



Macmillan Budding Scientist

~ Fostering Scientific Acumen ~

POWERED BY **SPRINGER NATURE**

IN ASSOCIATION WITH **INDIAN INSTITUTES OF TECHNOLOGY**

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Foreword



It was a pleasure for me to be approached by Macmillan Education India (MEI) in 2018 to explore the possibility of my involvement in their initiative “Macmillan Budding Scientist” (MBS). Right from the outset, it was clear to me that this was a somewhat unique beginning in the landscape of Indian school education system. At the time, I had already been professionally introduced to the school education system in India through (a) several invited and “popular” guest lectures for school students both at IIT Delhi and/or their respective schools, (b) an MHRD

(now MoE) programme called IIT-Professor Assisted Learning (IIT-PAL) for class XI and XII school students that I was given the responsibility to initiate from IIT Delhi (along with a few of my colleagues), and (c) an honour of serving as an “Eminent in Education” member in the management committee of a Kendriya Vidyalaya (KV) in Delhi. Through the latter two, it was my sheer privilege to closely interact with KV teachers, who inspired me to appreciate the key foundational roles school teachers play in our lives and the unparalleled efforts they put in towards executing their responsibilities, beyond any prior experience of mine.

In 2018, MEI took the bold step of advancing the concepts of co- and extra- curricular initiatives of the Government of India that aim at enhancing the school education experiences of students by integrating beyond-the-classroom exploratory avenues for teachers and students. Inspired by Neil Armstrong, I would go to the extent of stating *“That first Macmillan Budding Scientist in 2019 was one step for Macmillan Education India, but a giant leap for corporate involvement in the Indian education sector”*.

Having successfully completed three iterations since the first one in 2019, MBS initiative has fast established itself as a benchmark for recognizing co- and extra- curricular academic efforts of student-teacher teams from schools across the country. While encouraging beyond-the-classroom engagements of teachers with their students in schools, MBS initiative encourages students who wish to push their educational explorations beyond their books. Additionally, an abstract achievement of the MBS initiative is that it recognizes and celebrates those teachers who push their own limits in guiding students beyond classrooms. I feel privileged to have been asked to write this foreword for the first edition of this booklet showcasing projects of the MBS initiative. I hope that these projects will inspire students towards pushing the boundaries of their educational experiences beyond-their-classrooms but within-their-school-systems. More importantly, I hope this booklet will be seen as a first-of-its-kind effort in recognizing the often-unsung champions in our society – the teachers in schools who push their limits for every pupil entrusted to them.

Prof Aditya Mittal, B. Tech., Ph. D.

Kusuma School of Biological Sciences,
Indian Institute of Technology Delhi



Message from MD

Today STEM pervades every part of our lives and science's marvels can be seen and experienced everywhere we look in the world. STEM education links disciplines into a cohesive system and creates critical thinkers, increases science literacy, and prepares the next generation of innovators capable of transforming society through innovative solutions.

Being an integral part of India's education ecosystem, it is Macmillan's desire and duty to foster their interest, and ambition and give them a platform to showcase their creativity, which will spearhead tomorrow's technology.

At the Google Science Fair 2019, Tuan Dolmen from Turkey received the Scientific American Innovator Award for a digital agriculture module design that can capture tree vibrations. Further Aman KA and AU Nachiketh Kumar from India took home the National Geographic Explorer Award for a natural coagulant for rubber latex.

All of these children have done India proud, and we can't wait to see what they come up with in the future. You children should look up to young scientists like them as role models and strive to solve India's pressing problems, such as pollution, hunger and infant mortality.

I also encourage teachers to embrace STEM education because children are born with a natural curiosity for exploration and discovery.

We look forward to taking Macmillan Budding Scientist to schools across the country giving young learners an opportunity to showcase their ideas at a national level.

Rajesh Pasari
Managing Director
Macmillan Education India

About Macmillan Budding Scientist



I remember the town hall hosted by the entire Springer Nature senior management team, on a cool November evening in 2016, in India. The Springer Nature group launched an innovative initiative to encourage and develop scientific talent in schools across India - Macmillan Budding Scientist, powered by Springer Nature. The thought behind it was to develop curiosity and scientific temper in young learners and promote research and innovation for sustainable development. The announcement came after an education conclave was organized by Springer Nature to discuss strategies and evolve solutions to challenges in science education in the years ahead. This initiative was to be integrated with the efforts of IIT Delhi towards school outreach and taken to thousands of schools in India, by Macmillan Education India. I would like to acknowledge the support of Ms. Subhra Priyadarshani, Chief Editor, Nature India who was instrumental in the conceptualization of the Budding Scientist initiative, enabled the partnership with IIT, and promised workshops on Science Communication to students.

At the launch event, a student of Amity International School Gurgaon Vaishali Tikko, was honoured by Springer Nature for the novel instrument she developed to help her fellow students facing learning difficulties. From 2016 to 2023 Macmillan Budding Scientist has grown in stature and today the engagement with IIT Delhi has extended to IIT Mumbai, Bhubaneswar and Chennai. This will allow more students across the country to experience Science.

Macmillan Education is looking to expand this programme in the coming years and deepen its impact.

Vandana R Juneja
Director Marketing
Macmillan Education India



Vaishali Tikko, of Class XII was awarded as the budding scientist for her project titled- Novel Instrument to detect learning disabilities in children by Macmillan Education. School Principal, Mrs Arti Chopra was also bestowed for fostering scientific talent.

From the Principal's Desk



Collaboration is the call of the day. The teachers bring their best practices to the table, which are then discussed and deliberated as a team and delivered effectively to the students, thereby ensuring the best quality of content as well as maintaining parity amongst all sections (A-G) of classes.

Teaching is concept based, wherein the students are made to think and arrive at a conclusion, rather than feeding them with information.

All 6 science labs in our school facilitate hands-on experience for our students. This leads to a better understanding and appropriate application.

Students work on projects and wall magazines in school, displaying the Science behind pertinent topics of global concerns like rainwater harvesting, global warming, sustainable development goals, alternative fuels, boon and bane of chemicals, medicines, etc. This involves extensive research work by the students, forging budding scientists.

Fun-filled learning happens too when the students are taken for an outing to science museums, monuments, and parks. From the primary to the senior level, teachers ensure graded learning of Science, fostering bedrock learning.

Mrs. M N Arul Raj Principal,
Somerville School, Noida



Joint Runner-Up team (Grand Finale) and
Runner-Up Team (North Zone)

From the Principal's Desk



“Science is the most powerful weapon which one can use to change the world”. – Nelson Mandela.

Holy Cross School is a group of Institutions all over the world which works honestly with its Moto Love and Service . We give emphasis on holistic development of students with good character building and at the same time cater them all the opportunities by which they can explore the field of their own interest in Humanities, Commerce, Science and innovation.

Everyone is aware of the significance of science and its miracles to mankind. Today the whole world understands that we as Indians can, not only bring flexibility to the set patterns of science also we can give laurels to the society who is self radiant. I am glad to see Macmillan Budding Scientists programe which has provided a platform for the students to exhibit their scientific knowledge.

Today's dreams are tomorrow's success. I want to give message to the students not to be afraid of high Hopes or Dreams that seem to be out of reach. Life is meant to explore, experience because every situation allows learning, innovation and growth.

With best compliments & God's blessings

Sr Kamala Paul Bihari

Principal Holy Cross School Bokaro Steel City, Jharkhand



Runner-Up team (East Zone) from Holy Cross School Bokaro Steel City, Jharkhand

From the Principal's Desk



Most people say that it is the intellect which makes great scientist. They are wrong, it is the attitude to ask “why” that develops a way to satisfy one’s scientific temperament. Macmillan Young Budding Scientist provided one such platform to students having scientific thirst.

Indeed it is everyone’s dream to be at IIT and Macmillan paved that way for the young minds who are the harbingers of change. These harbingers are the one who reached one summit, did not sit idle but started climbing the next, striving hard to win.

I am happy that I and my team at Saksham were a part of this journey which taught our students, that who stands fire of challenges and adversity genuinely comes out as heroes.

The Macmillan team left a golden key with our team to be consistently positive and productive. Surely we don’t stop though we could not make it for finals but we navigate to upheaval in such a way that we leverage towards growth.

Best wishes and Good Luck.

Regards

Mrs. Padmaja Marathe

Principal

Sevasadan Saksham School, Nagpur

From the Principal's Desk



Take up one Idea. Make that one idea your life, dream of it, think of it, live on that idea. Let the brain, muscles, nerves, every part of your body, be full of that idea and just leave every other idea alone. This is the way to "SUCCESS".- Swami Vivekananda.

Indeed the path to success demands complete focus, single-mindedness and 100% conviction

towards achieving our goals and competitions like Macmillan Budding Scientist championship helps children to dream, imagine, invent and discover numerous possibilities. Engaging yourself deep in the idea is central to the whole process of diving deep into it. If you have the will to succeed and you have realised your vision, it automatically becomes success worthy because success is the product of realisation of our ideas.

So, choose your ideas wisely, and immerse in them with complete devotion and commitment so that their realisation can bring you recognition in the world.

Ms. Rekha Sharma,
Principal,
Alpine Convent School, Gurugram

From the Principal's Desk



Education is evolving at expeditious pace. What is right and true in this moment may become outmoded in the next.

To condition the minds of the young learners for research, exploration, experience and developing rationale is foremost. In a system where the children feel free to question and do not have a sense of being right or wrong is prime. The moment they are judged for asking wrong questions or questions with obvious answers and are snubbed, that yearning for creativity in learners is suppressed.

I strongly believe in identifying that spark in each child and then nurturing the talent by giving opportunities and making resources available for the students. Not only this but also the teachers and Principal should be supportive and put together the requirements for the learners. How the students are directed is the next important aspect. Giving thinking, analyzing, critically evolving, that time to develop their own recordings based on their observations and understanding and then develop reasoning are all aspects of scientific bent of mind.

It's always good to know what's important but it's also good to know what doesn't work. So like Edison said that he found out 10000 ways which will not work, we as educators have to constantly direct the students but my suggestive technique will be scaffolding because that only can lead to Eureka moments in the life of our learners. I also believe that reading about the great discoveries and inventions and how they were done will illumine the minds of students and makes the neurons wire and fire.

At early age, exposure should start with concrete examples for learning so that the students acclimatise and are able to visualize a better world with more scientific discoveries and developments for the world to experience.

Break the glass ceiling and evolve.

Ms. Geetika Ahuja

Principal, Aspire Indian International School, Jleeb Al Shuyoukh



Winner team
(Middle East) from
Aspire Indian
International
School, Jleeb Al
Shuyoukh

From the Principal's Desk



I take this opportunity to appreciate and thank Macmillan Education India Private Limited for providing such a wonderful platform where students can showcase their scientific experiments and get confidence. Our students could perform in this platform and that enabled them to be the runner up in South Zone that was held in IIT Madras and got golden chance to be part of the National round which is to be held at IIT Delhi. It is a matter of great joy and pride for us. I gratefully remember Ms Tresa Mini George and Mr. Aromal A for being the mentors of our young scientists while doing this project.

Real meaning of education is to create an environment which not only helps children learn well but also inspires them to recognize and explore their own potential. We put equal emphasis on academics, sports, life skills and values. Fulfilling the global needs and trends of quality and holistic education we impart technologically embedded education where children get ample exposure to Language, Science, Mathematics, Artificial Intelligence, Robotics etc. besides digital smart class room for teaching and learning process.

Continuous learning process will not only help them to learn more but it will also help them to develop their scientific temper. We allow the students to carry out activities, observe, derive and conclude. This will help students to innovate and explore.

Sr.Little Rose SABS,
Principal,
St. Joseph's Public School And Junior College, Kanjirapally

From the Principal's Desk



We, at TPS constantly endeavor to inculcate scientific temper among the students which is also direly needed in today's times. MacMillan Education India gave a wonderful opportunity to our students to showcase their innovation and talent. Through such competitions students develop immense self confidence and their zeal to excel grows even stronger.

It was a prestigious opportunity to present a Project in the highly esteemed IIT Mumbai Campus. The students have had the privilege to be reviewed and analyzed by the honorable scientists at the Event. Competing at the National level has boosted our faith in many more such future associations.

It was an extremely enriching experience for the students who are just stepping into the World Of Science with such a remarkable exposure. Our students enjoyed the challenge to the core and it will be deeply embedded in their hearts as the first source of inspiration for outperforming themselves in the future!

Mrs. Yogini Suvarna
Principal,
Thakur Public School,
Kandivali (East) ,Mumbai.

Macmillan Budding Scientist, powered by Springer Nature 2022-23

Finalists:

1. **School Name:** Navrachana Higher Secondary School, Vadodara

Winner: Grand Finale and West Zone

Students: Aarav V. Shah, Vidita Naik and Shipra Pradeep

Project Supervisor: Ms. Sudha Naddi

Project Name: Solution For Noise Pollution

Scan the code to watch the video of the project



Problem Statement

Noise pollution is defined as any disturbing or unwanted noise that affects or deteriorates human or wildlife. Although noise constantly surrounds us, noise pollution generally receives less attention than, for example, water quality and air quality concerns, because it cannot be seen, tasted or smelled. Nonetheless, it is an indisputable fact that noise has a negative impact on everyday life especially if we observe urban areas. One of the main sources of noise is traffic. Our project works on reducing the same with efficient means.

Proposed Solution

While there is an extensive range of solutions for water and air pollution, after our research, we found that Noise pollution is a field that remains vastly untouched. One solution that is used today to prevent noise pollution, is noise barriers. Noise barriers can be defined as a certain sound “obstacle” between the sound source and the observer. Conventionally, noise barriers are made of materials such as wood, metal, glass, cement and plastic. Our idea is to use recycled rubber obtained from local industries to make noise barriers. At present, rubber is used in indoor areas for acoustics, but not outdoors. There are many properties that make rubber suitable for this. It has great acoustic properties, i.e., it absorbs sound well. Rubber, at present, is used for acoustic purposes in indoor areas. It is extremely cost effective. Rubber, on the whole is comparatively cheaper than conventionally used materials for noise barriers. Recycled rubber is even more so. It is durable and can withstand extreme weather conditions. Being recycled, our material is sustainable and eco-friendly. Our main target locations are highways and railway tracks.

Principals used

- a. Deflection and absorption of sound waves by noise barriers.
- b. Acoustic properties of rubber

Other Applications

In the future, The applications can be widened with experimentation to cater to places such as party plots and residential compounds.



- 2. School Name: Somerville School Noida, Noida,**
Runner Up: Grand Finale (Joint) and North Zone
Students: Aadit Pandey, Samarth Bharadwaj
and Mayukh Chatterjee
Project Supervisor: Ms. Sharmila Chakravarty
Project Name: I-bin

Scan the code to
watch the video
of the project



Summary

The rise in urban waste generation in India comes from the consumerist behaviour and the ever-increasing population density in the cities. A vast majority of this collected waste is dumped into landfills. Every year, in India alone, approximately 40 million tonnes of urban municipal waste is generated. The two major waste handling methods widely implemented are landfilling and incineration. A landfill is an area of land in which waste is dumped and disposed. These landfill sites produce leachate that contains concentrated toxic chemicals. As waste decomposes, a combined chemical, thermal, and biological reactions release gases which are a mixture of methane and carbon dioxide. This gas being inflammable can cause a fire hazard at any given point. Hence landfill should be avoided to the maximum possible extent. Incineration is the process of burning solid wastes at a very high temperature. This is achieved by combustion of waste thereby liberating energy which is mainly used to generate electricity. The gaseous emissions from solid waste incinerators have positively been recognised as carcinogenic. Incinerators also require a massive capital investment.

Presently the segregation is done by manual labourers. This mostly proves to be inefficient and time-consuming. The handpicking method of sorting waste leads to a serious threat to the welfare of labourers who are constantly exposed to toxic substances.

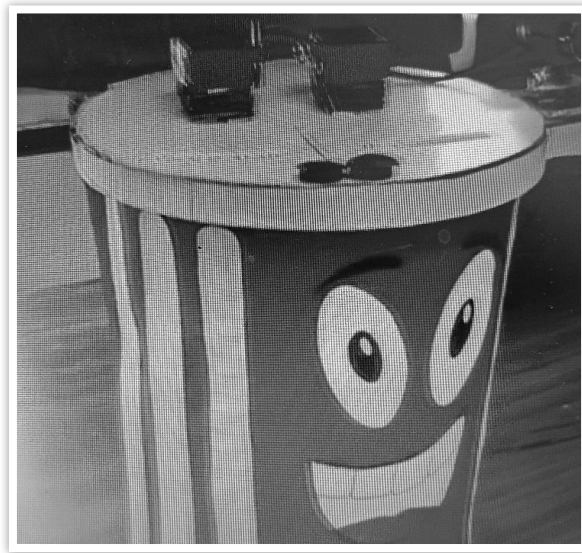
So we have developed the I Bin that can effectively separate the waste into biodegradable and non-biodegradable categories. This will drastically reduce the ill effects caused otherwise. It also saves the time spent on the process and the cost involved with it. The sorting also helps the local authorities to handle the waste with ease. Since the investment is not high it proves to be economical.

Materials used

- Arduino UNO
- Servo motors
- Webcam
- Laptop
- Plastic bin
- Card board
- Connecting wires

Working

The webcam was taught to detect waste items as biodegradable and non-biodegradable, using Google teachable machine. After detection, the webcam sent a command to the Arduino, which in turn, commanded the servo motors to open the respective flap of the bin for waste disposal.



Advantage

Wastes can be segregated at the source without manual labour.

Treatment of different kinds of wastes become easy.

Small effort to achieve SDG 12, 13 and 14.

Limitations

As the I Bin senses images of the wastes, it can sometimes fail to recognize the waste type if the wastes are similar in appearance.

- 3. School Name:** Aspire Indian International School,
Jleeb Al Shuyoukh
Winner: Middle East Zone
Students: Fida Anushad Poovanchery,
Abdul Rehman Tauqir Ahmed and Jeron Jaison
Project Supervisor: Ms. Varsha Arunkumar
Project Name: Alu Blister Alum-a Water Treatment Flocculant

Scan the code to
watch the video
of the project



Pharmaceutical packaging has come a long way, from stone jars to plastic and glass containers. One type of packaging, called blister packaging, has the most widespread usage around the globe. These are excellent in isolating the pharmaceuticals from gases and moisture. But such kinds of packaging have also caused detrimental effects to the environment, and after use, end up in landfills. With increasing use of medication, means an increase in use of such packaging, leading to more landfills as each day passes. Therefore, it is important that technology should be developed to prevent environmental pollution.

Solution Proposed

Blister packs collected from students and teachers from our school, were first weighed on a digital scale and then treated with a solution of KOH. The aluminium blister pack was allowed to dissolve completely in the solution. The potassium aluminate solution is heated and then cooled. Dilute H_2SO_4 is added to the solution drop by drop, until all the precipitate completely dissolves which is later heated for 3 to 4 minutes and is transferred to a crucible kept in an ice bath, which immediately starts to form the potash alum crystals and is weighed using a digital weighing machine.

Our research helped us to prepare potash alum for water purification which in turn help in the recycle of blister pack in a cost-effective manner. The prepared alum was used for flocculation test.

Conclusion

Our product provides an eco-friendly, alternative, low-cost water purification method, and would be effective in cleaning landfills as well as contaminated water sources.



Weighing of blister packs Dissolving blister packs in KOH



Filtering and Heating of Potassium Aluminate



Addition of Sulphuric Acid and Heating of the solution



4. **School Name: Ddms Ams P. Obul Reddy Public School, Hyderabad**

Winner: South Zone

Students: Naman Pattanaik, Soham Bilolikar, Debansh Mishra

Project Supervisor: Ms. Sharmila Maroli

Project Name: Iv Fluid Indicator

Scan the code to watch the video of the project



Problem

Most often when a person is hospitalized, he/she is given saline treatment.

There are instances when Saline/IV Fluid Level gets very low. In such cases, the blood of the patient can reverse flow and also result in air embolism. Due to this, the patient may face risk to life undergoing anxiety, high BP etc. This poses a threat to the healthcare staff. The paramedic staff have to check on many patients and have a tough time monitoring the IV Fluid/ Saline levels of all of them. During COVID – 19 outbreaks, this work increased tenfold when hundreds of people were admitted to hospitals on everyday basis.

Solution

To keep a check on the Intravenous fluid level, the team has designed an 'IV Fluid Indicator'. This device will detect the level of Saline left in a bottle and an LED fixed to it will glow along with an alarm to alert the nurse if it is low. A message with the bed number will display on the nurse's phone through a connected app.

Principle

The device is operated using Arduino which detects the level of Saline in the bottle through a load cell that measures the weight of the bottle helping to know when the fluid level is low. This Arduino is connected to an LED and a Buzzer which alerts when the Saline goes to a low limit. A HX711 amplifier will send signals to GSM Module, sending a notification to the nurse mobile or on the display screen whichever is connected.

A knob on the stand is used to adjust the low-level points.

Unique Selling Proposition

Accessible

Anytime, Anywhere by Anyone.

Automated device is

Affordable and

Alerts the medical staff at the right time.

5. School Name: Udgam School For Children, Ahmedabad**Runner Up:** West Zone**Students:** Satya Joshipura, Aashi Gandhi and Nimay Mavani**Project Supervisor:** Ms. Anita Sharma**Project Name:** Pumper Net

Scan the code to
watch the video
of the project

**Problem**

Worldwide many plants and crops die as they wither. The main reasons for it are going away from them for vacations etc. or you fall ill or the gardeners don't come to work etc. I and my teammates have gone through this situation very closely where we were out of town and our plants were dead.

Our Idea

Our basic idea was to make a water pump which can be controlled through Wi-Fi from anywhere in the world. To make this possible we had to use IoT.

What is IoT

IoT's main work is to operate particularly designed sensors by providing some kind of information to them through their environment.

The Solution

To make this possible we made a simple ON/OFF switch in an IoT supporting app and then designed the circuit of our project PumperNet. Then we connected the components which were NodeMCU ESP8266, BC547 Transistor, 220 Ohms Resistor, 5v Relay and 1N4007 Diode.

Advantages

- It is a huge relief to people who go away from their homes very often.
- It is very easy to use and economic. It costs ₹582 only.
- It has infinite range i.e. it can be operated from any corner of the world.

Limitations

- With this variation of the model one cannot monitor the water supply.
- You always need at least a stable 3g Network.
- Solutions for monitoring water supply-
- We can use a soil moisture sensor.
- We can measure the water pumped in a minute to assume how much water our plant requires.
- This is just the basic model of what we can do with a pump. Other changes can be made for any other uses.

6. School Name: St. Joseph's Public School And Junior College, Kanjirapally

Runner Up: South Zone

Students: Ahad Ali Nazar, Jithin S and Amin Shajahan

Project Supervisor: Ms. Tresa Mani George

Project Name: Nerobot

Scan the code to watch the video of the project



Water is essential for all forms of life on earth, however in recent years water bodies are being contaminated due to various causes. Also in our hometown alone there is a river called Meenachill River, after the great deluges of 2018 and 2022, plastics debris entered and contaminated the water. Therefore, a single drop of water cannot be taken to use for our daily needs.

To solve this problem, we the students of St. Joseph Public School Kanjirapally, Kerala, under the able guidance of our teachers Sri. Aromal A and Mrs. Tresa Mini George, we have chosen the topic Environmental Science along with the help of Robotics (A branch of Science). We have built this robot and named "NeroBot". 'Nero' means water in Greek and Bot stands for robot. So, NeroBot means Water Robot, which is a solution for water pollution.

Our Nerobot uses a robotic-arm for picking the debris and two compartments on the two sides for collecting the floating waste material over water bodies such as plastic materials etc. Our Robot uses the technology called the DTMF to function. DTMF are the tones produced by the numbers of the dial pad when being pressed. So the dialpad of a mobile phone act as a Remote Control for the project. Here first, we should make a phone call, to the mobile phone connected to the DTMF Decoder, and by pressing the dial pad on the mobile phone, which we use to call to the connected phone, we can control the whole project. We have set up each number as each controls.

We have used many hardware components in our prototype. We have implemented a DTMF Decoder to decode the DTMF frequencies from the controlling Mobile Phone. Here we have used Arduino UNO as the Micro-Controller board, where we code the instructions that how the robot works and this Arduino UNO board consists of a Microcontroller called ATmega 328p. We have used two ULN2003 stepper motor driver for the forward and backward movement of the Robotic Arm. We have used a L293D and a L298N motor driver for controlling the DC motors on the either side of the robotic vehicle. We have used a NEMA14 stepper for the whole movement of the robotic arm. A Tower-Pro Servo Motor of the opening and closing of the gripper. Two DC motors for the movement of the propellers and two DC motor Drivers and two Stepper Motor Drivers. For the battery backup, we make use of a 2500 Mah Battery and a booster circuit for charging the Nerobot.

Our work utilizes a Sensor Mechanism along with DTMF technology to function. So from all of this it shows that our robot is a low cost effective way for the collection of floating waste and it did not harm the Environment. Further developments can be done in the design of the robot and the robotic arm. We can use a PIR sensor to detect whether the obstacle is a living thing or not. We can use Raspberry Pie instead of Arduino UNO but Raspberry Pie is more expensive than Arduino UNO and also we can use metals instead of PLA in Robotic Arm which helps the robotic arm to lift heavy waste materials. We hope that our work can save millions of lives.

Together, let's build & hope for a better future.

7. School Name: Holy Cross School, Bokaro

Runner Up: East Zone

Students: Aastha Kumari, Sanprit Ranjan and Eklabya Mishra

Project Supervisor: Ms. Nicky Smita

Project Name: Algae:secret Weapon For Green Energy

Scan the code to
watch the video
of the project



Scope of our project

The aim of our project is to obtain biofuel from green algae.

The problem statement

We saw many ponds filled with green algae near our locality. This was not only making the environment stinky and unbearable for the people living around but was also killing the aquatic ecosystem so we thought of making biofuel from algae.

The hypothesis

We pondered and researched on different ways of how can we cultivate algae and how algae can be used to make biofuel. And we found that by adding certain chemicals like n-hexane, and baking soda we can activate algae to produce biofuel from its lipid layer and other bi products.

The objective

The objective of our project is to cultivate algae in a controlled manner and extract biofuel from it along with four more bi products. On one hand it consumes Co₂ and on the other it emits lots of O₂ in the atmosphere. Also it generates biofuel which can be used as an alternative for fossil fuels.

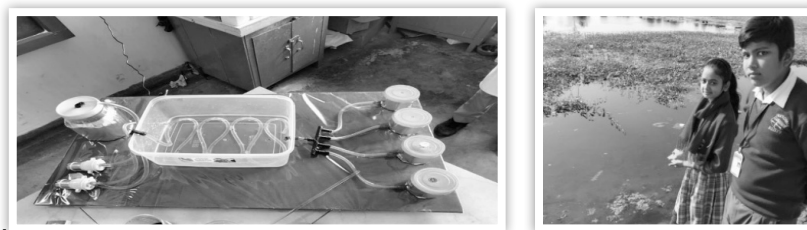
Methodology

So we created Omega structure model to cultivate algae. In a reservoir we collected industrial waste water which passes through floating structure on the waterbody. Industrial wastewater contains magnesium sulphate, carbon dioxide, and nitrate which gives favourable condition for algae to grow rapidly. Also closed pipe keeps it contamination free. This floating pipe gives algae perfect temperature 25 – 30° Celsius with electromagnetic waves. After 2 weeks when algae is fully grown, it goes to another container where we filter it. Collected algae is mixed with hexane and sodium bicarbonate in 10 :1:1 ratio. After that we grinder it and left it for 24 hours to settle down on the upper layer. Once we get oil surface we can collect it in another container with the help of decantation method.

Observation

We observed our mixture for 24 hours and found a layer of bio fuel(floating) over the surface of the container and filtered and separated it.

This obtained biofuel can be used in bio and Chemistry laboratories



Conclusion

1. By the above experiment we found out that from 500 grams of algae, 50 ml of bio fuel can be obtained.
2. Also 4 other biproducts can be obtained like organic fertilizer, cosmetics, Electricity and fish feed.

Limitation

This bio fuel can only be obtained from green algae.

Practical implications of the project

In Chemistry lab, and Bio lab on the place of spirit lamps this biofuel can be used. If produced on large scale it can be a perfect alternative of Fossil fuel.

8. School Name: Sevasadan Saksham School, Nagpur

Finalist: West Zone

Students: Diya Patle, Devanshi Thakur and Arjun Kedar

Project Supervisor: Ms. Ritu Sharma

Project Name: Solution For Solid Waste Pollution

Scan the code to
watch the video
of the project



“Waste Segregation refers to sorting and separation of various waste types in order to facilitate recycling and correct onward disposal.” Have you ever wondered that is this waste segregation actually being followed? We noticed at our homes, in school and also at other public places that waste is not properly segregated. By observing this we thought that waste segregation is a very major and critical problem in a country like India. A plan of waste segregation came up in the year 2014 but still the waste was dumped in a single bin without segregation due to busy schedule of people. As a solution to this problem, we came up with the idea of automatic waste segregator which segregates the waste automatically into wet and dry.

Technical Detailing

Our model is based on the Arduino uno microcontroller, which calibrated the different components by coding the Ardiuno in C++ language to form an automatic dry and wet waste separator. We have used the following components

1. Arduino uno
2. Ultrasonic sensor
3. Moisture sensor
4. Servo motor

The waste will fall on the platform of the dustbin , where its presence would be detected by ultrasonic sensor and after that the moisture sensor will measure the moisture content present in the substance and give the value in between the parameters of 0 to 1023. Where 0 means completely wet and 1023 means completely dry . On the basis of this information the sensor will classify the waste into dry and wet. Once this is done the moisture sensor will send the signal to servo motor and it will move in either angles depending on dry and wet waste. Motor will move 0 degree if the waste is wet and 180 degree if the waste is dry, the waste will fall in suitable bin. In this way our segregator works.

Advantages and future prospects

1. One of the major benefits of our smart bin is that it is substantially cost effective.

2. It helps us achieve various sustainable development goals-
 - Good health and well being of people is looked into.
 - Sustainable cities and communities
 - Climate action (Keeping the environment clean)
 - Life on land
3. We are also thinking of adding a dropper like structure to our bin. By using it , the waste will fall one by one on the sensors and further segregation will take place.
4. We are also planning to incorporate a separate conveyer belt system for distinctive metal and E-waste segregation.

9. School Name: Silver Oaks School, Bathindia

Finalist: North Zone

Students: Mir Arhaan Altaf, Samridhi Kakkar & Soham Patyal

Project Supervisor: Ms. Manmehak Sidhu

Project Name: Litter Glitter

Scan the code to
watch the video
of the project



As the name suggests, our project is based on importance of light but with eco-friendly means. We can even say best out of waste.

The use of plastic bottles in this way to provide indoor lighting from daylight was developed by Alfredo Moser of Brazil. Using the technology as a social enterprise was first launched in the Philippines by Illac Diaz under the My Shelter Foundation in April 2011. In order to help the idea to grow sustainably, Diaz implemented a “local entrepreneur” business model whereby bottle bulbs are assembled and installed by local people, who can earn a small income for their work.

Within months, one carpenter and one set of tools in one community in San Pedro, Laguna, expanded the organization to 15,000 solar bottle bulb installations in 20 cities and provinces around the Philippines, and began to inspire local initiatives around the world. My Shelter Foundation also established a training center that conducts workshops with youth, business companies, and other groups who are interested in volunteering their time to build lights in their communities. In less than a year since inception, over 200,000 bottle bulbs were installed in communities around the world.

In Philippines, people are very poor and do not have any electricity supply. So, the people here have started making bulbs out of waste bottles without any electric supply. Making this bulb costs lesser than 50 rupees.

To make it we need to cut two metal pieces in a circular pattern around the bottle, then we need to cut the inner circle. After that we need to bend small strips of the metal piece in upward direction. Next, we fill the bottle with water and add 10 milliliters of bleach or chlorine into it. This makes it glow in the day like a 45-volt bulb. But what about the night?

We know just what to do. We add a solar panel, a battery and a LED to it. This makes the bulb glow throughout the day and the night. The solar panel we added inside that store 10 hour of daylight. The device functions like a deck prism: during daytime the water inside the bottle refracts sunlight, delivering about as much light as a 40–60-Watt incandescent bulb to the interior. A properly installed solar bottle can last up to 5 years.

This project is helping millions of homes to light up. Let’s come together and spread brightness everywhere. This was our project litter glitter, brightening the world!

10. School Name: Thakur Public School, Mumbai**Finalist:** West Zone**Students:** Shaurya Saraf, Niket Jain & Chaitnya Jaiwall**Project Supervisor:** Ms. Priyanka Haritwal**Project Name:** Water Cleanser Boat

Scan the code to
watch the video
of the project



This is an Eco-friendly water cleaning device. The boat is made up of two segments. One segment is the motorized segment and the other is the plastic compressor. A board has been attached under the segments to lower its density so that it could float on water. Two turbines are attached on each segment. There is also a net under the board for the collection of plastic. Later this plastic is transported to the 'Plastic Compressor' segment. Then the substance collected is dissolved in a solvent (Styrofoam in Acetone). After compression it turns into a soft mold which can be given a desired shape. After 1-2 days it gets turned into hard yet light substance which can be used for construction purpose

The gaseous pollutants can escape through the passage provided on the top of the boat. The solar panels are attached on the top of the boat. The secondary battery gets charged by the solar panels after the discharge of the primary battery. The boat has lights for visibility at night. The inner surface of the boat is also coated with a fire-resisting substance (Starlight - name given by the team). It works on the Principle-'On coming in contact with fire, Starlight releases carbon dioxide'. The boat is equipped with a water filtration plant which filters the water.

Highlights

This device cleans dirty water in an Eco-friendly manner.

It works on electricity and also has solar batteries which automatically get switched on during day time.

Solves the problem of dirty water and creates avenues for cleaner and hygienic spaces



11. School Name: Alpine Convent School, Gurugram

Finalist: North Zone

Students: Nikunj Maheshwari, Aarna & Samyak Jain

Project Supervisor: Ms. Gunjan & Ms. Twinkle

Project Name: Self Secured Smart Handbag

Scan the code to
watch the video
of the project



Oh my god! Where did I keep my bag now? This happens with almost every other woman in the world. There's nothing more anxiety-inducing than fruitlessly searching for your purse or wallet.

Now a days, one thing that every other woman carries with her whenever she steps out for anything ...be it grocery shopping, clothing, hanging out with friend for a brunch ...here and there... handbag is a necessity. Unfortunately, carrying handbag in public is not safe. Every now and then we hear a lot purse snatching cases.

So, we the students of Alpine Convent School , Gurugram have come up with an amazing solution, that will take all your anxieties away.

A Self Secured Handbag

We decided to make a self-secured handbag in which you can keep in your valuables and they will be safe wherever you go. This bag can protect itself by allotting authorisation to the person who owns it. So, the heart of our system is an *Arduino nano* which is a micro-controller board which has the entire coding of the system. Our project make use of GSM connectivity for network access which can send/ receive sms to get the accurate location of the purse. The owner can get the location anytime by sending an sms to the registered number installed in the purse. It also makes use of Bluetooth connectivity to further secure it against any unauthorised access. It has a physical lock which can only be unlocked using the paired phone. In case the Bluetooth connection is no longer there, The alarm systems will activate and the purse will sound a loud alarm in-case anyone tries to touch it.

We have used a power bank as the source of energy. A provision of physical lock has been added as a security feature to prevent an unauthorised access. Physical lock can be enabled /disabled from the app. Also, physical lock is an independent 3D printed design whose prototype has been designed by us. We have also designed an app to connect, lock & unlock.

Use of GSM has added as an advantage of Internet Connectivity. Internet can be accessed from anywhere in the world. Also, since GSM can provide the location data using its NSS (Networking Switching Subsystem).

Motion sensors have also been implemented to work as an anti tamper/anti theft mechanism. A loud beep is sounded by the buzzer as a warning in-case motion is detected. After giving

a warning tone, if someone tries to move it further, the loudness of the beep sound will increase until the user's phone is connected.

Our Future Prospects

1. We will be working on a more robust and discrete circuit.
2. Also, a good anti tamper mechanism using a good conducting fabric along with improvement in GPS technology.
3. We will be also adding a Global Positioning system (GPS) to enable the user to track the purse in case of theft.
4. Improvement in lock designing and making it more compact.

Macmillan Budding Scientist, powered by Springer Nature 2021-22

Finalists:

1. School Name: MSB Educational Institute, Nagpur

Winner: National and West Zone

Students: Mohammed Khiilchipur, Ali Akbar Sunelwala & Haider Kapdawala

Project Supervisor: Ms. Rashida Merchant

Project Name: Mobiscope - Making Microscope From Old Mobile

Scan the code to watch the video of the project



Summary

Technology has improved so rapidly in the past few decades that today it's hard to imagine what the world would be like without smartphones, GPS maps, laptops, and other electronic devices. These devices contain toxic chemicals like mercury and lead, and while they're safe to use once they get placed in a landfill those toxins can seep out into the soil and water, contaminating both. If those toxins get into your drinking water, then that presents a health hazard for you and your family.

As all of you know that the volume of e-waste is growing enormously because people do not bother to repair the damaged device and discard it. There are now more mobile phones around the world than the number of people.

So the main aim to prepare our model is to reuse the ewaste, we have used all scrap things to make this model.

Technology has improved so rapidly in the past few decades that today it's hard to imagine the world without smartphones, GPS maps, laptops, and other electronic devices. These devices contain toxic chemicals like mercury and lead. They are safe to use, but the disposal of these devices in landfills contaminates the soil and water. These toxins pose a health hazard. As everyone knows, the volume of e-waste is growing because people nowadays discard their damaged devices rather than repair them.

Using a smartphone, we can build our microscope for a much smaller cost than buying one.

Though smartphone cameras cannot replace a microscope as is, adding an extra lens helps them get the desired magnification. In this way, we can increase the efficiency of a smartphone.

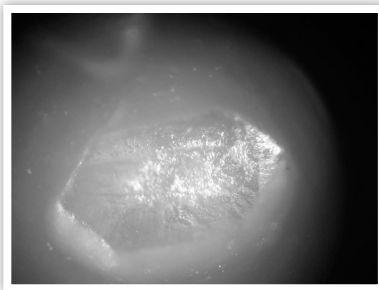
We can directly attach this lens to the smartphone, but it is hard to keep the phone steady when taking zoomed-in photos. That is why we need to build a stand! The scrap glass and plywood were used to make the microscope stand. Plywood acts as a base of the stand. Here we have used two pieces of glass. The upper glass of the stand is called the camera stage, and the lower one is the specimen stage. We have inserted a lens in the camera stage precisely in the center.

Amazing things you can do with this microscope:

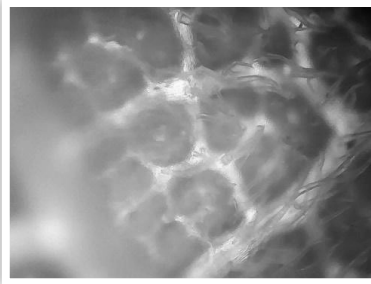
- You can see epidermal cells and hairs on the leaf.
- You can see tiny algal cells and tiny microbes in pond water.
- You can connect our cell phones to a laptop to make it digital.

It is a portable microscope, which can serve as an additional microscope in the lab. It is helpful when schools do not have funding to purchase microscopes, then Mobiscope is a viable option.

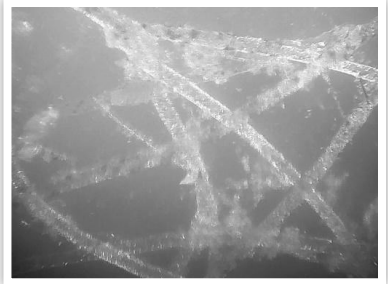
Some pictures taken with the Mobiscope



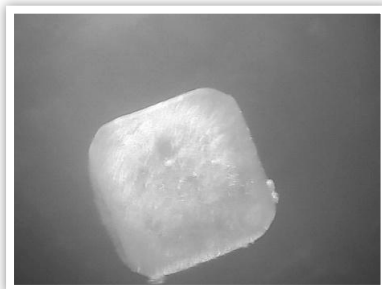
1. Sugar Crystal



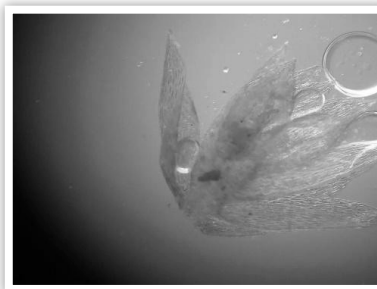
2. Soil Algae



3. Leaf epidermal hair Cell



4. Salt Crystal



5. Bryophyta[moss

2. School Name: Somerville School, Vasundhara Enclave, New Delhi

Winner: North Zone

Students: Ashrit Das, Atharv Mittal, and Rajit Sharma (Class VII)

Project Supervisor: Ms. Savitha

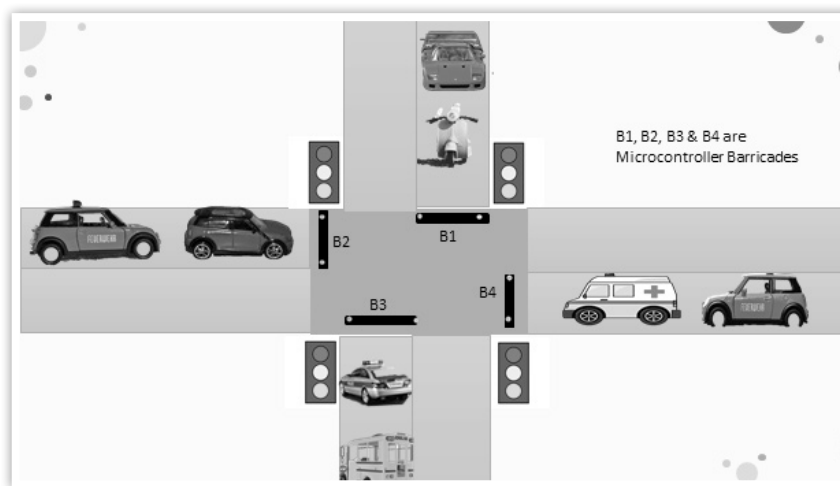
Project Name: Smart Traffic Control System - Traffic Lights with Smart Barricades

Scan the code to watch the video of the project

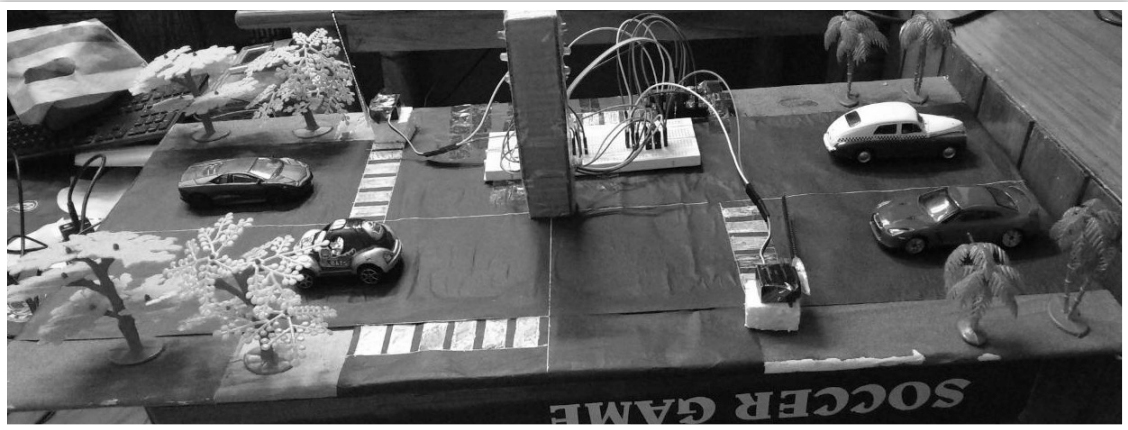


PROBLEM: A newspaper report in the Times of India provided some statistics showing that an average 1.5 lakh deaths are caused due to accidents in India each year. A major reason is the flouting of traffic rules, especially red light jumping.

BASIC IDEA: Our idea was to ensure strict observance of traffic light rules, we suggest putting up smart barriers at crossroads that close with red lights to stop any movement of vehicles, open with green lights and start coming down slowly with yellow lights, giving an indication to drivers to slow down and stop.



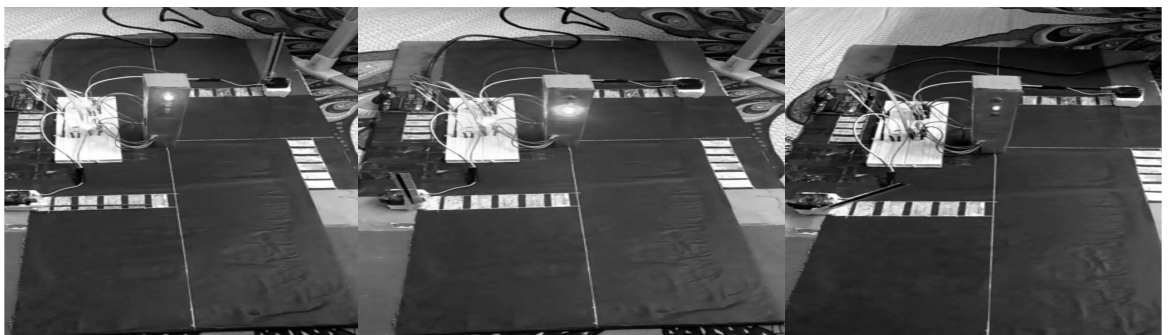
The Basic working barricade model was made using servo motors and coding.



Material needed for the project:

1. Arduino – an open-source platform.
 - a) Arduino IDE - software available for all computers which provide a text editor for writing code with integrated library support.
 - b) Arduino UNO microcontroller - physical programmable circuit board to run the code.
2. LED lights (red, yellow and green).
3. Servo motors, which get an electric signal to create mechanical movement, rotatory and linear.

With the signal changing every 7 seconds, the servo motors rotate accordingly and change the position of the barricades.



ADVANTAGES:

1. Disciplined traffic.
2. Lesser accidents.

CHALLENGES: Developing countries like India face practical issues like power failure, unexpected technical failure, congested/narrow crossroads, stray animals, etc., but with proper modifications/adjustments, we are sure this idea can one day be implemented successfully on Indian roads and make our roads safer.

3. School Name: La Martiniere For Boys, Kolkata

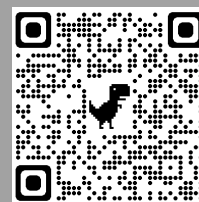
Winner: East Zone

Students: Sayandip Ganguly, Stav Sengupta & Deeptangshu Dasgupta

Project Supervisor: Mrs. Bishakha Banerjee

Project Name: Self-Monitoring Alarm to Resist Touch

Scan the code to watch the video of the project



Problem statement

People especially children have the habit of touching their face (nose, mouth & eyes) without properly cleaning or sanitizing their hands. This habit is a major problem in the current pandemic. People can easily contract Coronavirus because of this habit. Hence it is important to alert people from unknowingly touching their faces. So, we have designed a device that alerts us whenever we touch our face.

Principles used

- Piezo buzzer makes a sound when there is a flow of current through it.
- Current can only flow through a closed circuit.
- Heavy objects fall due to gravity.
- Metals are good conductors of electricity.

Proposed Solution

The device consists of a circuit with a Piezo buzzer and a movable metallic weight, which acts as a switch. The device will be worn on the wrist along with a wrist watch, a band, or a bangle. Normally our wrist points in a downward direction. Hence during a normal condition, the device will also be in a downward position. The heavy metallic weight is not in contact with the terminals of the circuit. So, the circuit is open and the current does not flow through the circuit and the buzzer. Hence, the buzzer does not make any sound.

Whenever a person tries to touch their face, the wrist points upwards. Hence in this condition, the device will also point in the upwards direction. The heavy metallic weight will fall on the terminals due to gravity and thus close the circuit. As soon as the circuit is closed current starts flowing through the circuit and in turn through the buzzer. Hence the buzzer makes a sound that alerts the person of their action.

Advantages

- Compact in size.
- Economic. Costs around Rs 60.
- Low current requirement hence safe to wear.
- Constructed using components easily available in the market.

Other Applications

- It can also be used by the patients to call for assistance.
- It may be used as an SOS signal in bikes or cars.

4. School Name: Silver Oaks School, Dabwali Road, Bathinda

Runner-up: North Zone

Students: Hargunpreet Singh, Gurmanpal Singh & Simreet Sokhal

Project Supervisor: Mr. Rajdeep Singh

Project Name: PARALI MURALS: A multi purpose approach to solve the problem of pollution due to stubble burning

Scan the code to watch the video of the project



The process of burning farm residue is one of the major causes of air pollution in parts of north India, deteriorating the air quality every year. Farmers burn stubble because they don't have any other feasible alternative that is economically viable.

Therefore, this is the biggest problem our region has been facing lately and we thought of finding an economical and feasible solution to this, as a result, we came up with an idea which we named "Parali Murals". We have been stimulated for this project by Kriya Labs, and the component which makes our challenge special from Kriya Labs is that we have tried to make this assignment on a household stage so the farmers can effortlessly make this at a domestic level.

The process is that it works on lignocellulose biomass. We collect the stubble and extract fibre from it and then make it into things of domestic use. The process is pretty simple, first the stubble is cut into small pieces and put into a utensil with some water into it and boiled for four to five hours. After that, it is bleached and left in the sunlight so that the moisture content reduces and the stubble dries up. The dried stubble is then crushed using a crusher to make fibre. This fibre is the ultimate product which could further be processed into various things for domestic use or for business purposes as well. For example, we can blend it with cotton and use it to make cushions, blankets or even mats. We can also process it into biodegradable plates and cups. The production cost of this fibre is very low which makes it very affordable and it does not require any complex machinery due to which the process could be followed very easily at a domestic level.

5. School Name: Stemfield International School, Baldeobhag, Jabalpur**Runner-up:** West Zone**Students:** Raghav Rusia, Sarvesh Tadse & Arav Borker**Project Supervisor:** Mr. Sanjay Pandey**Project Name:** Third Eye for the Specially-abled People(Blind)

Scan the code to
watch the video
of the project



Introduction: "When you start utilizing your third eye to seek the truth, you will then learn to see, that the divine is within you."

In our project "The third for the specially-abled people (blind)" is an amazing gift for visually challenged people. The device we made is actually a smart goggle. This smart goggle helps visually challenged people to walk easily and navigate confidently by detecting the nearby obstacles by using ultrasonic sensors. If any obstacles come across, this device notifies them with a vibration and buzzer sound. By using this device, the lives of visually challenged people would become more comfortable and would also avoid the chance of an accident.

Things required for the device are: Goggle, Arduino UNO, Buzzer, and a vibrator.

We have assembled Arduino UNO, Buzzer, and vibrator on both the sides on the temple of the goggles.

According to WHO 39 million people are estimated to be visually impaired worldwide. They are suffering lots of hardship in their daily life. The aim of our project is to develop a cheap, feasible, and efficient device to help visually challenged people for walking with greater comfort, speed, and confidence.



6. School Name: The Pentecostal Assembly School, Bokaro Steel City**Runner-up:** East Zone**Students:** Arpan Kumar, Satyam Chauhan & Amandeep**Project Supervisor:** Mrs. Rani Basanti Singh**Project Name:** Self Watering Plant System

Scan the code to
watch the video
of the project



Introduction

Self Watering Plant System (SWPS) is a device that can convert water vapour from the atmosphere into liquid water.

It is highly efficient due to compatibility with solar energy and no manpower requirements.

It is truly automatic and doesn't require any human interventions.

It is capable enough to bring a revolution in the agro-technology and liquid water scarcity management fields.

Basic Components

Water Generation

There's glass in the first part which is cooled by a Peltier module. A fan on the top sucks in moist air from the atmosphere into a pipe. The moist air comes in contact with the cooled glass and condenses on its surface to form droplets of water which are collected in the primary storage container.

Storage

These water droplets, thus formed, collect into the storage tank for further use. The container has a float switch which stops the cooling process once enough water has been collected.

This water is then used to water the plants.

Distribution

The water from the storage tank is then distributed to the plants through a highly efficient drip irrigation system to minimise water wastage.

Implicative Sectors

It can be used in any water-based industry without direct supply requirement. Broadly it is developed for the agro-tech industry but the first two parts can suit any level of water requirement, even liquid water scarcity-related issues or water supply to places which are away from municipality regions can be solved by this.

7. School Name: Vivekananda Mission School, Joka, Kolkata**Students:** Sayak Bhattacharya, Priyodip Saha & Samraj Das Adhikary**Project Supervisor:** Ms. Anamika Sen & Mr. Arindam Roy**Project Name:** Plant-Based MonitorScan the code to
watch the video
of the project

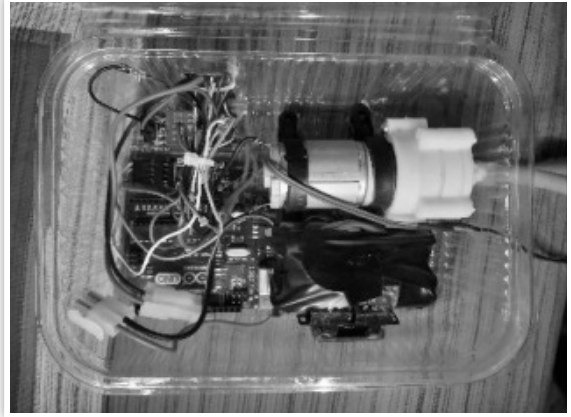
Every one of us likes gardening and planting plants. We always look after our plants so that they grow healthy and bear fruits or flowers in the future. But we can not tend to them all the time, because whenever we go out from our home for a trip or something else, the plants are left unattended. There is no one to take care of the plants and give them water from time to time. We have tried to solve this problem with our model - A plant-based monitor.

The plant-based monitor is such a machine that can detect the moisture in the soil and give water to the plants accordingly, [which means that this machine will release water to the plants when the soil is dry]. The Plant-based monitor takes power from a lithium-ion battery. The lithium-ion battery is charged using a mobile adapter and it can also be charged with sunlight using Solar panels. The water is stored in a plastic bottle tank that acts as a rain harvester. The plant-based monitor also uses a mist sprayer which makes the air laden with moisture and ensures faster growth of the plant body. The processor of this model is made of a single-core processor named Arduino. This model is best suited for people who are always busy with their work but at the same time, they want to take care of their plants. This model also applies to farmers who have become old and don't have enough physical strength to give water to the whole land.

The model's pump, solar panel, and battery need to be upgraded for a big farm. This model can also be used to water the trees on the side of roads which are neglected every day by people. It is critical to take care of them because we know that trees and plants are the only sources of oxygen on Earth.



Pictures of the model:



Save trees, Save lives.

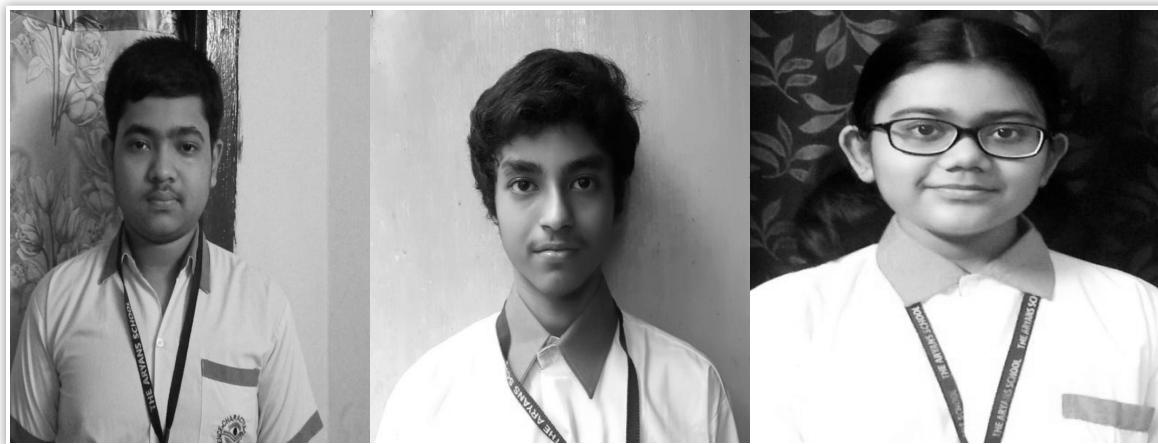
8. School Name: The Aryans School, Kolkata

Students: Arpan Roy, Subhayu Dev & Rittika Bhattacharjee

Project Supervisor: Ms. Sreeparna Sur

Project Name: Earthquake Alarm Model Working

Scan the code to watch the video of the project



An Earthquake, often known as a tremor or trembler, causes great harm to life and property every year. Though nowadays many modern instruments have been discovered through which we can detect earthquakes but they are not always available to us and also their cost is high and unaffordable for villagers. To avoid this problem we planned to create some device, which is simple and affordable to make people aware and alert about the earthquake instantly. Thus we created the earthquake alarm model out of the following materials.

To construct our model we have used:

- Two 9-volt batteries
- Two 9-volt clip connector
- Two vibrators
- A buzzer
- One small LED flashing light
- Two on/off switches
- Metal nut
- Copper wires
- Eye screw



- Choksi boards and card boards
- Both-sided gum tape
- Glue gun, fevicol
- Scissors/knife
- Grass mat

It works on the principle that during the earthquake when the vibration of the ground occurs, the naked wire which is passing through the eye screw (here it is working as a pendulum), makes contact with the eye screw. On the base plate, a buzzer has been fixed and there is a light fixed on the lower end of the vertical axis, just below the eye screw. These are connected with the eye screw with a very thin and fine wire. So when the wire touches the eye screw, as a result of vibration, the circuit gets completed and the buzzer starts ringing and the light glows. This indicates that the ground or the earth is trembling due to an earthquake. The instrument thus acts like an earthquake alarm.

9. School Name: Young Horizon School, Kolkata**Students:** Abhipsa Bhowmik, Nilarka Pahari & Srijit Ghosh**Project Supervisor:** Ms. Mahua Mukherjee**Project Name:** Sun TrackerScan the code to
watch the video
of the project

A solar tracker is a system that positions an object at an angle relative to the Sun. Solar trackers are mostly used in positioning solar panels so that they remain perpendicular to the sun's rays. The aim of the solar tracking systems is to improve and better utilize the current technology of solar trackers.

We made a single-axis solar tracker that rotates the panel in the east-west direction to align the solar panel with the sun throughout the day. The model we made works by getting light energy inputs from 2 light-detecting resistors placed on opposite sides. The sun moves from East to West and as the light energy inputs on the LDRs change, we can resolve which LDR has a lower input and then turn the Panel towards it until we get similar input from both sides.

A real-world usage for this technology could be implementing this technique in solar-powered street lamps that are used in many parts of India. By implementing this technology, an extra amount of energy is collected by the solar panels. We can conserve that extra power collected by each solar-powered street lamp in a power conservation facility, and then use that extra power for a variety of uses, like supplying free electronic vehicle charging stations for electronic vehicles.

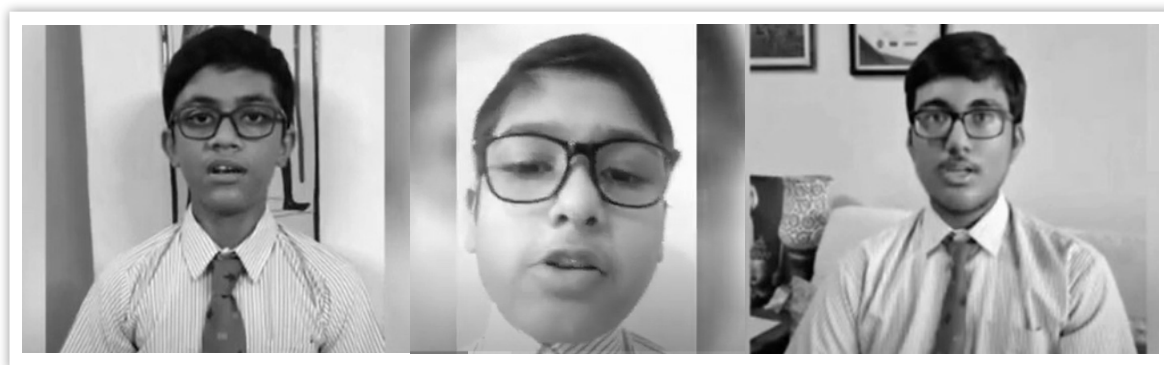
10. School Name: Birla High School, Kolkata

Students: Debarshi Bhattacharjee, Riddhiman Pal & Khushal Jaiswal

Project Supervisor: Ms. Binay Biswas

Project Name: Mobile App To Monitor Efficiency Of Oxygen Concentrator, Smart Dustbin And Other Machines

Scan the code to watch the video of the project



Nowadays human mortality due to Covid-19, and especially child mortality due to pneumonia is a major global health problem and is associated with hypoxemia. Access to concentrated oxygen can be the difference between life and death. Safe and continuous oxygen therapy can save a person's life; however, low-income countries may lack the necessary resources for oxygen delivery.

In this experiment, we have developed a solar-powered oxygen concentrator that can reliably provide medical oxygen with minimal access to electricity. This oxygen concentrator is also cost-effective. We have produced the oxygen with the help of water electrolysis. Moreover, this oxygen concentrator is monitored by an app which increases its efficiency.

To develop our model, we have used basic materials such as air-tight containers, plastic bottles, tap water, etc. This makes our product more economic as compared to the conventional oxygen concentrator. To set up a conventional oxygen concentrator, the cost is around 12 crore rupees while our oxygen concentrator will cost just around 500 rupees. This shows that our model can be used in regular households for emergency purposes. Keeping the current situation of the world in mind, our model works on solar energy which is a renewable form of energy. Hence, it is also eco-friendly. The recent pandemic has shown us how important oxygen is. Thus our oxygen concentrator can help the common people, who need oxygen but are not in the economic condition of buying a conventional oxygen concentrator. This oxygen concentrator can save the lives of many desperate people.

Smart Dustbin is a bin integrated with some hardware components such as Arduino, Servo Motor, Ultrasonic sensors. These components help in opening the lid on the detection of

the human hand and also sending the notification in the form of LED. The code required to perform the above-mentioned operation is dumped in Arduino. IOT-based dustbins help people to manage waste easily and help them reduce the work of calling or waiting for the specific person to make the area clean and make a healthier environment to live in. There won't be any kind of diseases and the people will be fit and not prone to diseases caused by these waste materials. The mission Swachh Bharat can also be implemented easily. This system ensures the cleaning of dustbins soon when the garbage level reaches its maximum. It will take power with the help of Battery. If the dustbin is not cleaned in a specific time, then the record is sent to the Sweeper or higher authority who can take appropriate action against the concerned contractor. It ultimately helps in keeping the surroundings clean and waste management can be much easier.

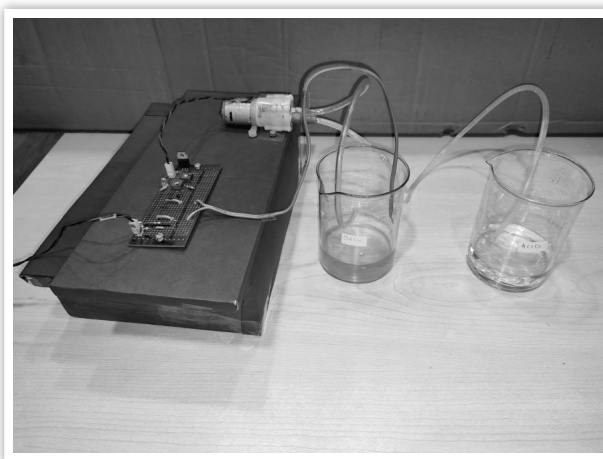
Nowadays the world is going through a phase of new innovation and technology. However, most of the machines will eventually falter without correct maintenance. Maintenance is an integral part for the functioning of the machine. If the machines stop for a day or two due to improper use then the incurring losses would be immense. Keeping in mind the importance of resources and the ease of calculation we have created the app to not only provide efficiency at the fingertips but also suggest the proper type of maintenance to be applied in case any problem occurs.

11. School Name: Adamas International School, Kolkata**Students:** Soumyarup Yadav, Rishabh Chatterjee & Srijan Das**Project Supervisor:** Mrs. Liya Das**Project Name:** Freedom From Diabetes: Is Artificial Pancreas The Answer?

Scan the code to watch the video of the project



Our school's project, "**Artificial Pancreas: Freedom from Diabetes**", focused on making a simplified model of the artificial pancreas and explaining its working principle by comparing it with neutralisation reaction. A basic solution represents high blood glucose levels, and a more neutral solution represents normal blood glucose levels in this setup. A conductivity sensor made by constructing an electrical circuit becomes the glucose sensor and it controls whether a pump in the circuit turns on or not. When the solution is basic, the conductivity sensor will make the electrical circuit run the pump. The pump will move acidic solution, which represents insulin, into the basic solution to neutralize it. The conductivity sensor will stop the pump when the basic solution becomes neutralized. This means high blood glucose levels being lowered by the addition of insulin until the glucose levels are normal and no more insulin needs to be added to the bloodstream.



While insulin shots are common ways to deal with insulin but artificial pancreas has sophisticated features which shines as a bright beam of light in the future of diabetes treatment. The aim of this project was to bring awareness among people about this device and let people know about its pros and cons so that they can make a wise decision during their fight with diabetes.

12. School Name: Purushottam Bhagchandka Academic, Kolkata

Students: Aditi Das, Arnab Das & Debarpan Chakraborty

Project Supervisor: Ms. Anindita Nayak

Project Name: Improving Efficiency of Machines at Home

“The important thing in science is not so much to obtain new facts as to discover new ways of thinking about them” -William Lawrence Bragg

All great things begin with a small step and one such endeavour of P.B.Academic School, Kolkata was its participation in “Macmillan Budding Scientist Award-2021”. It was the team of Physical Science composed of Aditi Das, Debarpan Chakraborty, and Arnab Das with the project on “Improving Efficiency of Machines at Home”.

The project was based on simple household and commercial appliances - water dispenser, candy vending machine, and vacuum cleaner. The working model was created from waste materials. It also included simple circuits and cost-effective materials. The scientific principles of the models are as follows:-

1. **WATER DISPENSER** - In a water dispenser, the main concept is pressure and gravity. Here, when the cap of the water bottle is opened, water flows through the straw and when it is closed, it stops the water flow. So, when the cap of the water bottle is opened, air starts to press the water and water flows via the straw. When the cap is closed, then the pressure is absent thus stopping the water to flow.
2. **CANDY VENDING MACHINE** - It shows the transition from potential to kinetic energy. When a Candy slides down, it gains more and more speed, thus kinetic energy increases. When a Candy is placed at a certain height then it possesses maximum potential energy.

Scan the code to watch the video of the project



3. **VACUUM CLEANER** - Materials flow from one location to another when a pressure difference is created between two locations. This phenomenon is the basic working principle of an ideal vacuum cleaner. In this appliance, the rotating fan of the motor creates a vacuum and begins to draw in air through the suction nozzle.



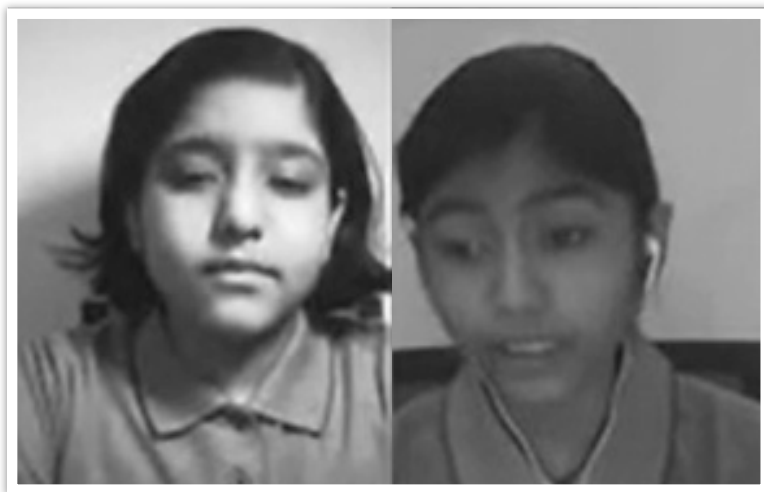
The vacuum cleaner is highly known for its flexibility, motor control, and versatility. The students enthusiastically participated in the event. The team spirit and the confidence of these students deserve a special mention. Their effort and hard work enabled the school to compete at a National Level Competition.

13. School Name: Patanjali Rishikul, Prayagraj

Students: Tushti Pandey, Vaibhavi Mitra & Sanjam Preet Singh

Project Supervisor: Mr. Saurabh Shukla

Project Name: Smart virtual supervisor for monitoring cleanliness of public toilets in India



Scan the code to watch the video of the project



In India, the concept of smart restrooms involves developing smart monitoring, auto-flushing and auto-dispensing toilets. Building such a toilet costs around 4 to 5 lakhs. Modifying these toilets would require major transformations and is a costly alternative. The cleaning and monitoring of the cleanliness of the public toilets is manual and follows a fixed routine. However, the restroom located near bus stations, railway stations, and densely populated areas are used more frequently and need multiple cleaning sessions. An alternative to facilitate clean toilets is to install smart auto-cleaning toilets. The major objective of our proposal is to design an Internet of Things(IoT) and AI-based smart virtual supervision equipment that can transform the conventional cleaning methods of scheduled cleaning and periodic monitoring into data-driven intelligent cleaning operations. The manual cleaning process should be augmented with a smart supervision system to improve the hygiene level of the existing restrooms. Restrooms should be deployed with sensors for monitoring footfall trends, ammonia levels, wetness values, air quality, soap dispensing levels, etc. The sensors are deployed on an Arduino kit. Data collected from sensors would be transferred to a computing server(RaspberryPi/fog/cloud). Then the summarized data would be processed by an app. This platform will be utilized to generate timely alerts regarding the condition of the toilet. It may also help in learning usage patterns for the predictive deployment of cleaners. Further, the proposed system would also increase the transparency of the system and make significant improvements in saving time and cost while improving customer satisfaction. A feedback collection app can also be developed. Cleaners are assigned a unique ID and the information regarding each cleaner is updated in the cloud database.

14. School Name: Sophia Girls' Sr. Sec. School, Bhilwara**Students:** Sejal Vagrecha, Hiya Surana & Subhra Dhadhich**Project Supervisor:** Mrs Anuradha Rathore**Project Name:** Environmental Science- solution for air pollution

Scan the code to
watch the video
of the project



The aim of our project was to create an economically viable pollution absorber. The principle behind our model was to reduce harmful pollution by passing the air through a chamber housing a plate with a petroleum jelly surface, which absorbs the pollutants and filters the air.

In this pollution absorber, a fan sucks the polluted air inside, and the pollutants in this air while passing through the chamber, sticks to the petroleum jelly. After a few minutes, we discovered tiny pollutants accumulating on the plate which is kept inside. We tried our best to avoid using non-biodegradable items like thermocol and plastic. This effort was done with the hope that the pollution levels could be decreased and we can breathe in a cleaner environment.

15. School Name: Raghav Global School, Noida

Students: Aviska Chaurasia, Taksh Sagar Khanduri & Kaushiki Pandey

Project Supervisor: Ms. Koyeli Mazumdar

Project Name: Environmental Science- solution for air pollution
- Best air Purifier



Scan the code to watch the video of the project



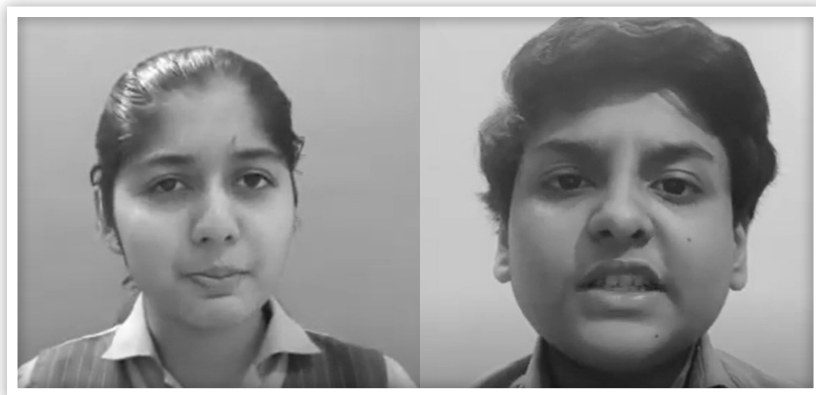
It all started with the mail we received from the “Macmillan Budding Scientist Award”. The task was to make a project or a model very unique to solve present-day problems.

An online meet was called for all the students of grades 6-8. Three children from grade 6-8 were picked up. They came up with the unique idea of making an air purifier using the used disposable facemask.

Taksh Sagar Khanduri and Kaushiki Pandey from Grade 7 and Avishka Chaurasia from Grade 6 teamed up for the project. Taksh took the responsibility of making the air purifier using the carborater of a car, while Avishka and Kaushiki started by making the mask carpet.

The Idea was good as during covid there were many disposable masks that were being dumped into the ecosystem. This mask carpet is actually recycling these used masks and preventing them to go into the surroundings. A fan fitted with a switch and a bulb completed the circuit. Keeping Bernoulli’s principle in mind the “best air purifier” was made.

The purifier was taking air from the surroundings and throwing out fresh air from the top. The particulate materials were stuck within the mask carpet which is washable and can be cleaned on a regular basis. This air purifier was very cheap to make and can be easily used in homes and offices.

16. School Name: Vivekanand School, Anand Vihar, Delhi**Students:** Shreya Giri, Navaneet Nambissan & Maitri Das**Project Supervisor:** Ms. Anju Moorjani**Project Name:** Environment Friendly Edible Cutlery

Scan the code to
watch the video
of the project



Plastic pollution is a global problem. Governments, foundations, and some social welfare organisations are all attempting to raise awareness about this issue. Plastic pollution has several negative effects on our climate. Some state governments are imposing strict regulations to reduce the usage of single-use plastic so that people are aware of the effect of plastic waste on the environment. As a result, action must be taken to address this issue before it is too late.

Keeping this in mind, students of Vivekanand School came up with a wonderful idea of making environment-friendly edible cutlery which is an alternative to non-biodegradable single-use plastic cutlery. Edible utensils help limit the use of plastics, resulting in the reduction of plastic waste. These are also biodegradable and would decompose. These types of utensils are better alternatives to using plastic cutlery at home and in business operations.

It is made out of completely natural materials, with no extra coatings, or additives, and it is perfectly safe to be eaten once the meal is over. Of course, this is not entirely necessary, as if you throw it away, insects, dogs, and birds can eat it too. And if it is not eaten, it will decompose within a week. The shelf-life of the cutlery is 18 months.

The ingredients for making home-made utensils are basic to most kitchens:

- 3 and ½ cups of flour
- 1 cup of water
- 1 teaspoon of salt

The tools required are:

- Small knife
- Scissors

- Rolling pin
- Baking sheet
- Metal spoons

The steps are simple, but some hands-on skills are required:

1. Preheat the oven to 375 degrees Fahrenheit.
2. Pour the water into a bowl, stirring in the flour gradually until the mixture is too thick to stir.
3. Dust a cutting board or surface with flour and transfer the flour mixture to it. Pat the mixture with both hands and roll it into a ball. Lightly dust the dough with flour.
4. Use the rolling pin to roll out the dough until it is $\frac{1}{4}$ inches thick.
5. Cut out spoon, knife, and fork shapes using the metal spoon as a guide for the handle lengths and utensil shapes. Use the small knife to carefully cut out the dough cutlery.
6. Cover the baking sheet with parchment paper, now place the dough in the pan and bake until its turns into golden brown for about thirty minutes.
7. Let the cutlery to cool down.
8. Use the cutlery for eating, and then eat the utensils.

Edible cutlery is environment-friendly, biodegradable, and generates less waste. It's a great solution to reduce plastic waste. Most importantly it provides occupation to the unemployed women in rural areas. It is chemical free and contains no additives and preservatives. So the students of Vivekanand School request you all to stop using plastic cutlery and move towards a green India.

17. School Name: Sevasadan Saksham CBSE School, Nagpur

Students: Kanak Joshi & Aadit Kapse

Project Supervisor: Mrs. Ritu Sharma

Project Name: Solutions For Noise Pollution



Scan the code to watch the video of the project



This model aims to decrease the noise pollution caused due to honking of automobiles, which are major contributors to noise pollution, especially in urban areas. Sighting this major problem, a unique horn has been designed using Arduino Uno Microcontroller. The primary objective of this system is to limit the number of times the horn is used, which ensures that the driver does not overuse the horn which will help in reducing the noise levels.

Technical Detailing:-

The model is programmed on Arduino Uno Microcontroller and the components like buzzer, LED's (Light Emitting Diodes), push button, resistors, jumper wires, etc are connected to it through the breadboard. When the push button is pressed, the buzzer makes a sound and the Arduino counts the number of times the push button is pressed and keeps a record of it. When the count exceeds the target limit (here set as three), it deactivates the buzzer (horn) for a certain period of time. After the stipulated delay, the buzzer (horn) can be used again. All these components are collaborated by coding the Arduino in C++ language.

Advantages and Future Prospects:-

1. With the advancement in technology of manufacturing vehicles and software advancement, we can incorporate this idea easily and can be made cost-effective also.
2. This circuit can also be integrated with powerful technologies such as Machine Learning, Global Positioning System and Artificial Intelligence which can enable this circuit to adapt to different scenarios and make it more efficient.

18. School Name: Ambuja Vidya Niketan, upparwahi

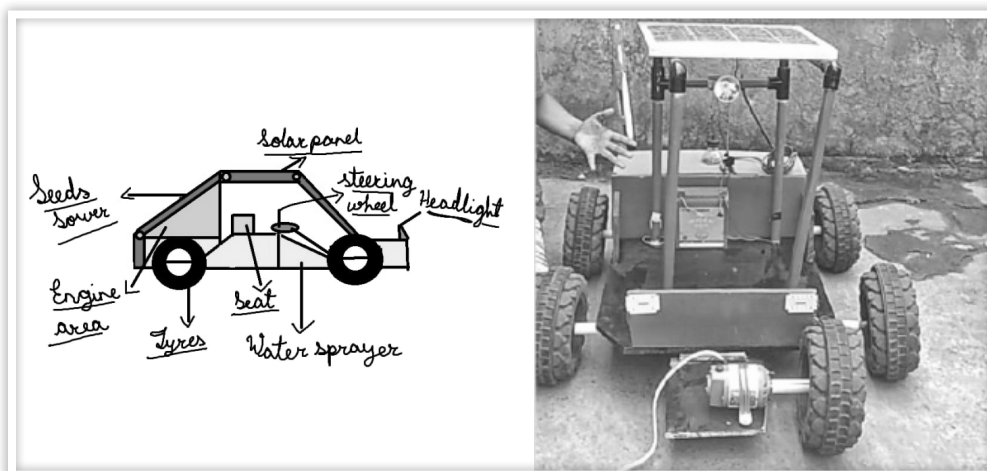
Students: Shivraj Wadai, Tanmay Gokhare & Bhargav Awande

Project Supervisor: Mr. Rohit Shukla

Project Name: Farmers Friendly Kart(physical Sciences)

Farmers-friendly kart is a model that can help farmers in many different ways. This model can replace bullock carts in the future. It works on solar energy and can save electricity and can also replace petrol and diesel which are very bad pollutants. The main aim behind making this model is to reduce the use of petrol and diesel and save time for the farmers. This model can do some extra work like spraying water and sowing seeds in the field. This project works on solar energy from the sun's rays. In the solar panel, there are many small solar cells that directly convert light energy into electrical energy through the photovoltaic effect. Photovoltaic cells convert sunlight into direct current (DC). Advantages of this kart -This model can be used for many purposes. In many villages, electricity is the main problem, keeping this in mind this project uses solar panels to charge the battery. It requires less maintenance. If kept in a sunny day, the battery charges automatically if wires are connected. This model helps the farmers in many ways so that their work becomes easy. This model uses only solar energy and helps to reduce air pollution. This model reduces the transportation time and the bullocks used in bullock carts can now be healthy and fit to be used for other purposes rather than used for transportation. This model can be used for many purposes.

Scan the code to watch the video of the project



19. School Name: Sri Sathya Sai Vidya Vihar, Indore**Students:** Angel Tiwari, Aaradhy Goyal & Vihaang Dalal**Project Supervisor:** Ms. Taranjeet Vyas**Project Name:** Air Purification

Scan the code to
watch the video
of the project



A simple, economical, and highly efficient air purifier consisting of different layers of filters in a stainless body to purify the air. The air passed through the filters becomes clean, breathable, and sanitized. The Purifier is portable and can fit on the dividing belts of the road. The simplicity and the minimalist design makes it efficient. It is self-sustainable and uses clean and green energy.

Design/Working

Stage I - The suction fans suck the air inside the air purifier, while exhaust fans push the air out from the top. It creates pressure and moves the air upward. This upward-moving air passes through the pre-filter that blocks all the large dust particles from the air to make it dust free.

Stage II - The air passes through the HEPA filter that blocks all the particles as small as 3 microns.

Stage III - The carbon filter absorbs deadly contaminants such as the VOCs and the carbon monoxide particles.

Stage IV - This air passes through the correctly tuned UV light that disables air-borne bacteria and viruses, thus making it germ-free and odourless. Then, this air is pushed out of the air purifier.

Sustainability of the project:

We use the energy produced by solar panels, winds, and traffic turbines. This extra clean and green energy produced can be used to power the street lights.

Commercial viability

- Selling Carbon Credits achieved by the air purifier will raise funds.
- Extra electricity can be sold to different organizations to generate money.
- Wi-Fi routers installed inside the lower section of the Purifier will attract sponsors from internet companies.
- The maintenance and nationwide use of the Purifier will offer more job opportunities.

The idea mentioned above will bring down the API, thus increasing the health quotient of the citizens.

20. School Name: Jawaharlal Nehru School, Bhel, Bhopal**Students:** Latika Malthare, Pawan Patil & Anushree Soniya**Project Supervisor:** Mrs. Parineeta Shakya**Project Name:** Hydrogen Gas As A Future Fuel

Scan the code to
watch the video
of the project



In our daily lives, as we use methods of different equipment and appliances etc. to make our life easier, the consumption of energy is increasing day-by-day. As the energy sources are limited and the population is increasing per second, the demand is also increasing each day. To meet this type of energy crisis we should adopt some alternative source of energy that is capable of meeting the energy needs of individuals while at the same time, it should be eco-friendly and economically affordable. Hydrogen can be used as a future fuel. Electrolysis of water to obtain hydrogen is a safe and economic option. We can use seawater for electrolysis as it already consists of a huge amount of salts that act as electrolytes. Hydrogen gas is an energy carrier that can be used in internal combustion engines or fuel cells producing virtually no greenhouse gas emission when combusted with oxygen. The only significant emission is water vapor.

Method of preparation in lab by electrolysis of water --

The electrolysis of water produces hydrogen and oxygen gases. The electrolysis cell consists of a pair of platinum electrodes immersed in water to which a small amount of an electrolyte such as H_2SO_4 has been added.

At cathode: $2\text{H}_2\text{O}(\text{l}) + 2\text{e}^- \rightarrow \text{H}_2(\text{g}) + 2\text{OH}^-$ $E^\circ = -0.42 \text{ V}$

At anode: $2\text{H}_2\text{O} \rightarrow \text{O}_2(\text{g}) + 4\text{H}^+ + 4\text{e}^-$ $E^\circ = +0.82 \text{ V}$

The net reaction of electrolysis of water is given as; $2\text{H}_2\text{O} + \text{Electrical energy} \rightarrow \text{O}_2 + 2\text{H}_2$
 $E^\circ = -1.24$

Electrolysis is a promising option for carbon-free hydrogen production from renewable and nuclear resources. Electrolysis is the process of using electricity to split water into hydrogen and oxygen. The hydrogen produced can be stored in suitable chambers and oxygen produced as a byproduct can be used for medical purposes for patients having medical emergencies for oxygen cylinders.

21. School Name: Bombay Scottish School, Powai, Mumbai**Students:** Swasti Singh, Parth Naik & Vaibhavi Venkateshwaran**Project Supervisor:** Ms. Riya Joseph**Project Name:** Treatment Of Injuries, Diseases, VaccinationsScan the code to
watch the video
of the project

Statistics show the third major cause of death worldwide is COPD (Chronic Obstructive Pulmonary disease). Research also revealed that by 2050, COPD will turn out to be the major cause of death worldwide, thus there is a necessity to create awareness about the same.

We made a 3-minute video for the first round which comprised the causes, symptoms, ways to prevent COPD, the government's role in imposing stricter measures, mention of the app to create awareness, and how one must not self-medicate or google their symptoms but consult the doctor.

A survey was conducted for students of grades 6, 7 & 9 to gauge their awareness of COPD. The survey results showed that there is very low awareness of COPD among people. They are aware of what causes lung issues but do not know how to avoid it.

Our app "Pulmofit" aims at creating awareness, encouraging people to practice breathing exercises, checking pollution levels anywhere and taking necessary precautions.

Macmillan Budding Scientist, powered by Springer Nature 2019

Finalists:

1. School Name: Silver Oaks School, Bathinda

Winner: North Zone

Students: Agamveer Singh, Harshveer Singh, Harkirat Kaur

Project Supervisor: Man Mehak Sidhu

Project Name: Eco Ink: Solution To Air Solution

Scan the code to watch the video of the project



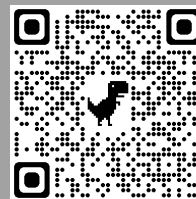
Recycle smoke from the chimneys, in the form of soot and convert it into eco-friendly ink that helps reduce air pollution. The resultant ink is very dark and durable. It does not fade easily.

- 2. School Name: Sri Padmapat Singhania school, Kota**
Runner-up: North Zone
Students: Anusha Saxena, Indra Prataph Singh Rajawat
Project Supervisor: Ms. Shipla Saxena
Project Name: Bricks from PET



Recycle plastic waste and made bricks from them. Melting the plastic by heating it with sand particles to form a paste-like substance, which is then put in a mould to set. The bricks made are economical and can be used for insulation.

Scan the code to watch the video of the project



- 3. School Name: St. Xavier's International School**
Zirakpur Zirakpur, Ramgarh
Students: Kiranjot Kaur, Vaibhav Ghai, Nandini Sharma
Project Supervisor: Ms Manisha Gulleri
Project Name: Bioshearing Wool Harvesting System

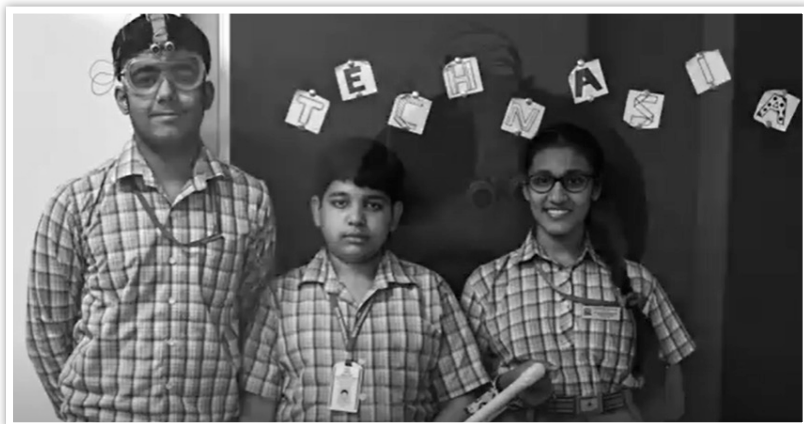


An effective way to shear sheep while reducing the chances of injury to the sheep and minimizing the chances of contracting Anthrax.

Scan the code to watch the video of the project



4. **School Name:** Ahlcon International School, Delhi
Students: Rudraksh Arora, Aditya Acharya and Nisha Gupta
Project Supervisor: Ms Mayank Dugar
Project Name: Eco-Signal-Glasses for the blind



Scan the code to watch the video of the project

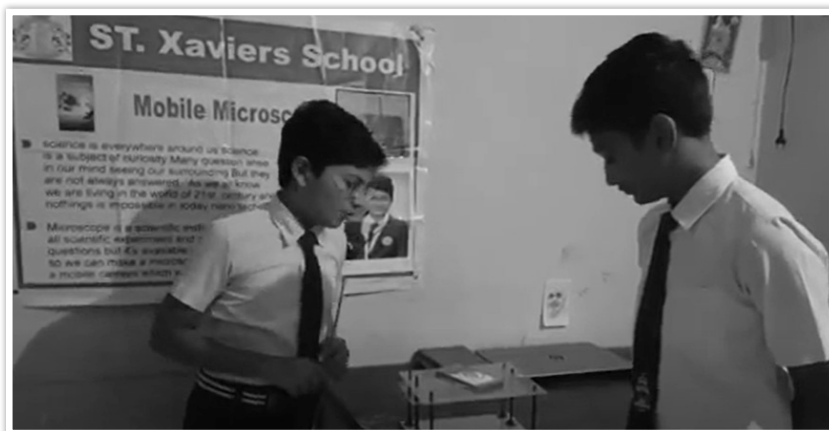


Using ultrasound-equipped goggles and walking stick which triggers a warning to the user when objects are close. These two smart devices enable the visually impaired by innovative use of technology.

5. **School Name:** Mount Carmel School , Dwarka, Delhi
Students: Akhyaan Kumar, Abhaas Dhayal and Maanya Dhawan
Project Supervisor: Ms. Deepshikha Kaur
Project Name: Cure For Cancer



Explore how copper plays an important role in starving the cancer cells and controlling cancer growth, and thus open a doorway to a cure for cancer.

6. School Name: St. Xavier's School, Bhuj**Students:** Pandya Parv, Thacker Rudra**Project Name:** Mobile Microscope

Explore how you can use your smartphone camera as a microscope with materials that are easily available.

Scan the code to watch the video of the project

**7. School Name: K.V. IIT School, Mumbai****Students:** Ishana Mukherjee, Tanisha Srivastava, Madhav Pillai**Project Name:** Solar Energy Based Net To Control Mosquito

A clean and cost-effective solution for mosquito control. Use of a solar-powered net to keep the mosquitoes at bay!

Scan the code to watch the video of the project



8. **School Name:** Amarajyothi school, Pathapatnam, srikakulam
Students: D.MOHITH, CH.MOUNIKA, S.JASWANTH
Project Supervisor: Ms. L Suneetha
Project Name: Water purification



Explore how sedimentation using simple machines like a water wheel can help you purify water.

Scan the code to watch the video of the project



9. **School Name:** Carmel convent sr. sec. school, Amlai
Students: Aastha Pandey, Shreya Chaturvedi and Lakshay Gauta
Project Name: Solution to control Air pollution



Explore innovative ways in which you can recycle pollution (Air Pollution) and use it to generate electricity, form ink, and other interesting things and take a positive step to curb air pollution.

Scan the code to watch the video of the project



Macmillan Budding Scientist, powered by Springer Nature 2018

Finalists:



Winners

Students of Carmel Convent Senior Secondary School, Amlai, Madhya Pradesh India. Presenting their project on "Increasing Efficiency of Machines"



Winners

Students of Ujjawal's Sprouter International School, Jalgaon, Maharashtra, India with their project on "Generating Electricity from Solid Wastes".



Winners

Students of Vivek High School, Mohali, Punjab, India, with their project "Rigator -- an easy irrigation machine that reuses surface runoff water"

Glimpses from 2018





Participate in Macmillan Budding Scientist 2023-24

ELIGIBILITY

Classes
6 to 8

Team Size
3 students & 1 coordinating teacher

CATEGORIES

Internet of Things

Environmental Science

Biological Sciences

Physical Sciences

Chemical Sciences

NOMINATION

Nomination is going on and closes on October 31, 2023



Scan the QR Code
for the nomination form

OR

Enter this URL in your browser

<https://macmillaneducation.in>

NOMINATING YOUR TEAM IS AS EASY AS 1 - 2 - 3!

1. Fill in all details accurately in the nomination form and submit. The video upload is optional at this step.
2. After successful nomination, the mentor teacher receives an email from **forms-receipts-noreply@google.com** with a copy of the responses. To make changes, access this email and click **"Edit Response"**.
3. To upload the **3-minute video**, use the same email and click **"Edit Response"** again. Upload the video in the last field of the nomination form.
4. Please note: Submission of video can be done only once.

THINGS TO CONSIDER

- The last date for submission of the video is **November 30, 2023**. Entries will be judged by an independent jury comprising scientists and academicians.
- Top 8 Teams of each zone along with their mentor teacher will be invited to showcase their working model/experiment/idea to the jury at their regional IIT Campus.
- The winner and runner-up teams will be eligible for participation in the grand finale.
- Participants are eligible to receive digital certificates of participation upon successful submission of the video.

REGIONAL

STEM



**Exciting STEM kits for
1st & 2nd placed teams**

AWARDS



GRAND FINALE

1st place: Science grant of ₹25000*
2nd place: Science grant of ₹20000*

**Subject to applicable taxes.*

Write to somanjan.bandyopadhyay@macmillaneducation.com for queries.



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2022-23 WINNERS

**National Winners of Macmillan Budding Scientist 2022-23
from Navrachana Higher Secondary School, Vadodara**

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