plate reconstruction and tracking down poison. Police are faced with many challenges when tackling a crime. Mathematics can help with all of these. Data can be stored and interpreted using wavelets, probability and statistics.

I PCMB 'D'

MATHEMATICS IN GRAVITATIONAL LENSING

Gravitational Lensing is a phenomenon in which light from a celestial source, such as a star or galaxy, is deflected by a massive object (or objects) between the light source and the observer. Because of the deflection, the observer sees multiple images of the same light source. In some idealized situations one can count the number of images of the light source seen in a gravitational lensing system by counting the number of zeros of a rational harmonic function which is an extension of Fundamental Theorem of Algebra in Mathematics. This project is an attempt to appreciate Mathematics for its contribution in Gravitational Lensing which has lot of application in real world.

I CAMS 'K'

ENERGY OF A MOLECULE

The concept of graph energy arose in chemistry where certain numerical quantities, such as the heat of formation of a hydrocarbon, are related to total π-electron energy that can be calculated as the energy of an appropriate "molecular" graph. In mathematics, a chemical molecule can be represented by a graph by taking each atom of the molecule as a vertex of the graph and making edges of the graph represent atomic bonds between the end atoms. Every graph has a corresponding matrix called Adjacency matrix for which we can calculate the eigen values. Energy of a graph is the sum of the absolute values of its eigen values. The aim of this project is to calculate the graph energy of certain chemical molecules and verifying the same with the actual energy of chemical molecules.

II PCMB 'D'

THE DUCKWORTH-LEWIS METHOD

The D/L method sets a revised target for the side batting second when overs have been lost by a suspension in play. Each team is taken to have two 'resources' to use to make as many runs as possible: the number of overs they have to receive and the no. of wickets they have in hand. A single table gives the resources remaining at any stage of an innings for any number of overs left and wickets lost. It is a widely used system whenever it comes to deciding the result when the match cannot be continued.

II CAME 'L

BIOLOGY

BIO-PESTICIDES AND INSECTICIDES

This project rules out the disadvantages of the inorganic pesticides and insecticides. By using the natural extracts such as cow urine, chilli garlic extract, neem kernel extract and fermented curd water extract, bio pesticides and insecticides are obtained by the process known as broad spectrum formulation which is eco- friendly in nature. These pesticides are applied on plants over a period of time and the effect of it on pests is seen. This project helps to create awareness among people about the consequences of using inorganic farming methods and to clearly depict the benefits of bio pesticides and insecticides.

I PCMB 'D'

ATMOSPHERIC MOISTURE/WATER COLLECTOR

The moisture content in the air is used to produce water through condensation of water. The air is absorbed by the absorber which has an air filter. Then the air is carried into the evaporator/condensor, where water is condensed as the air passes out. The cold air circulates around the air tube. A condenser cools the air and a compressor pushes the air, where the water formation takes place.

I PCMB 'F'

TALES FROM A TEA HOUSE

Tea is an infusion made out of dried leaves of C*amellia sinensis*, which when steeped in hot water releases various components including vitamins (E, C), caffeine and antioxidants. These components decide the flavor and types, which are diverse—black, white, green, yellow, Oolong, and Pu-erh. The curing done to the leaves decide its type and flavor. The project highlights historical details about tea, tea house culture, tea tasting, tasseography and use of tea in various industries. The study also brings to limelight the health benefits.

II PCMB 'B'

LEARNING AND MEMORY

Brain produces every thought, action, feeling and experience of the world. Neurons, the structural and functional units of the brain make several thousands of connections via synapses. The pattern and strength of connections is constantly changing and in these changing connections, memories are stored, habits learned and personalities shaped. Hippocampus, resembling a horse-shoe, one of the structures of the limbic system of the brain is the seat of space, inhibition and memory. As the focus in the present study is memory, parameters like short term memory and long term memory are highlighted. The role of hippocampus in converting things those are in the mind "at the moment" into things that will be "remembered for the long run" shall be brought out. The information encoded and stored in memory needs to be retrieved. Varied ways of information retrieval like recall, recognize, recollect and relearning are posted through the exhibits. Memory test, offered stands as a challenge to those who can remember the most.

II PCMB 'C'

ELECTRONICS

VIBRATION SENSOR

There are many different illumination sources like Incandescent bulbs, florescent tube light, CFC, the most recent one is the LED which is bright and as well consumes very less power. This is a project which will meet the needs of every household. When there are constant power cuts especially at night times it is required that we should equip ourselves to meet this challenge. The circuit is based on low power LED lighting with a transformer less power supply to charge the battery. The emergency lamp is constructed to give sufficient light for a room of 10 by 10ft and at least for three hours.

II PCME 'I'

MICROCONTROLLER BASED MULTIPURPOSE VEHICLE

Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems.

Our main aim of this project is to design and implement a project based on these microcontrollers which will help us to understand the programming (Software) and Circuit design (Hardware) part which is a higher level of our standard and to integrate the same with other applications on a single vehicle.

II PCME 'H'