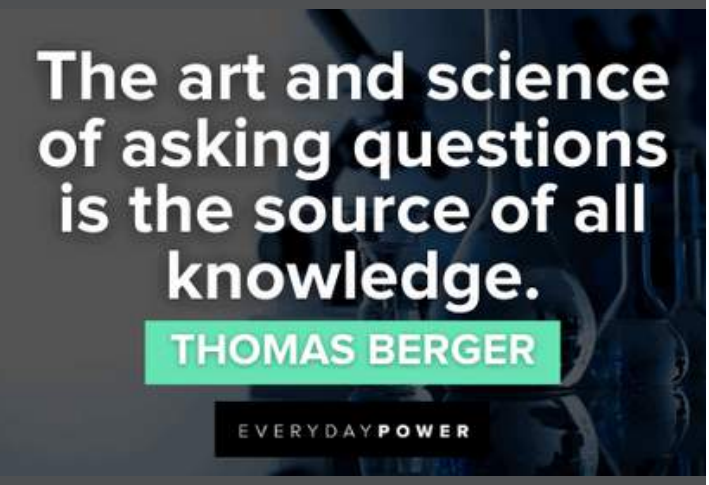
ANNUAL EXHIBITION (2022)

EXTRAVAGANZA OF CREATIVITY

CONTENTS



COMPILED BY:

DR. MANPREET KAUR

MS. PRABHJOT KAUR

EXHIBITS GUIDED BY: MR. SANJAY BHARDWAJ

Exhibit 1: Moving train and track

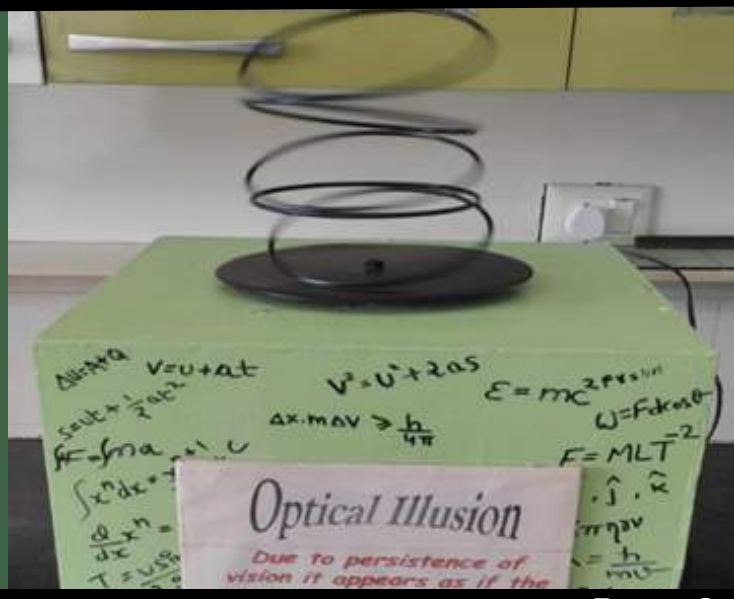
This exhibit is a demonstration of Newton's third law of motion. To every action there is an equal and opposite reaction. The track of the exhibit has been made free to rotate. When the wheels of the train rotate, they exert a force on the track in backward direction. As a result, the track also gets equal force in opposite direction and starts rotating.

Exhibit 2: A bird balanced at it's beak

This bird has been designed in such a way that the centre of mass of the bird is at its beak. So, if an upward force equal to the weight of the bird is applied at the beak the bird is balanced.

Exhibit 3: Jumping Rings

This exhibit is based on optical illusion. Our eyes gather information and it is sent to the brain for processing, which takes finite time to process the image. If the object keeps on changing fast then we get an illusory image which is actually different from the actual object.



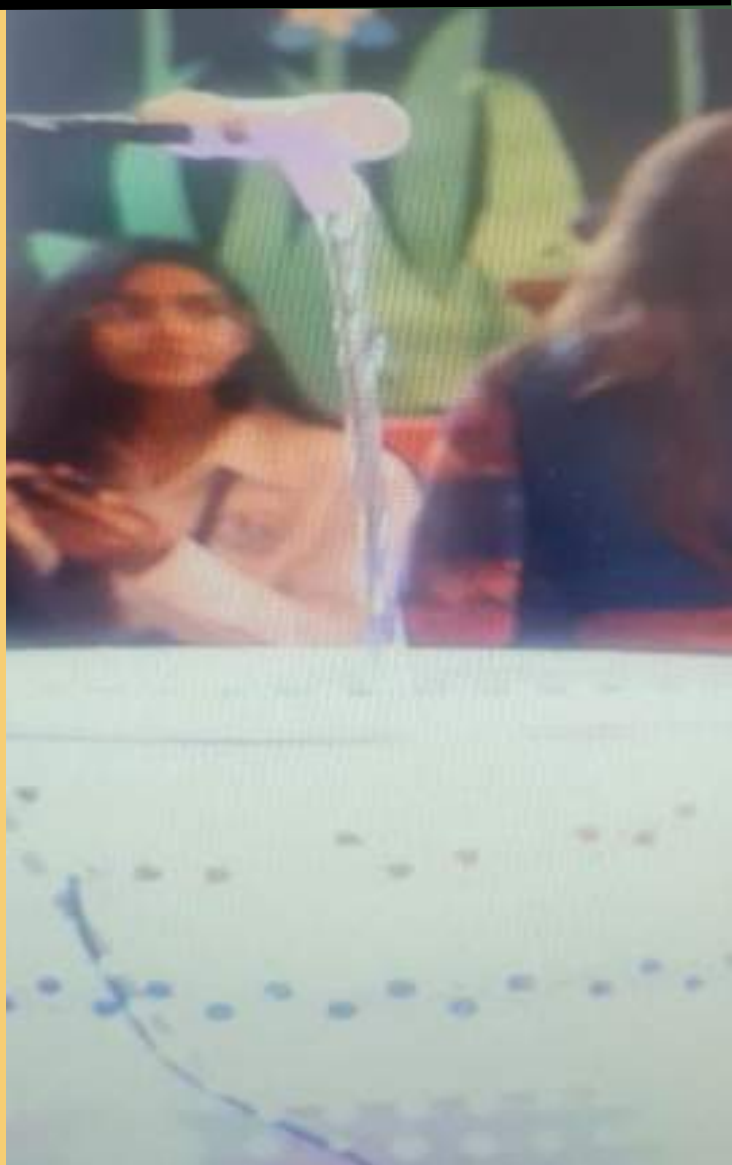
EXHIBITS GUIDED BY: MR. SANJAY BHARDWAJ

Exhibit 4: Rotating lamp shade.

This exhibit is based on Newton's third law of motion. The air inside the black paper cylinder gets heated and escapes through the flaps. the escaping air pushes the flaps in opposite direction as a result the cylinder starts rotating.

Exhibit 5: Magical Tap

In this exhibit there is a glass tube between the tap and the bottom of the bucket. A water pump is pumping the water from the bucket to the top through the tube. Water comes out of the tube at the top and falls down along the tube. Since the refractive index of water and glass is almost same the glass is not visible.



CLEAN COOKING SOLUTION FOR RURAL HOUSEHOLDS

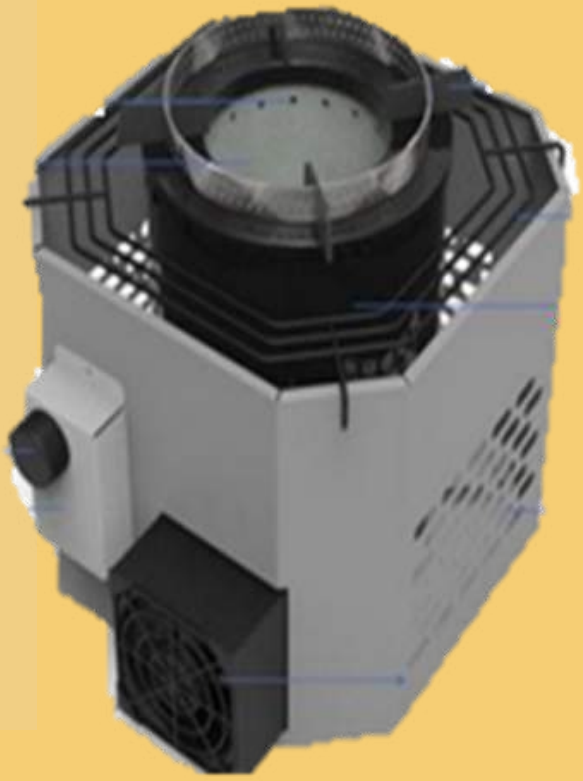
GUIDED BY: DR. KIRAN VARSHA

Nature of Work: Novel solution to an indigenous problem

Principle: In rural households, women have to stand and cook in the kitchen for prolonged hours where a lot of smoke and heat is released which results in discomfort and sickness. This solution provides cleaner cooking without smoke and a more time-efficient stove so that it not only reduces pollution but also brings relief to the cook.

A normal stove/chulha generates carbon monoxide and particulate matter due to incomplete combustion which is very toxic for the environment and therefore, it is a monumental concern that needs to be acted upon.

Science Principle/ Concept used: Force draft- For the fan, which provides air for clean combustion; Energy loss is minimized by the refractory (combustion chamber) which acts as insulation; Air fuel ratio is being matched resulting in clean combustion.



Materials used :Metal (Mass steel), Consumption chamber made from ceramic cement ,Pellets made from agri-waste/biomass(bought directly from factories, used in boilers and various thermal applications), Fan which is battery powered.

NAVYASHA CHADHA -- SS1 B

AIR FILTER FACE SHIELD DIY (MAKE IT AT HOME)

GUIDED BY: DR. KIRAN VARSHA

The model relates to the safety of the human society with the aim to reduce the risk of spreading communicable infections particularly at the time of pandemic. It will protect wearer's forehead, ears, nose, chin and face from infection carrying droplets, aerosol and light solid particles present in air. Its inhale Exhale Air filter will allow the air to breathe but resist direct flow of the particles up to 0.3 microns.

Air Filter Face Shield has three layer filters comprising of Electrostatic Nonwoven Fabric, i.e. Polypropylene, High Efficiency Particulate Air (HEPA) paper and Cotton Fabric.

SAKSHAM KHANNA- SS2B

MAGIC BOTTLE

GUIDED BY: DR. KIRAN VARSHA

Fun of chemistry was depicted in the form of a magic bottle. The experiment could also explain and motivate the students about the blues that come in our life and go after some time. This bottle involved transforming Methylene Blue from blue to colorless and back again by mixing with glucose and shaking the solution, then letting the it to settle.

An alkaline solution of glucose acts as a reducing agent and reduces added Methylene blue from a blue to a colorless form. Shaking the solution raises the concentration of oxygen in the mixture and this oxidizes the Methylene blue back to its blue form. When the dissolved oxygen has been consumed, the Methylene blue is slowly reduced back to its colorless form by the remaining glucose, and the cycle can be repeated many times by further shaking.

SUNESH PATTANAYAK – SS1 B

SOLAR POWERED IRRIGATION SYSTEM

GUIDED BY: MS. ANJALI CHHIBBER

Solar powered irrigation is a reliable, energy efficient, agriculture friendly solution. It is utilized in places with extensive abundant sunlight like Africa and the middle east. It includes the generation of clean energy through solar panels to facilitate the movement of water in the fields. Solar panels are a good alternative compared to other ways of electricity generation, they are very useful for big farms and are low maintenance, they save a lot of resources and manpower too.

ALEENA DANISH - SS1A

HYDROPONICS AND AQUAPONICS

GUIDED BY: MS. ANJALI CHHIBBER

Hydroponics

Hydroponics is the technique of growing plants using a water-based nutrient solution rather thal soil, and can include an aggregate substrate, or growing media. Hydroponic agriculture saves water, space, chemicals and provides enhanced crop yields!

ACHINT KAUR & AISHANI GOOPTU - SS1A

Aquaponics

Aquaponics is a combination of two words aquaculture (the growing of fish in a closed environment) and hydroponics (the growing of plants usually in a soil-less environment). It is an association between plants and fish.

PRACHI GOWDA -SS2A & TASMAI GOWDA - M3B

GUIDED BY: MS. ANJALI CHHIBBER

Rain Water Harvesting

Rain water harvesting is collection and storage of rain water that runs off from roof tops, parks, roads, open grounds, etc. This water run off can be either stored or recharged into the ground water.

KASHVI JALAN & TAVISHA KUMAR - SSIA

Waste water treatment

Sewage Treatment refers to the process of removing contaminants, micro-organisms and other types of pollutants from wastewater. The treatment process involves:

- Coagulation
- Flocculation
- Sedimentation in settling tank
- Filteration (Grit tank)
- Treated water storage

APOORVA GUPTA - SS1A

Drip Irrigation

This method is achieved by making small continuous holes in a straight line on a watering pipe and connecting the pipe to the water pump or tap. This pipe is then put near the roots of plants and when the tap is opened the water drips through the holes in small drops from time to time on the roots of the plants.

DIVYA KUMARI - SS1A

HIGH TUNNEL

GUIDED BY: MS. ANJALI CHHIBBER

High Tunnels are also called hoophouse or polytunnel. High tunnels are typically lighter, more movable, more flexible and more versatile. The greenhouse is bigger and more permanent. High Tunnels have large openings on both ends the allow enough air to circulate. Whereas in the greenhouse, for ventilation they have an opening on the roof, a door and side vents.

in high tunnels, heat retention is directly affected by the type of plastic sheet used for covering. Whereas in a greenhouse, poly covers do not allow enough light to pass through. Therefore require artificial heaters.

High Tunnels are used to extend the seasons whereas a greenhouse can he used to grow plants in all seasons.

Setting up a high tunnel does not require much money, they're cheaper while a greenhouse costs a lot more than a high tunnel.

BY PALAK KASHYAP - SS1A

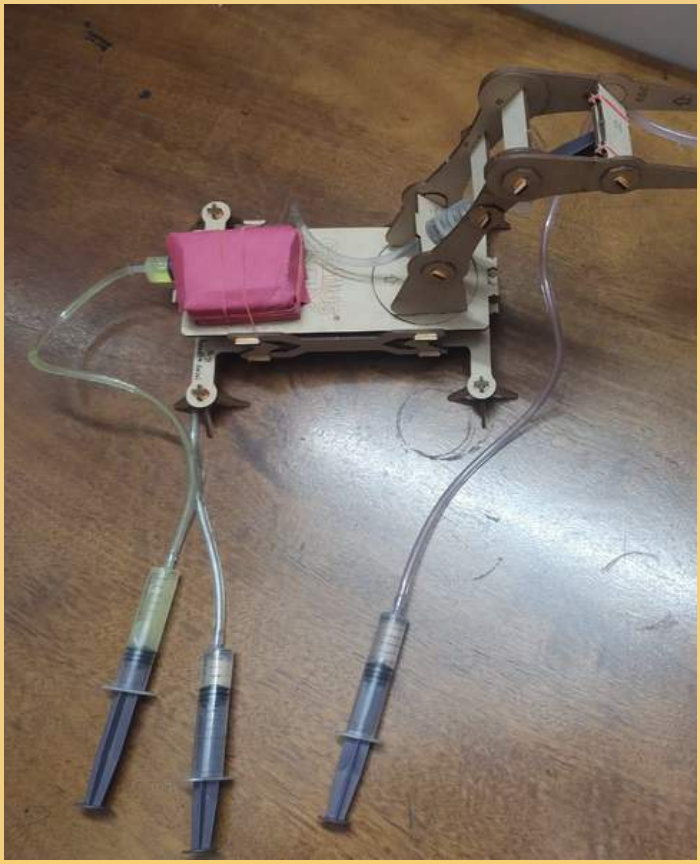
SMART DUSTBIN

GUIDED BY: MS. MINI SETHI

This is a smart dustbin which works on the principle of ultrasonic waves. It contains and Ultrasonic Sensor, Servo Motor and Arduino Uno. The Ultrasonic sensor transmits ultrasonic waves which are transmitted by the transmitter. When the waves hit an object (garbage), within a radius of 15 cm, they are reflected and received by the receiver. When the waves are received, they are sent as a signal to the Arduino which is later given to Servo motor, which when received rotates to 180 degrees and opens the lid. When they don't get the signal, the Servo Motor comes back to its original position and the lid is closed.

HYDRAULIC CRANE

GUIDED BY: MR. SATISH DIXIT



What Hydraulic cranes are:

Cranes that rely on a hydraulic system to work are hydraulic cranes. They are used to lift heavy materials, usually in construction sites.

Working of the Crane:

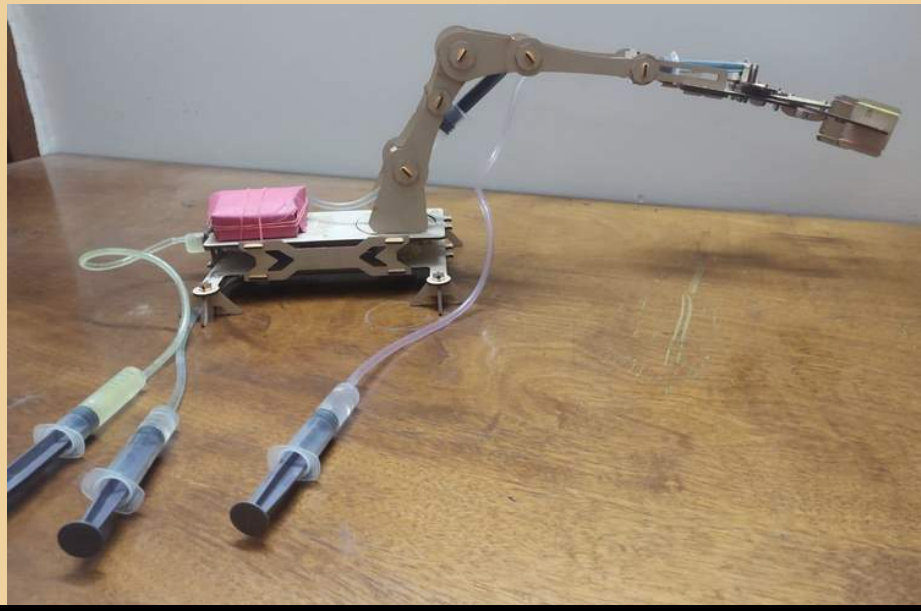
The hydraulic crane works on the same principle. In our hydraulic crane model, pressure is applied on the fluid in the syringe, which then is transmitted through the pipe to the syringe connected to the corresponding part without any change in pressure. This pressure moves the parts and does the desired work. This is how the hydraulic crane works.

Procedure of making the model:

The model was made with pieces of wood, cut into the desired shapes for the crane. Then the parts were assembled with rubber bands and glue. Then we attached two syringes (one filled with water) with pipes and attached it to the hand, claws and the body of the crane. This is how the crane was made.

Pascal's Law:

Hydraulic system works on the Pascal's Principle. This principle states that a pressure change at any point of a closed, in-compressible fluid will be transmitted throughout the fluid without any change.



EXHIBITS GUIDED BY: MS. ARVINDER KAUR

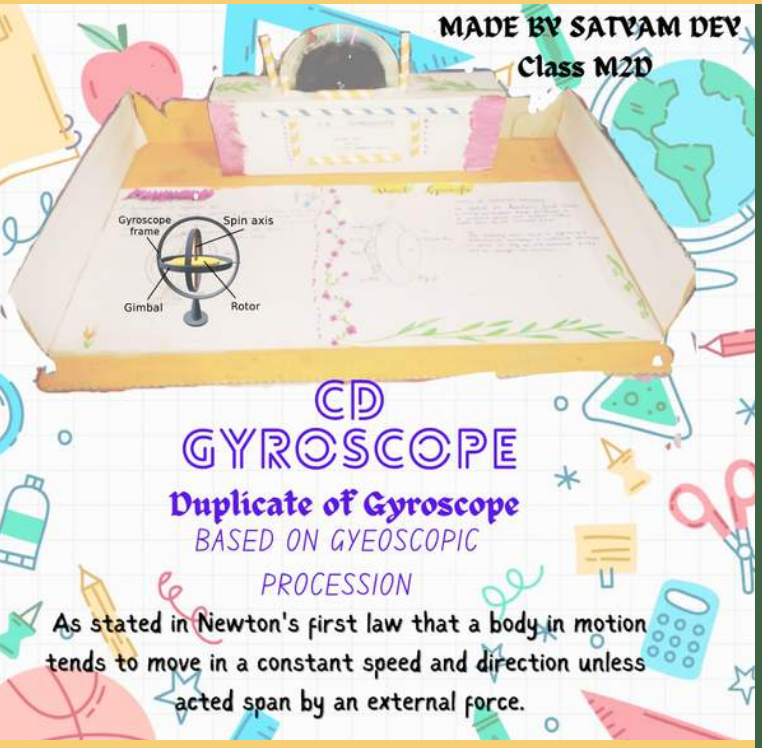


Exhibit 1: CD gyroscope

As stated in Newton's first law of motion, a body in motion tends to move at a constant speed and direction unless acted upon by an external force.

The spinning rotor inside a gyroscopic instrument maintains a constant altitude in space so long till external forces act to change its motion.

SATYAM DEY - M2D

Exhibit 2: Newton's Disc

The Newton's disc is also known as disappearing wheel. It is a rotating wheel which segments in different colours appearing as white as it spins fast. It can be created by painting a disc with seven colours-

V=Violet
I=Indigo
B=Blue
G=Green
Y=Yellow
O=Orange
R=Red

The white sunlight consists of seven colours, that we see in a rainbow. The seven colors combine to give white light.

EXHIBITS GUIDED BY: MS. ARVINDER KAUR

Exhibit 3: Sonar System

Sonar stands for SOund Navigation and Ranging. The sonar consists of a transmitter and a reflector which is installed in a boat/ship. The transmitter emits ultrasonic waves which get reflected back by an obstacle and are detected by the detector (receiver). Once the utrasonic waves are received, they get converted into electrical signals which are interpreted to determine the distance of the object striked.

PRITHAV AGARWAL - S1B

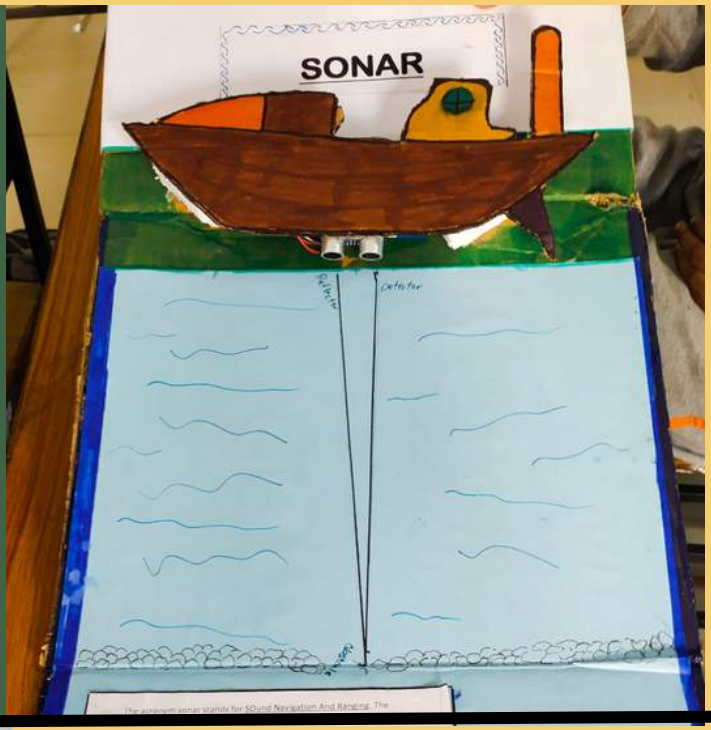


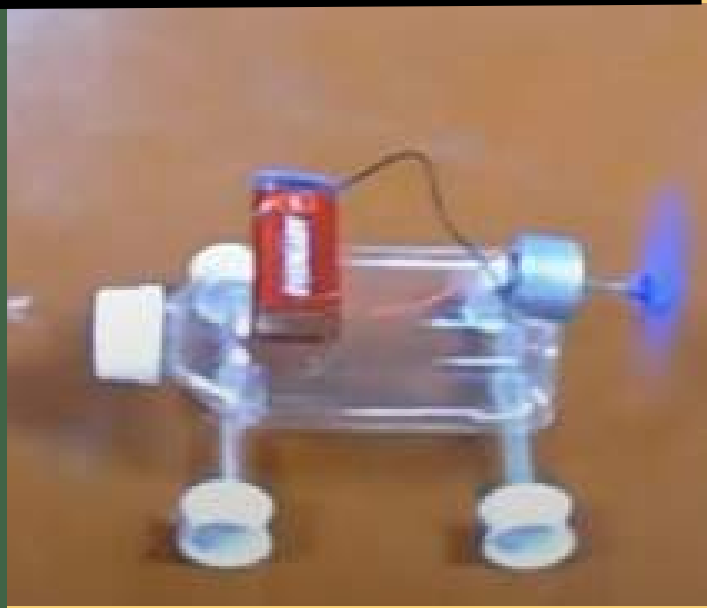
Exhibit 4: Astronomical Telescope

Astronomical telescope is used for viewing and to get the magnification of distant stars, planets or moon. It consists of two convex lenses- one as the objective (receives light from the object) and the other as the eye piece (through which we see).

ADITYA YADAV - M2D

Exhibit 5: Air propelled Reaction Car

This exhibit is based on Newton's third law of motion. In this exhibit, the force exerted by the air due to the rotation of the fan is in the backward direction which in turn generates an equal force in the forward direction which helps propel the toy car. The greater the speed of the fan the more is the more will be the force with which the car is propelled forward.



JIVOM MANCHANDA - M3A

TESLA COIL

GUIDED BY: MS. ARVINDER KAUR

PRINCIPLE:- ELECTROMAGNETIC INDUCTION

As per this principle, when a conductor is kept under altering magnetic field, there happens induction of current in the conductor. In the Tesla coil, this conductor is termed a secondary coil and the generation of altering magnetic field is done by a primary coil through which there is passing of oscillating circuit. If a fluorescent light bulb is held near the coil, the electricity will then go through the light bulb before it gets to the ground, which makes it light up.

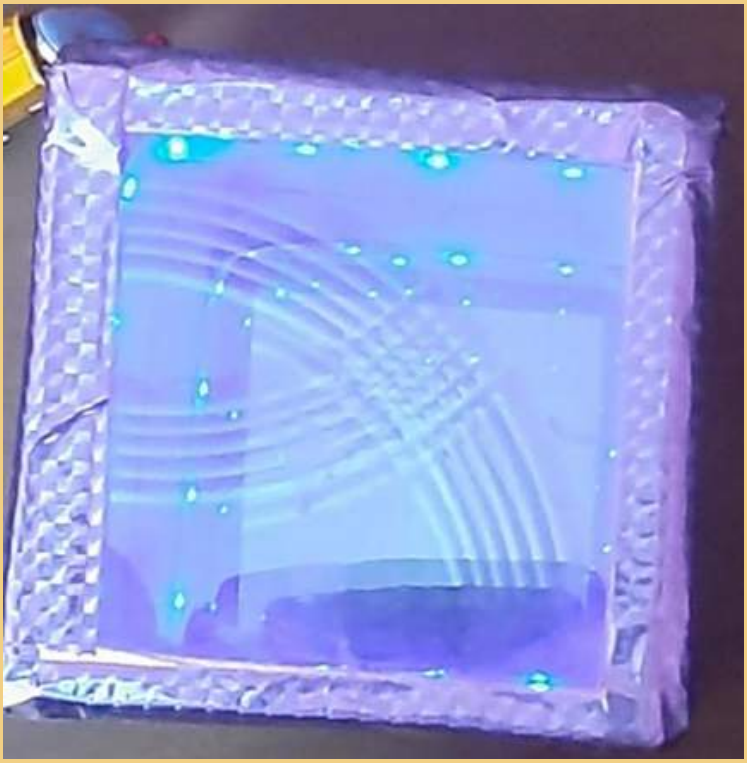
The Tesla coil requires a capacitor to store the charge that is fired in one huge spark.

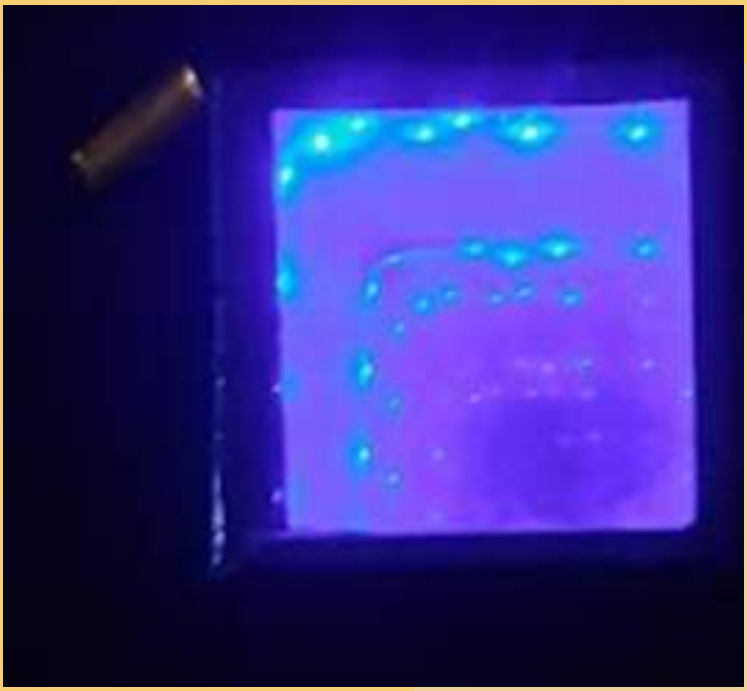
USAGE:- Concept of Tesla has been used to great extent in the entertainment industry for creating dazzling artificial lightening which is very beautiful.

JIVOM MANCHANDA - M3A

ILLUMINATED TUNNEL

GUIDED BY: MS. ARVINDER KAUR





JIVOM MANCHANDA - M3A

PRINCIPLE- 3D ILLUSION MIRROR EFFECT

The 3D illusion mirror effect is produced whenever there are two parallel reflective surfaces which can bounce a beam of light back and forth for an indefinite (theoretically infinite) number of times. The reflections appear to recede into an infinite distance because the light actually is traversing the distance it appears to be traveling.

In the model of the illuminated tunnel a set of LEDs are placed around the periphery of a fully reflective mirror, and a second, partially reflective "one-way mirror" is placed a short distance in front of it, in a parallel alignment. When an outside observer looks into the surface of the partially reflective mirror, the lights appear to recede into infinity, creating the appearance of a tunnel of great depth that is lined with light.

If the mirrors are not precisely parallel but instead are canted at a slight angle, the "visual tunnel" will be perceived to be curved off to one side, as it recedes into infinity.

EXHIBITS GUIDED BY: MR. ANIL BATRA

Exhibit 1: Wind Tunnel Using Smoke

This exhibit is a visualization of streamline flow. In streamline, fluids flow in parallel layers such that there is no intermixing of the layers. The flow is “visualized” by introducing smoke into the flow (using fan) in the area shown in the image.

EKLAVYA RAMAN , MEHUL CHHIBBER & RAGHAV SINGH - SS1A

Exhibit 2: Screen Distancing

This exhibit is based on Arduino. Whenever it confronts an obstacle in its range, it sends a signal to act.

RAGHAV SINGH GOSAIN - SS1A

Exhibit 3: Balancing Bottle

In this exhibit a bottle is balanced at a surprising angle. The bottle may be full or empty. In the figures here, it is empty. The simplest view of the system the force of gravity acting on the system plus the force by the table on which it sits must add to zero. This view assumes that the center of mass is directly above point at which the system touches the table.

EKLAVYA RAMAN , MEHUL CHHIBBER & RAGHAV SINGH - SS1A

EXHIBITS GUIDED BY: MR. ANIL BATRA

Exhibit 4: Thermoelectric Effect

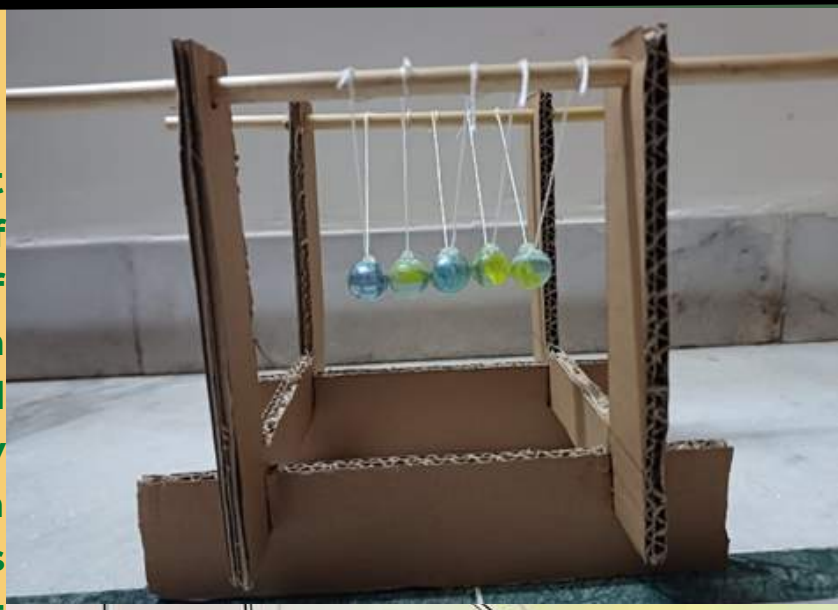
This exhibit is based on thermoelectric effect. It occurs when a temperature gradient is applied across two different surfaces, and it result in the direct conversion of temperature difference into voltage. The movement of electron from hotter to cooler side causes the generation of the electric current.

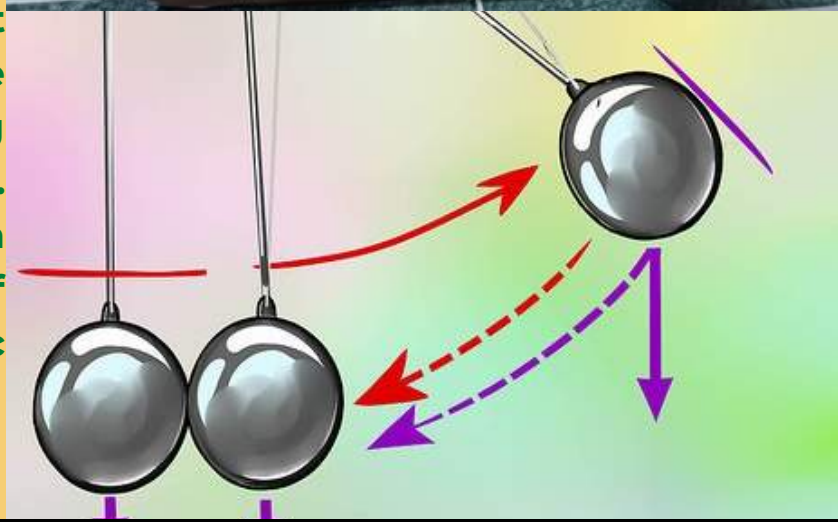
ARNAV RANKA & ABDI GULATI - SS1A

Exhibit 5: Newton's Cradle

The Newton's cradle is a device that demonstrates the conservation of momentum and the conservation of energy with swinging spheres. When one sphere at the end is lifted and released, it strikes the stationary spheres, transmitting a force through the stationary spheres that pushes the last sphere upward. The last sphere swings back and strikes the nearly stationary spheres, repeating the effect in the opposite direction. The device can be explained with some of the fundamental principles of physics as theorized by Sir Isaac Newton.

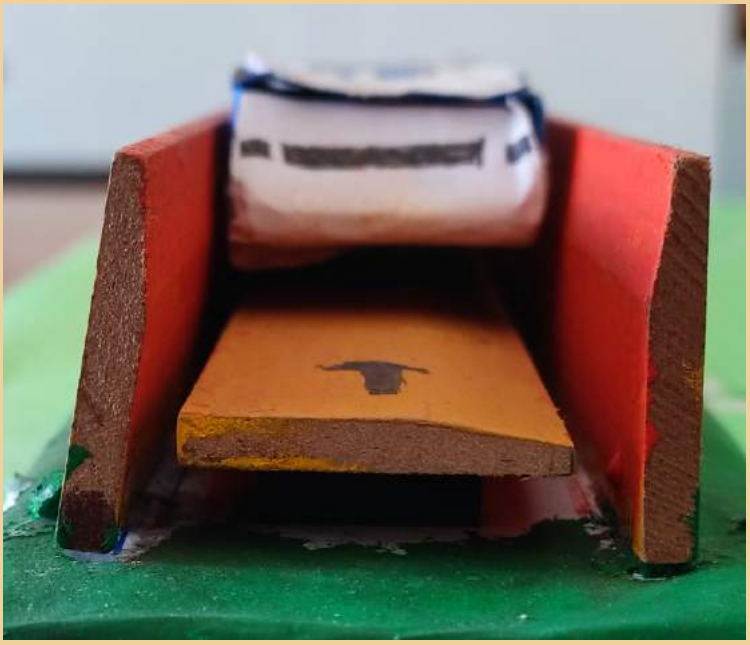
ANIKETH PATWAL - SS1A

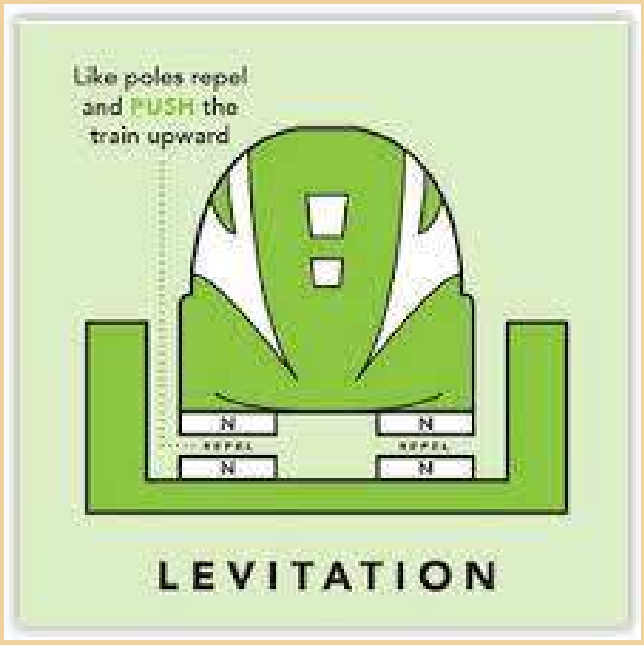




MAGLEV TRAIN

GUIDED BY: DR. MANPREET KAUR





What is Magnetic Levitation?

A magnet has two poles: north and south. The unlike poles of a magnet attract each other while like poles of a magnet repel each other. This principle of repulsion between the like poles of a magnet is used to levitate objects having magnets upon each other. The given apparatus shows an important application of magnetic levitation.

Maglev Train: The Levitation Locomotor

Maglev trains are based on the idea of magnetic levitation. Magnets with one pole facing upwards are placed on the track. Magnets are also placed in the train with the same pole facing downwards. The repulsion between the like poles of these magnets allows the train to levitate over the track.

Levitating the train over its track helps to eliminate ground friction that slows down the speed of the train.

SANKALP DUBEY- M2C

SHLOK DUBEY - M2D

CYMATICS: TONOSCOPE

GUIDED BY: DR. MANPREET KAUR

What is Cymatics?

Cymatics is the study of sound and vibration made visible typically on the surface of a plate, diaphragm or membrane.

Cymatic patterns: Tonoscope

When musical vibrations are channeled through a malleable membrane medium, such as a liquid, the vibrations cause the medium to arrange itself into visible geometries known as cymatic patterns. .

Treatment of diseases through cymatics:

When different parts of our body are vibrating at their normal health frequency, it is seen as a state of health. When a portion of the body begins to vibrate at a frequency that is not harmonious to a person, it is seen as a 'disease'. Based on the science of Cymatic, if the diseased organ or tissue such as a kidney or liver is exposed over aperiod of time to the correct frequency of a healthy kidney or liver, it will cause vibrational pattern of the diseased organ to correct itself and return to a state of health and harmony.

Discovery of Cymatics

Hans Jenny (1904-1972) was a physician and natural scientist who coined the term 'Cymatics' to describe the acoustic effects of sound wave phenomenon.

SANKALP DUBEY, M2C

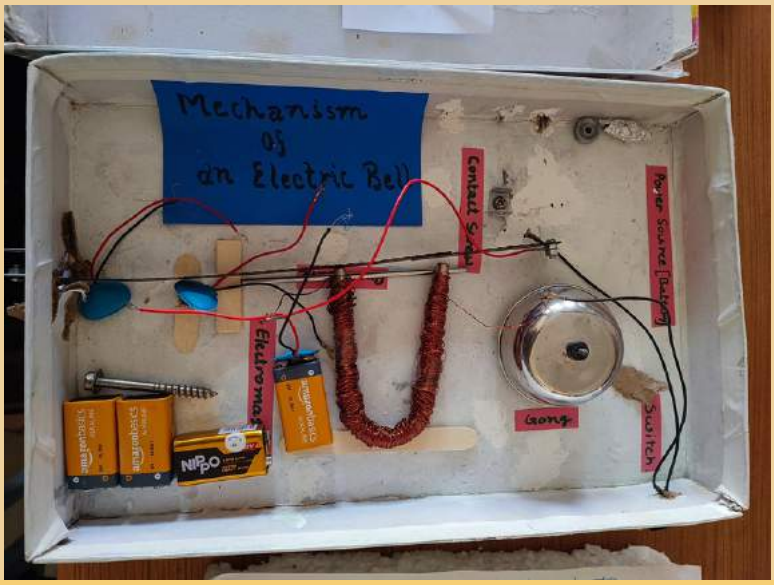
Acoustic-physics scientist John Stuart Reid has partnered with Dr. Sungchul Ji at Rutgers University, to apply cymatic imaging to identify cancer cells compared to healthy cells. The two hope to develop this technology to allow surgeons the ability to more precisely target cancerous cells when removing tumors.
Reference:
https://www.gaia.com/article/cymatic-imaging-could-help-surgeons-identify-cancer-cells

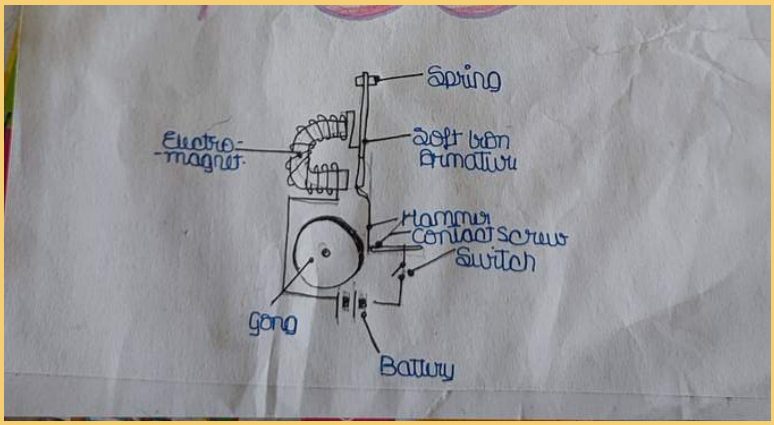
Healthy cell sound made visible

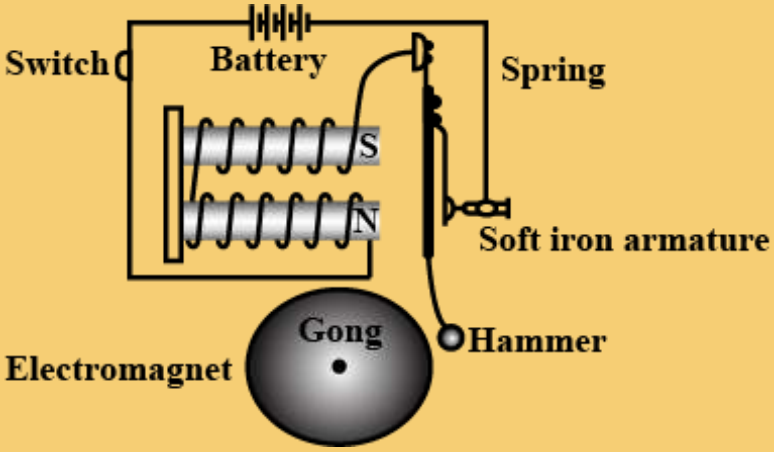
Cancer cell sound made visible

ELECTRIC BELL

GUIDED BY: DR. MANPREET KAUR







Process of the working of an electric bell:

- The switch is pressed and current flows through the circuit.
- The electromagnet is powered and generates a magnetic field that attracts the iron strip towards it.
- The striker strikes the gong (bell).
- When the striking arm strikes the gong, the contact is broken and the current stops flowing through the circuit.
- This causes the electromagnet to lose its magnetic field.
- The connected spring arm returns the striker to its original rest position.
- The contact is restored and current flows through the circuit (provided the main switch is still pressed).
- The process is repeated from the beginning.

SANKALP DUBEY-M2C
SHLOK DUBEY - M2D

DRIP IRRIGATION

GUIDED BY: DR. MANPREET KAUR

Drip Irrigation is modern method of irrigation which ensures a sustainable use of water.

It minimizes the contact of water with leaves, roots, stems, fruits etc, preventing it from diseases.

This method is achieved by making small continuous holes in a straight line on a watering pipe and connecting the pipe to the water pump or tap. This pipe is then put near the roots of plants and when the tap is opened the water drips through the holes in small drops from time to time on the roots of the plants.

This method is usually practiced in arid areas.

It is a method of irrigating plants in such a way that time, water and money are saved.

JIGISHA PRASAD - M1C

AR SANDBOX

BY: COMPUTER DEPARTMENT

PRINCIPLE:

Kinect depth sensor connected to the PC measures the distance to the sand and the projector castes the geographical topography accordingly.

COMPONENTS USED:

- **First Generation Kinect Sensor**
- **Short Throw Digital Projector**
- **Computer with Linux operating System with a high end GPU**
- **Sand Pit with approximately 100 kg of White Sand**
- **Mounting Mechanism of Kinect Sensor + Projector attached to the trolley or Sandbox**

AR Sandbox is a 3D, interactive, dynamic educational tool to help understand mapping, topography, watersheds, natural hazards, and more!

SMART STICK

BY: COMPUTER DEPARTMENT

PRINCIPLE:

Usage of Ultrasonic Sound waves (Sound waves above Frequency 20kHz) to detect nearby objects using the principle of reflection of sound.

COMPONENTS USED:

- MDF Design for Blind Stick (Enclosure)
- Arduino Nano Microcontroller
- Ultrasonic Sensor
- Jumper Wires
- Mobile Vibration Motor
- Wooden Stick
- Arduino Nano Cable

USAGE:

To enable visually impaired people who find difficulties in detecting obstacles and dangers in front of them during walking and to identify the world around.

SMART DUSTBIN

BY: COMPUTER DEPARTMENT

PRINCIPLE:

Usage of Ultrasonic Sound waves (Sound waves above Frequency 20kHz) to detect nearby objects using the principle of reflection of sound and coordination of the motors accordingly

COMPONENTS USED:

- MDF Design for the Smart Dustbin
- Servo Motor
- Ultrasonic Sensor
- Jumper Wires
- Arduino UNO Microcontroller
- Arduino Cable
- Battery
- Cardboard Lid
- Screws
- Screwdriver

USAGE:

To bring into action of the idea of an auto opening dustbin.

PIANO

BY: COMPUTER DEPARTMENT

PRINCIPLE:

Works on the principle of using a Micro:bit and using aluminium foil as a conductor of signals.

COMPONENTS USED:

- MDF Design for Piano
- Aluminum Foil
- Jumper Wires/Crocodile Clips
- BBC Micro:bit
- Micro:bit Cable
- AAA Cells (2)
- Cell Holder

USAGE:

To play notes and compose simple music.

CASTLE RUN

BY: COMPUTER DEPARTMENT

PRINCIPLE:

To conduct a race with different kinds of obstacles using Blutooth controlled and Joystick controlled cars

COMPONENTS USED:

Robot

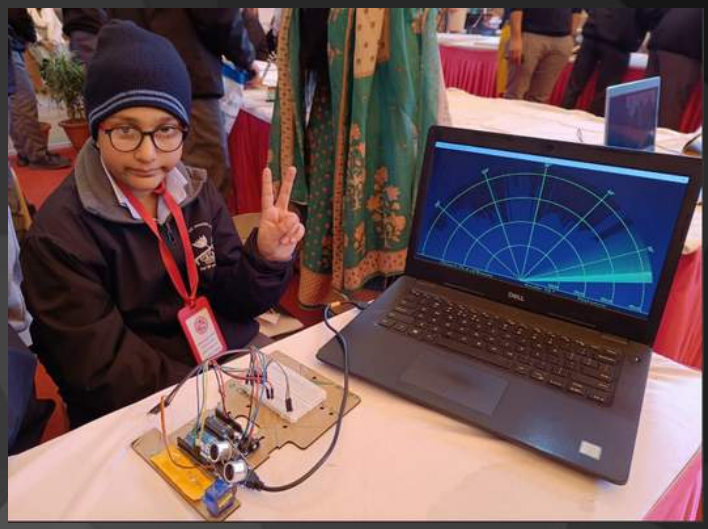
- Motors
- Wheels
- Motor Driver
- Chassis
- Motor Holders
- Arduino UNO
- Arduino Cable
- Jumper Wires
- Bluetooth Module
- Small Breadboard
- Screws
- Screwdriver

USAGE:

To have some fun and competition side by side

SONAR/RADAR

BY: COMPUTER DEPARTMENT



PRINCIPLE:

Usage of Ultrasonic Sound waves (Sound waves above Frequency 20kHz) to detect nearby objects using the principle of reflection of sound and coordination of the motors accordingly

COMPONENTS USED:

- Arduino UNO
- Breadboard
- Ultrasonic Sensor
- Servo Motor
- Jumper Wires

USAGE:

To detect nearby objects and draw a SONAR distance graph accordingly

PING PONG

BY: COMPUTER DEPARTMENT

PRINCIPLE:

It works on the principle of using RGB led strips and using buttons to control a fun ping-pong game

COMPONENTS USED:

- WS2812 LED Strips (3 metres)
- Buzzer
- Arduino UNO Microcontroller
- Jumper Wires
- Push Buttons
- Arduino Cable
- BC547 Transistor
- Mounting Platform for LED Strips

USAGE:

To use robotics in a fun way for entertainment purposes

EDGE AVOIDER ROBOT

BY: COMPUTER DEPARTMENT

PRINCIPLE:

Usage of infrared sensors. Whenever it comes near the edge the ir sensors detect that it is the dead end. Therefore it stops and backs up.

COMPONENTS USED:

- Arduino UNO
- Motor Driver
- IR sensors
- Switch
- Jumper Wires
- Castor wheel
- Motor
- Wheels
- Battery Holder
- 18650 cells

USAGE:

To use robots in a fun way or entertainment purposes or to learn more about AI.

SPOTIFY CONTROL USING HAND GESTURES ARTIFICIAL INTELLIGENCE

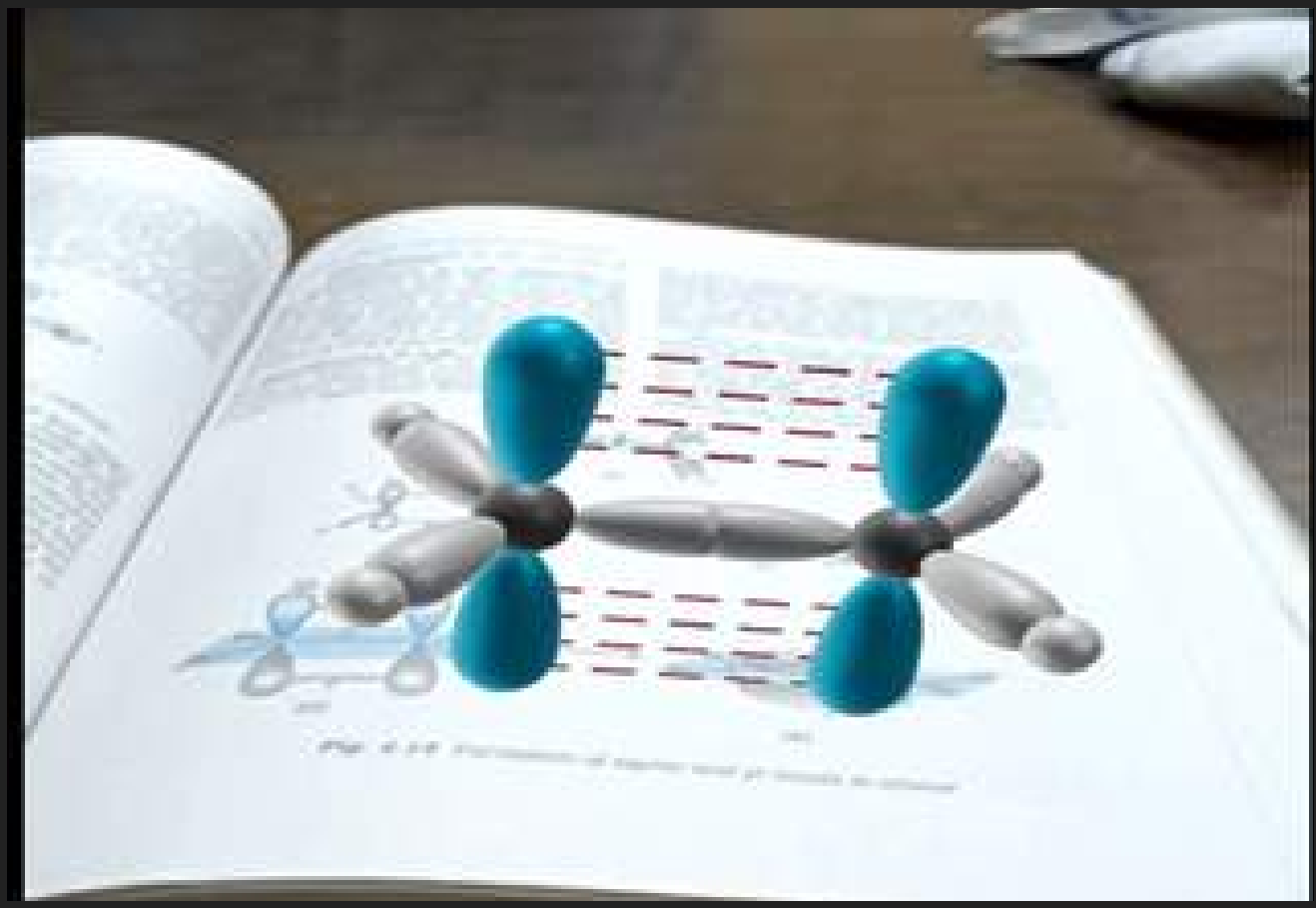
BY: COMPUTER DEPARTMENT

This is an AI project made to control Spotify app with the computer vision domain. Using this software, we can control like We can play, pause, switch to previous and next song using hand gestures. This technique helps the user to use Spotify without touching the device. This can also be beneficial for the persons having any skin disease whose touch is not captured.

Aditya Gaur - SS2C
Tanveer - SS2C

AUGMENTED REALITY BOOK

BY: COMPUTER DEPARTMENT



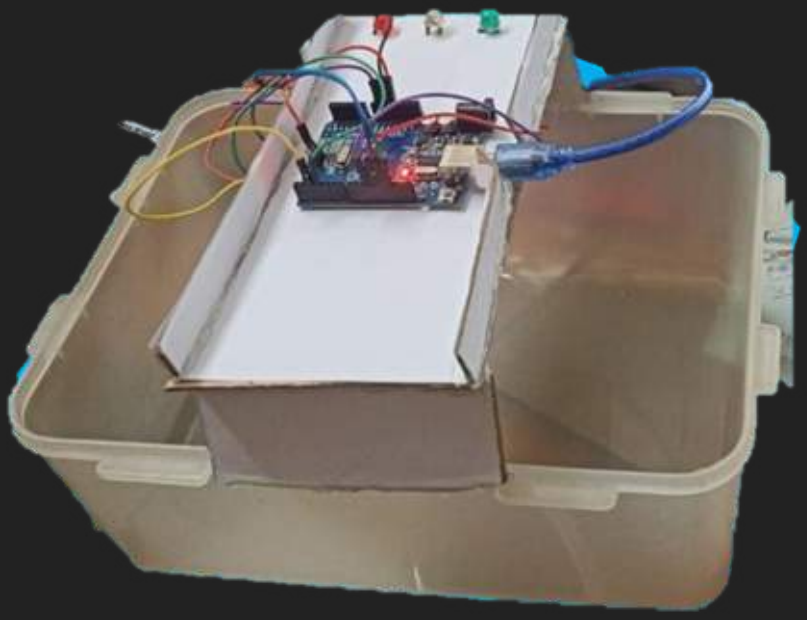
Students made Chemistry and Alphabetic AR books with the printed text that have triggers to show additional 2D or 3D layers of content via an AR app. These books allow readers to immerse themselves in highly captivating experiences, visualizing different concepts, adding fun elements to the text, and allowing interaction with virtual models.

Video link:-
https://drive.google.com/file/d/1xLOuQgSgQwszaK83NqG3zCpXe5CWpUKc/view?usp=share_link

Divyanshu Rana , Saiyyam Jain & Vivid Goel - SS1

FLOOD MONITORING SYSTEM

BY: COMPUTER DEPARTMENT

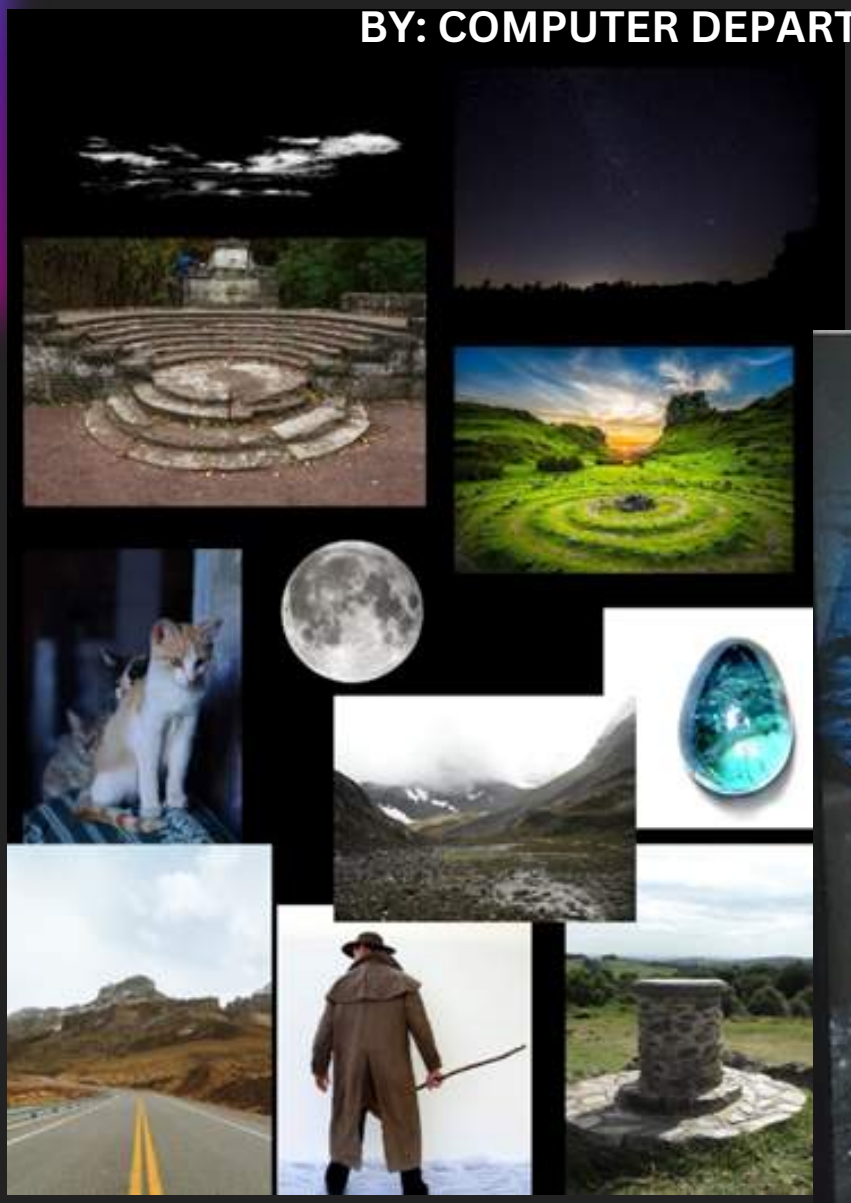


This project is about detecting the level of water in a river and alerting the residents of the nearby areas for the chances of flood. This is an Arduino project made with using distance sensor:hc-sr04 and 3 different coloured lights , which will glow according to the level of water in the river . The sensor is placed under a bridge. Green light will glow indicating that the level of water is in normal condition, white light will glow when the water level is above the usual level and red will glow when the water level is extremely close to the bank of the river. And this system can help the nearby areas for easy evacuation and planning before the flood actually comes in.

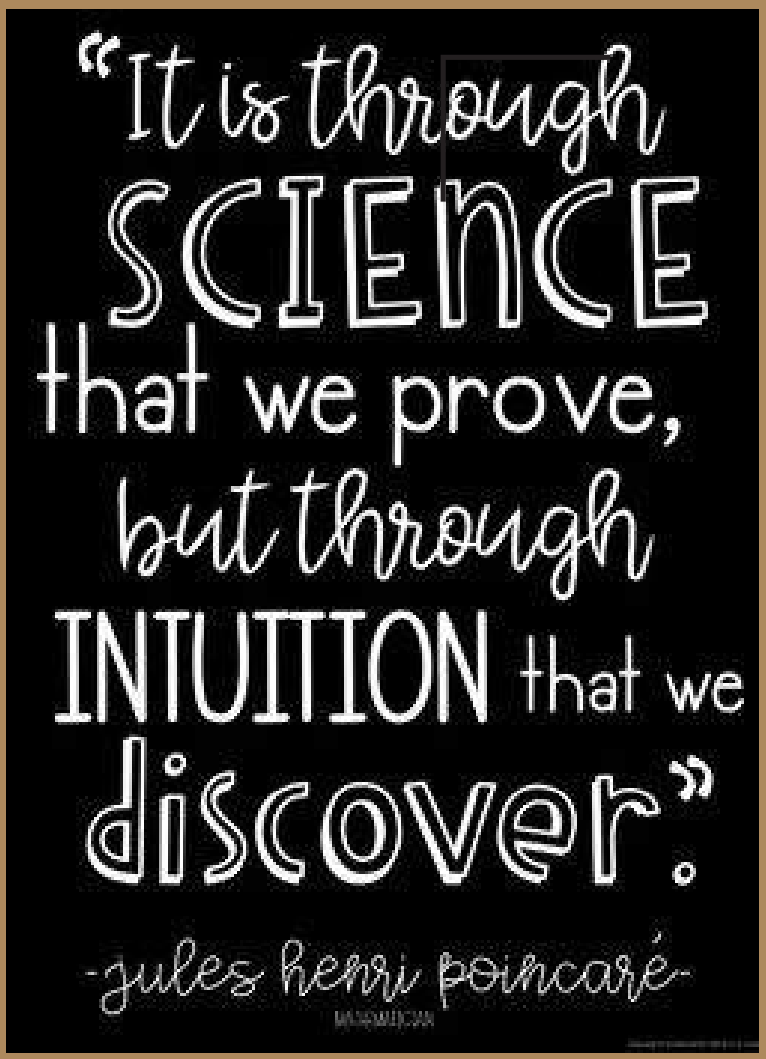
Sunesh Pattanayak - SS1

DIGITAL IMAGE MANIPULATION

BY: COMPUTER DEPARTMENT



Student beautifully compiled an image in Photoshop by using 10 raw pictures. A beautiful illustration with iconic colour compilation is done in this image. Various features of Photoshop like colour grading,filters,layer masking etc. used in the image.
Isshaan Marwah - SS1



LEARNING IS THE PROCESS WHEREBY KNOWLEDGE IS CREATED THROUGH THE TRANSFORMATION OF EXPERIENCE.

DAVID A. KOLB