

# INSEF Regional Fair – Pune

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Conducted By

## Exciting Science Group

Exciting Science Group, Pune

*An Initiative of NCL scientists and IISER-P faculty*

in association with



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IISER Pune

Dr Homi Bhabha Rd, Ward No. 8, NCL Colony, Pashan, Pune, Maharashtra 411008

(The abstract text provided is exactly as submitted by the participants)

 Innovation Partner of INSEF

**Project Code:Bio-01 (Team)    Online ID:2265**

**Title: Silage & Cattle Fodder banks – an Innovative approach to address fodder shortage during drought seasons**

**Name: Velide Gayatri& Vennela Rathod Std: 9**

**Guide: B.Satheesh Kumar**

**School: Delhi Public School; Warangal**

**ABSTRACT:**

Cattle are the backbone of agro economy of the nation. The major constraints and challenges for the cattle and farmers is poor availability of quality feed particularly in the long dry season which has profound impact on the development of this sector. Lack of fodder forces farmers to sell off the cattle to the slaughterhouses, which drastically impacts the milk production capability of the rural economy. This has been a big problem which has not been addressed effectively in India. We believe that constant supply of quality fodder throughout the year will ensure healthy population of cattle and increase in milk production, thus aiding growth in rural economy and empowerment of small farmers. The answer to this lies in identifying crops which can be scientifically processed to increase the shelf life so that it can be used as fodder throughout the year. Maize is one such crop which is grown in abundance. Maize plants are left to dry and go waste after the corn cobs are harvested. The leftover maize crop which has high nutrition content, if processed, fermented by adding necessary enzymes, will form into a product called silage which can be stored for almost 6 months. A two season crop harvest will ensure round the year fodder supply for village or group of villages. Preparation of Silage involves finely chopping maize plants, adding necessary inoculants and allowing it to ferment till about 4 weeks, after which it is ready as fodder for the cattle. Silage has been proven to contain more nutritional value than normal fodder which impacts in increasing the milk production. A village can be setup as a unit and sustained fodder supply can be ensured by setting up fodder banks which store Silage. If rural women are taught the process and fodder banks are established, then this will help in rural women empowerment creating employment.

**Project Code:Bio-02 (Jr)    Online ID:2449**

**Title: Can unheard sounds make seeds germinate faster? Testing the effects of infrasonic and audible low frequency vibrations on the germination of Kala Chana (Cicer Arietinum)**

**Name: Sonit Sisolekar& x Std: 6**

**Guide: Dr Santosh Sisolekar**

**School: Blue ridge Public School; Hinjewadi; Pune**

**ABSTRACT:**

The effects of music on the growth of plants have been studied, mostly by exposing plants to varied genres of music. Little is known about the effects of infrasonic sounds, and specifically pure infrasonic frequencies/vibrations on the germination of seeds. I think infrasonic and low frequency vibrations may have greater effect on the seeds than the ariel sounds because of the firmness of the ground and the intimate contact of the seeds/roots it. In the earth, infrasounds

travel long distances than higher frequencies. There is a need to study the effects of infrasonic vibrations at specific frequencies rather than the mixed frequencies of music. The study involves two groups of Cicer Arietinum seeds exposed to 10Hz and 100Hz of sound and the control groups not exposed. The sound is produced by the 'Frequency Generator' android app, and amplified by an amplifier. A tray containing the germinating seeds is kept in contact to the vibrating surface of an open speaker/transducer to transmit the vibrations directly. The seeds are exposed to infrasonic vibrations - 1.5 hours twice daily i.e. 3 hours daily. The weight of the seeds at the beginning of germination and after three days of exposure is measured by a weighing scale (to the accuracy of 0.01 grams.) and results calculated for comparison. Results showed that 100Hz frequency has inhibitory effect on the germination. More studies at different frequencies for different seeds can be done further. This may open up new knowledge about effect of soil-noise pollution and its effects.

**Project Code:Bio-03    Online ID:2495**

**Title: Microchip for the detection of pathogenic DNA using LAMP assay:  
Development of a Point-of-Care; sample to result; temperature independent;  
quantitative nucleic acid amplification test using Loop Mediated Isothermal  
Amplification**

**Name: Dev Narang & x Std: 12**

**Guide: Dr Kiran Pote**

**School: Bhavans Lloyds Vidya Niketan; Bhugaon Road; Wardha**

**ABSTRACT:**

This study was done to develop a Point-of-Care, sample to result, temperature independent, low cost, quantitative nucleic acid amplification test using LAMP with accuracy similar to LAMP performed in Laboratory setting. "LAMP" which stands for Loop-mediated Isothermal Amplification is a simple, rapid, sensitive, specific and cost-effective nucleic acid amplification method developed by Eiken Chemical Co. Ltd, Japan. This study was divided into the fabrication of a quantitative DNA detection system, stabilization of LAMP reagents and automation of DNA extraction in a microfluidic system. LAMP was established for Escherichia coli ATCC 25922 DNA which was extracted from the culture using boil and spin method. Different concentrations of DNA were prepared to be used in further reactions. A change in pH for LAMP assay was used as an indicator for quantitative analysis, values of pH before and after reactions were measured and it was found out that the logarithm of DNA present in the LAMP assay and the change in pH of LAMP assay had a linear relation. I was successful in fabrication of a miniaturised and low-cost chemiresist made of Ox-SWNT/PAA. This sensor was tested for buffered solutions of different pH values and it showed a change in resistance with different pH solutions. I was also able to stabilize the LAMP reagents using a disaccharide trehalose. These stabilized reagents showed activity for at least 1 week. An automated DNA isolation system integrated with microfluidic system was also planned for automated DNA extraction from blood.

**Project Code:Bio-04 (Team)    Online ID:2539**

**Title: weed that heal**

**Name: Edwin Govias& CHELUVARAJU M A Std: 11**

**Guide: SHALINI G R**

**School: JAWAHAR NAVODAYA VIDYALAYA; SHIVARAGUDDA; MANDYA**

**ABSTRACT:**

Medicinal plants have important contributions in the health care system of local communities. According to the world health organization, more than 3.5 billion people in the developing world rely on medicinal plants as components of their health care because, better compatibility with the human body and fewer side effects. Microorganisms are increasingly becoming resistant to conventional antibiotics. Development of antimicrobial agents has become an emergency need. Medicinal plants are considered to be new resources for producing agents that could act as alternatives to antibiotics. The aim of this study is to evaluate the antimicrobial activity of the common weed *Euphorbia hirta*. It has traditionally been used to treat respiratory system disorders. To test the antimicrobial activity, leaves were macerated separately in both water and ethanol. The extract was placed in an evaporating dish to be subjected to water bath. The extract was dark green in colour in its semisolid form. The microbes from the dirt and dust were collected and cultured in the lab using agar as medium. The leaf extracts were tested separately on the culture to determine the inhibiting capacity of leaf extract on microbial growth found on the agar plate. The phytochemical analysis was also carried out in the school lab. *E.hirta* has good antimicrobial activity with inhibition zone of 7mm. The ethanolic extract was more potential than aqueous extract. The leaf extract showed the presence of tannins and flavonoids. Thus *E..hirta* can be exploited for future plant –based antimicrobial drugs. It has various medicinal values and has been used since earliest time as a medicine for curing various diseases.

**Project Code:Bio-05 (Team) (Jr)    Online ID:2540**

**Title: GREEN PRESERVATIVE**

**Name: SHREYA S K& RACHANA RAJU M Std: 8**

**Guide: SHALINI G R**

**School: JAWAHAR NAVODAYA VIDYALAYA; SHIVARAGUDDA; MANDYA**

**ABSTRACT:**

Food preservation is one of the oldest technologies used by humans to prevent its spoilage. The increasing demand for ready to eat food products led to challenges for food distributors regarding the safety and quality of their foods. Artificial preservatives meet some of these challenges by preserving freshness for longer periods of time, but these preservatives can cause many health issues like asthma, allergic reactions and even cancer. Hence there is a great demand for natural food preservatives. In this project we investigated the efficacy of aloe vera gel as food preservative. We tested the efficacy of aloe vera gel as a food preservative by taking peas, banana and grapes. Many trial and error experiments were conducted. The gel was applied on the banana and grapes. The peas were soaked in the gel for 48 hours to observe the

turbidity. From the experiments we found that aloe vera gel has delayed the spoilage. We also conducted the experiment by pairing the another approach like refrigerating the fruits which are washed in aloe vera gel. From the experiments it was found that Aloe vera gel acts as a natural barrier to moisture and oxygen which are the main agents of spoilage of fruits and vegetables. It can increase the shelf life of the fruits and vegetables by minimizing the rate of respiration and maintain quality like colour, texture etc. In future Aloe vera gel can be thickened by adding other natural jelling agent and applied to coat the fresh fruits and vegetables. Thus, present investigation proved that Aloe vera can be one of the best edible and biologically safe preservative for different types of foods especially fruits and vegetables.

**Project Code:Bio-06 (Team)    Online ID:2543**

**Title: Effect of music on plants**

**Name: SOUMITRA MAHASHABDE & OMKAR CHAVAN Std: 9**

**Guide: MADHURA LUNKAD**

**School: Pune**

**ABSTRACT:**

We were interested in studying how music affected the growth of plants. We also wanted to know whether different types of music have different effect on plant growth. An experiment about the effect of music on the growth of plants was conducted. We exposed two plants to different varieties of music. i.e. Indian classical and Western rock music respectively for a week. We also kept a third plant in the same setting with no exposure to music. Equal volume and equal time duration of music was maintained. All other variables were controlled. The height of each plant was measured and recorded everyday. At the end of one week it was found that the growth of the plant exposed to classical music was maximum. The plant which had no music exposure showed medium growth, while the plant exposed to rock music showed least growth.

**Project Code:Chem-01    Online ID:2497**

**Title: Element flame colours: Relationship with their arrangement / position in periodic table?**

**Name: Ananya Amit Gandhi & x Std: 10**

**Guide: Amit Gandhi**

**School: Abhinava Vidyalaya Eng. Med. High School; Pune**

**ABSTRACT:**

My project basically revolves around the different and interesting properties of the elements found till now. We all know that flames of salts / metals of different elements show characteristic flame colours. So, I am actually trying to figure out if there is any relation between the arrangement of the elements in the periodic table and the flame colours. Since the flame colour depend on upon the amount of the energy released in the form of light when the electron of the atoms which had before jumped into the higher orbitals jump back to their normal orbitals. Since the energy releases is different for different elements, the flame colour vary. But when I tried to obtain by information the different colours of the flames of different elements, their seems to be a relationship between the flame colours and position of the

elements in the periodic table. There was no such information available about such a relationship on various resources. I am confident that there exists such relationship which needed more research, of course, barring few exceptions and the logic behind this relationship make sense too.

**Project Code:Chem-02    Online ID:2506**

**Title: DARBHA MEMBRANE FILTER PLANT**

**Name: AKHANDJYOTI GUPTA & x Std: 12th std.**

**Guide: shashank mund**

**School: Sant Shri asharamji Gurukuldabad ;Gujarat 380005**

**ABSTRACT:**

I had made four membranes water filter plant by using DARBHA GRASS to develop water filter plant. Through my experiment I proved scientifically without adding any chemical in filtering process that darbha grass membrane kills all harmful contents of water and filters the water. I take GUJARAT LABORATORY help to prove it scientifically by testing all of my experiments and I got successful result which I had attached in PDF file. It is beneficial to all people and most for people who live in hilly area, valley area, in forest as ADIVASI peoples and those people who are poor, cannot purchase filter plant they can also use it because it is developed in low cost. All details of experiment model etc. are attached in PDF file.

**Project Code:CompSc-01    Online ID:2321**

**Title: RoadVisor: A Smartphone App to Sense Bumpy Conditions on Indian Roads**

**Name: Shreya Sandurkar & x Std: 9**

**Guide: Sunand Sandurkar**

**School: Amanora Pearson School**

**ABSTRACT:**

Navigation apps like Google Maps do not show actual road conditions like potholes and speed breakers. This made me wonder if a smartphone can be used to record real road conditions. I tested various sensors like Orientation Sensor, Acceleration Sensor, Location Sensor, Pedometer Sensor, that are available in common smartphones. I found that Orientation Sensor can be used to infer road conditions with fair accuracy. My app records the road conditions and transfers it to an online database. In addition, I provided a viewing tool for everyone to plan their travel by making use of readings recorded by other people.

**Project Code:CompSc-02    Online ID:2431**

**Title: Advance Messenger service**  
**Name: Samarth Rahul Tarkunde& x Std: 9**  
**Guide: RAHUL TARKUNDE**  
**School: DES NEW ENGLISH SCHOOL**

**ABSTRACT:**

My project is made of advanced next level of Messenger service like Whats App. The messenger service at the receivers end instead of having just or only screen uses a bionic like hand that displays different emojis like Good, Thumbs up. Most people are used to messenger service Whats App and Hike and regular SMSs for chatting. However staring at small smarthone screen is very tiresome. This is even bad when the person is away say on Antarctica or say travel to Mars where long distances and staying away from near and dear ones for long time is involved. My messenger has the ability to change the emoji and stay in that position. It also is close to physical touch instead of seeing blatant plain emojis on screen. Further to that some animated emojis can be introduced like that of Bahubali start command and hand-holding.

**Project Code:Energy-01    Online ID:2063**

**Title: footstep electricity generator**  
**Name: Sandeep Ramesh Ranmode& x Std: 10**  
**Guide: x**  
**School: Vidya Pratishthan's New English Medium school**

**ABSTRACT:**

In this project I had generated electricity using the kinetic energy of our foot using the protocol made up of several piezo plates and a circuit to control the electricity power . If we use this project in large quantity ,we can make and use our own energy anywhere. Using this project in crowded place for eg. railway stations, footpaths, rail roads or roads ,it can produce so much of energy than can light up our whole city easily.

**Project Code:Engg-01    Online ID:2293**

**Title: Sole and Tile generator: A smart way of generating electricity by walking**  
**Name: Chakreesh Minnal& x Std: 10**  
**Guide: M.G.Muthuvelu**  
**School: Delhi Public School Bharuch**

**ABSTRACT:**

The project is all about producing electricity in a simple and eco friendly way. This project is a device which uses solid materials to generate electricity which is known as Piezoelectricity. The device will be fitted in the shoes and even in:- jogging tracks, malls, footpaths etc.. and when we step on it, energy will be produced which will be stored in a power bank. The stored electricity then can be used to charge the mobile phones, and other devices which use less power. It is a simple yet an effective idea which can help in reducing the dependence on alternative current. The main concept behind the project was to find an alternate source of

energy which can be used to charge our gadgets which are used on everyday basis.

Piezoelectricity, also called the piezoelectric effect, is the ability of certain materials to generate an alternating current voltage when actuated. Certain ceramics, Rochelle salts, and various other solids exhibit this effect. For example,  $(\text{Pb}[\text{Zr}_x\text{Ti}_{1-x}]\text{O}_3$  where,  $0 \leq x \leq 1$ ), also called PZT, will generate measurable electricity when their structure is deformed by about 0.1% of the original dimension. A piezoelectric disk generates a voltage when deformed (change in shape is greatly exaggerated). In this project, the generated electricity on a specific time will be recorded and determined if it would be enough to completely charge a Li-ion battery or a high capacity capacitor.

**Project Code:Engg-02 (Team)      Online ID:2357**

**Title: Ecofriendly Multipurpose Equipment**

**Name: Mast. Gautam Umesh Krishnan & Mast. Badal Jitendra Rathi Std: 9**

**Guide: Mr. Samir Khule**

**School: Bhavan's B P Vidya Mandir; Ashti. District:Nagpur**

**ABSTRACT:**

Ecofriendly Multipurpose Equipment Abstract: We saw in Vidarbha region, where temperature reaches up to 47 deg. cel. in summer, people throw vegetables and fruits or sell at very low cost because of no cold storages and air coolers in villages. Hence due to hot temperature it became stale. Again they suffered from many diseases in summer due to high temperature and villagers are mostly not having a good economic condition and electricity is also not evenly distributed in villages, this gives us an idea to make an Ecofriendly Multipurpose Equipment, which works on solar energy and which is used to give cool air, cold water and store fruits and vegetables at very low cost for rural people. Purpose : To use an earthen pot to get cool air, cool water. b) To use an earthen pot as a fridge to store vegetables and fruits. The scientific principle involved: Our model is mainly based on a) Evaporation causes cooling. b) Conversion of solar energy into electrical energy and is used to charge battery. c) Further energy stored in battery is used to run DC motor to run fan and to run DC pump to regulate water. Construction and working: Construction: We took two earthen pots. One will be used for cool water, cool air and second pot will be used for keeping vegetables, fruits and cool air also. For both the pots, a dc motor is attached with the pot by making a hole on it. This will be used to fix the fan. For power a twelve volt battery will be used which is charged by a 15 W solar panel. By using a net, khus and stick, we made a cover on it. Side cover on pots is made by using jute. We used a dc pump which circulates the water in the pots. A digital temperature sensor is used to note down temperature in the room and inside temp of pot. We used one pot for cooling air and cooled drinking water and other pot as fridge to keep vegetables and fruits fresh. We have used IC 7805 for charging mobile phones. Again We have connected Radio and tv, so that people from rural areas ( where frequent power cut is there) can take benefit of it. Working: As the power is switched ON, DC pump circulates the water inside the pots. Simultaneously Fan is switched ON, it sucks the air from pots to throw it in the surrounding. In the same time air is sucked from atmosphere into the pots so that air will be continuously circulating inside the pots. Due to DC pump water is continuously spread inside the pots and hence we get a cool water to drink and a

cool air by the principle cooling by evaporation. We have recorded temperature inside the pot in day and night. It is found that necessary temperature is maintained inside the earthen pot to keep vegetables and fruits fresh for 3 to 4 days. In 10 ft by 10 ft room temperature was maintained 25 deg. cel. at night and 29 deg. cel. at day respectively. Temperature of drinking water was also recorded. Temperature of water was 21 deg cel at night and 24 deg. cel. at day respectively. BIOLOGICAL FACTS: Our System prevents many food-borne diseases because of cooling below 30 deg. celsius. Mishandling of raw and cooked foods allows bacteria to grow. The temperature range in which most bacteria grow around 30 deg cel. By reducing the temp. below 30deg. Celsius, we avoid or prevent many food related pathogenic bacteria and thus prevent diseases like listeriosis, constipation, food poisoning and other food borne diseases. Principle of working of solar panel: We have used a solar panel for obtaining energy. Solar panel works on the principle of photovoltaic effect. The photovoltaic effect is the creation of voltage or electric current in a material upon exposure to light and is a physical and chemical property/phenomenon. The photovoltaic effect is closely related to the photoelectric effect. In either case, light is absorbed, causing excitation of an electron or other charge carrier to a higher-energy state.

**Project Code:Engg-03 (Team)    Online ID:2487**

**Title: Multipurpose Agriculture Machine**

**Name: Mast. Ritik Rupchand Ramod & Mast. Yash Vijay Yenurkar Std: XI**

**Guide: Mr. Samir Khule**

**School: Bhavan's B P Vidya Mandir; Ashti. District:Nagpur**

**ABSTRACT:**

India is an agricultural country. Around 75% of the population is directly dependent on farming and farm related activities. But due to many problems farmers cannot produce greater yield. Problems like frequent power cuts (approximate 10 hours), uncertain rainfall, and unavailability of labor leads to bad harvest. Bad harvest means less profit. How should the farmer pay his debt? He is now thrown into a vicious cycle. Eventually he commits suicide. we are from suicide prone region-vidarbha. Government is initializing many agro-projects. But those are not uplifting them. So farmers are dying continuously. This enables us to develop something that helps the poor farmers with the help of science. Hence we invent Multipurpose Agriculture Machine. Our sole intention behind this is helping the poor farmers. We have showed a schematic diagram for the same. We have developed a small model by using small bicycle. In place of well we are using a small bucket in that a small pressure pump is fixed to draw the water from bucket by just peddling the bicycle. This equipment has three main components namely-1) wheel 2) Axle mechanism 3) pulley. The rear wheel is connected to the pulley by a rope. This pulley is connected with crop cutter and pressure water pump. A dynamo is placed near the wheel. As the wheel rotates, it makes the pulley to rotate which in turn creates a pressure in the pump to draws the water from the well. This water will be stored in the tank and used for drip irrigation through pipes. The pulley is connected to the cutter with the help of another rope. Here also, as the wheel rotates, the pulley rotates which in turn makes the cutter to turn which can be utilized to cut crops and fodder. The dynamo is attached to the rear

wheel. As the rear wheel rotates, the dynamo turns and produces electricity by the phenomenon of electromagnetic induction. The electricity can be used at night and can also be used for charging batteries (storage of electricity) and other purposes. Again we can use this as peddle power washing machine. By using this machine i.e. Using friction between wheel-rope and wheel-pulley We can do following work at a time or separately as per the requirement.1) Crop cutting, 2) Pulling the water from well by using pressure water pump for irrigation, 3) Generation of electrical energy by principle of Electromagnetic Induction.4) To wash cloth.( we can use it as peddle power washing machine. Energy required by the small pump used in model is given in separate chart. It was found that to lift 16 ml water for 1 ft, we required 0.5 joule energy. To lift 3.3 liter water for 15 ft. we required 144 joule energy, which can be easily done a common man by just doing 1 complete rotation of peddle. Still we are working on observations of the ratio of no. of rotation of wheels. We will complete it within a week.

**Project Code:Engg-04    Online ID:2553**

**Title: A Practical solution to reduce turbocharger lag**

**Name: Anshul Vardhan& x Std: 11**

**Guide: Tushar Batham**

**School: Delhi Public School; Mohammadwadi; Pune**

**ABSTRACT:**

The phenomenon of turbocharger lag, due to which turbocharged automobile engines accelerate slowly at low velocities, leads to decreased efficiency and increased emission of pollutants like nitric oxide and soot in the early stages of engine operation. I have designed a low-cost solution to this problem. In my model, below a certain speed, the engine behaves like a naturally aspirated (NA) engine--the air does not pass through the turbocharger compressor before entering the intake manifold, instead passing through a bypass pipe. The air thus does not face the obstruction which leads to slow acceleration. Once the engine and the turbine are moving at high speed, the engine starts to pass the incoming air through the compressor. I have designed a bypass valve to execute this transition, described in Figure 2 in the attached file. My solution is based on the idea that although turbocharged engines are more efficient at later times, NA engines perform better in the early stages. To support this claim, I calculated the transient mass flow rate as a function of time, using data from the paper <https://doi.org/10.4271/840134> and my own approximations. I found that this quantity is greater for NA engines than for the commonly used inline 4 turbocharged engines for a significant initial duration. This shows that my model is worth studying further. Next, I will run numerical simulations with a computational fluid dynamics (CFD) software, to understand the transient performance more accurately. I will try to estimate the average improvement in efficiency and reduction of emissions due to my model, using analysis similar to the references <https://doi.org/10.1016/j.enconman.2004.02.006> and <https://doi.org/10.1016/j.enconman.2009.05.022>.

**Project Code:Env-01 (Team)    Online ID:2400**

**Title: Best Out of Household Waste**

**Name: Mast. Arjun Jitendra Gautam& Mast. Ninad Arun Wadaskar Std: IX**

**Guide: Mr. Samir Khule**

**School: Bhavan's B P Vidya Mandir; Ashti. District:Nagpur**

**ABSTRACT:**

Abstract: As we know that in today's world, people are careless about management of waste and disturb the environment. Hence Our project deals with household waste management i.e. tea powder waste and human urine is used to prepare organic compost and generate pollution free electricity and to keeps the environment clean. We have used these wastes to generate electricity. We had taken tea powder waste plus water and human urine in 10 different containers to form two different set up. In each container we kept zinc and copper plates. We have connected in series to form two different batteries. We have noted down the potential difference and current for two different batteries with respect to time (80 hr). The maximum P.D was found to be 9.91 V for tea waste battery and 7.52 V for human urine. and hence we have calculated power. We found that power decreases more with load (L.ED.) as compare to without load as shown in the given graph. But its enough to glow the power L.ED. However this production is less but if we think about everyday lives we go for large quantity of tea waste powder and human urine to get more power. Our source of electricity is human urine and tea powder waste, which act as electrolytic solution. When zinc and copper plates come in contact with electrolytic solution, electrons starts to move to generate electricity. Human urine contains an assortment of inorganic salts and organic compounds, including 6.87 g/L carbon, 8.12 g/L nitrogen, 8.25 g/L oxygen, and 1.51 g/L hydrogen and hence has good conductivity to flow electrons from cathode to anode. Tea powder waste contains tannin and tannin solution is acid and hence tea powder waste solution has good conductivity to flow electrons from cathode to anode to generate electricity. After 80 hr we don't throw tea powder waste but 800 gm is used to prepare organic compost by using anaerobic composting method. We have used some amount of decomposed cow dung( 150 gm) as cultured for boosting decomposition process. Some decomposed (100gm) cow dung is added to tea powder waste because compost microorganisms need both carbon and nitrogen to survive. Then cover the mixture with thin layer of decomposed cow dung. Every day we have to turn the material with the help of wooden stick for proper aeration required to make the compost. We kept it for 15 days and finally we have prepared compost from tea waste powder and sample has been sent in laboratory to test its physical and chemical properties. The result is shown in the following table. It was found that all content in the compost is in very good proportion as the ideal compost. This Compost is a organic matter that has been decomposed and is recycled as a fertilizer and soil amendment. Compost is a key ingredient in organic farming. The compost generate is rich for ornamental plants and vegetables.

**Project Code:Env-02 (Jr)    Online ID:2545**

**Title: Green pen saves plastic pen**

**Name: Janhavi Sanjay Adisare& x Std: 7**

**Guide: Mrs.Kishori Dareade**

**School: Abhinava Vidyalaya English Medium Primary School**

**ABSTRACT:**

Due to lack of bio-degradability, discarded plastics are a big cause of pollution. Nowadays ballpoint and gel pens have become an inseparable part of our life. I observed my classmates discarding their plastic pens instead of changing the refill, thus causing harm to the environment. My project was to find natural substitutes to replace plastic in pens –to reduce and control environmental pollution. I studied the plastic waste disposal, especially of plastic pens. Then based on the results, carried out simple home based experiments to find natural substitutes to plastic in pens. 1. First I did an experiment in which I used paper mache, which hardened enough to form the body of the pen [paper mache is made out of biodegradable materials]. 2. Then the second experiment was to use CASTOR STEMS as the body of the pen. This was a success. The innovative idea in my project was that I inserted a seed of a native plant at the bottom of the pen so that when we throw the pen in the soil, the body will degrade and the seed will germinate, thus helping in increasing green cover and reduce carbon footprints. Native seeds are familiar to our environment and support the ecosystem around them. Then I gifted these pens to my classmates which helped create awareness about the use of plastic pens and the harm they cause. These pens are economic and efficient. The seed in them makes them attractive and innovative.

**Project Code:Env-03 (Jr)    Online ID:2549**

**Title: Water conserving pot**

**Name: Ishita Pushkar Darade& x Std: 7**

**Guide: Kishori Darade**

**School: Sri Sri Ravishankar Vidya Mandir; Bhugaon; Pune**

**ABSTRACT:**

Aim: To identify an innovative way to save water. Name of the project: Siphoning and watering mechanism  
Technical details: 1) Developed a Siphoning and Watering mechanism on the principles of Capillary action. 2) This mechanism will be installed at the base of the pot below the mud section. 3) Materials include a) cotton wicks, pot, dish and PVC pipe. b) cotton wicks, 2 waste paint buckets, and PVC pipe. 4) The principle of Capillary action is applied to siphon optimum amount of water from the water source and water the plant at a root level. 5) Construction: a) In the pot few inches above the base of the pot, a dish is installed, having water entry hole to fit the PVC pipe, and few other small holes to fit cotton wicks each of 15 to 25 cm long. The soil and the plant are placed above the dish. When water is poured through the pipe, it lands in the part below the dish. The cotton wicks siphon the water from the base into the soil both, automatically and optimally. b) Instead of Pot we can use 2 waste buckets inserted into one another. The lower bucket will hold water and the base of upper bucket will have siphoning holes. Also a hole to install the PVC pipe which reaches the bottom

bucket for filling water. Innovative and usefulness:1)Water wastage by evaporation is avoided and excess drain.2)Daily watering not needed.Current status of development: Constructed and being used successfully.

**Project Code:Physics-01 (Team)    Online ID:2552**

**Title: Floating cups**

**Name: SOHAM BABAR& PARTH JOSHI Std: 10**

**Guide: MADHURA LUNKAD**

**School: Pune**

**ABSTRACT:**

The topic which we were studying is Floating Cups. The main objective of the topic is to study the levitation of the inner cup (a cup is placed inside another cup), when constant air flow is given to the gap between the peripheral region of the rims of the two cups. Project Floating Cups studies the interdependence of different variables on the height of levitation of the inner cup. In this experiment we tried to study the effect of the weight of the inner cup on the height of its levitation. The pair of cups and the source of air are kept apart from each other at specific distance. The air flow is controlled and maintained at a constant speed. The weight of the inner cup is increased and the height of levitation is measured.

**Project Code:Tech-01 (Jr)    Online ID:2336**

**Title: Mosquito detector Arduino kit based on sound sensors**

**Name: Vikram Vinay Jirgale& x Std: 7**

**Guide: Mr. Vinay Ashok Jirgale**

**School: Jnana Prabodhini Prashala**

**ABSTRACT:**

I came across a video from Prof. Manu Prakash about tracking mosquitoes using a simple cell phone.(1)(2). The main idea here is to record the sound of mosquitoes and use a big database to identify the type of mosquitoes. I also came to know that every mosquito species makes a unique sound, even male sounds differ from female. Mosquito-bound diseases like Dengue and Malaria are very prominent causes of death and fever in India and world. I have recently learnt Arduino programming and had also built circuits like proximity sensors. As part of this project, I am building a small Arduino based device using sound sensors, which can be fitted in buildings to track the mosquito species like Aedis Aegypti ( Dengue) and Anopheles (Malaria) etc. The device will notify via a message or signal when it will detect presence of dangerous mosquitoes. Once identified, quick action can be taken to control these mosquitoes. I have found different databases for insect sounds(5) on internet, which can be used as reference. I am planning to use Python library, "audiodiff" to compare the sounds. Recently I have done basic study about various types of mosquito-bound diseases, their different sounds, and how we can remove noise from sound data etc. I want to continue with this idea and test it at different places around my residential locality, school and nearby places where ample no. of mosquito samples are available.

References:1.[https://www.ted.com/talks/manu\\_prakash\\_lifesaving\\_scientific\\_tools\\_made\\_of\\_paper](https://www.ted.com/talks/manu_prakash_lifesaving_scientific_tools_made_of_paper)2.<http://abuzz.stanford.edu/>3.<https://www.popsci.com/blog-network/our-modern-plagues/identifying-insects-music-their-wings>  
4.<https://www.ncbi.nlm.nih.gov/pmc/?term=mosquito+sound>5.<https://www.ars.usda.gov>6.<https://pypi.python.org/pypi/audiodiff>

**Project Code:Tech-02 (Team)    Online ID:2395**

**Title: SMART-BIN 1.0**

**Name: Shivam Vijay Bomble& Advait Avinash Bendre Std: 9**

**Guide: Suraj Ghayal**

**School: Dr.Kalmadi Shamrao High School;Ganeshnagar;Pune**

**ABSTRACT:**

SMART-BIN 1.0This project has been made by Advait Bendre & Shivam Bomble. This idea was originally founded to be a dashing solar panel bin. But not all dreams can come true, can they? So we found an alternative source of energy to solar panel, i.e, rechargeable batteries. So we took a simple dustbin costing Rs.160(cheap, isn't it?) and fixed a 8.5 X 8.5 inch plywood on the bottom. We ordered most of our stuff online(21st century). It includes Arduino r3 processor(the holy grail of our project), Ultrasound sensor, InfraRed sensors, Wheels, DC brackets, DC motor drive, DC motors(200 RPM at 12 V).Now about our guide, Suraj Ghayal sir. Great man. To speak honestly, he helped us with almost 60% of our work. Maximum contribution was his. We had no experience in robotics and he saw some spark in us and helped us. He provided knowledge of Arduino Programming Software to us. He really is a 'Robotic Wizard'.Our dustbin is a line follower, and we are aware of that a line follower is nothing novel. That is why we added an Ultrasound sensor. It works on the same principle as of a SONAR( Sound Navigation and Ranging). The 'Transmitter' emits a sound beam and within a certain range, the beam bounces back to the 'Receiver'. If the beam bounces before a certain distance, the dustbin stops. The 'EYES' of our dustbin are the InfraRed sensors. They recognize a surface and the dustbin moves accordingly.

**Project Code:Tech-03    Online ID:2503**

**Title: A novel and economic approach towards paper analysis using machine learning and image processing**

**Name: Apoorv Sadana& x Std: 12**

**Guide: Sunita Razdan**

**School: Delhi Private School Dubai (Indian Citizen)**

**ABSTRACT:**

The aim of my paper analysis app is to create a user-friendly application that will aid in the effective digital transformation of answer papers after a test. In my school after checking every paper, the teacher is expected to bring forward the marks for each question on the front sheet. This followed by manually transferring the data to an excel sheet. This process is repeated for every paper. This process is time-consuming and cumbersome. My app uses image processing (OpenCV) and machine learning to make the task much easier and error-free. My app takes two

inputs. First, it takes the images of the scanned papers and second, it takes the paper layout (how many questions and subparts). After the processing, the app creates a checksheet where the user is required to confirm that all predictions made by the computer (digits are predicted using MNIST dataset) are correct (against each computer prediction there is an image of the digit cropped from the answer sheet to enable prompt checking) and make changes wherever required. After this checking, a final excel sheet is created which has the admission number of each student, the marks secured by the student in each question and also the total marks. Moreover, Ctrl + Click on any question number for a student will show the answer the student has written for that question. In order to make the experience as user-friendly as possible, I have also made a GUI that allows any non-tech-savvy teacher to use the app.

**Project Code:Tech-04    Online ID:2548**

**Title: Eco-Bin**

**Name: Kushagra Goel & x Std: 11**

**Guide: Mrs. Sowjanya Yepuri**

**School: Akshara International School Pune**

**ABSTRACT:**

My project is in the form of a model of a special garbage-bin. It measures the amount of garbage it has inside. This data is then communicated to the concerned municipal corporation of the area in which the bin is installed. With this data in hand, the routes of the trucks can be optimized and they do not have to visit each and every garbage-bin. Working: Each dustbin has a distance sensor on the underside of its cap. This measures the distance between the surface of the garbage and the cap. When this distance reduces to a set limit, a transmitter sends out a signal to the corporation which flags it as full and in need of emptying. The power consumption is very low. This reduces traffic, fuel consumption, and pollution while saving time. This idea is also economical as one bin uses only 1 sensor, 1 transmitting device and a power connection. Multiple bins can be connected to the network of the municipal corporation of an area. Advertisements can be posted on the outer surface of the bin to generate additional profits to cover nominal costs of power and maintenance. This is feasible for large dustbins in public areas. The system prevents a garbage-bin from overflowing as the truck can visit it twice per day. It also prevents checking a bin which does not need emptying which wastes resources and time. A brief presentation can be viewed on the following link:  
<https://youtu.be/YP3guXEmnil>