SCIENCE CASTLE

in ASEAN

4th & 5th November 2020

Leave a Nest

SCIENCE CASTLE in ASEAN 2020

Day 1: 4th November 2020

Plastic Waste, Natural Resources and Energy Session

	Time (SGT)	Contents	
Session 1 Tsunagu Research Project	13:00 - 13:20	Opening Ceremony	
	13:20 - 13:30	Theme setting presentation by Leave a Nest about new ways of international collaboration for secondary school students	
	13:30 - 13:45	5 min Presentations by 3 student teams	
	13:45 - 13:55	Voice from school teachers on project	
	13:55 - 14:00	Break	
		Topic: Plastic Waste & Natural Resources	**Topic: Energy**
Session 2 Circular Economy	14:00 - 14:05	Introduction by Moderator	Introduction by Moderator
	14:00 - 14:10	HICKAM (SG)	StingTec (IND)
	14:10 - 14:15	MizuU (JP)	Turbinobabies (PH)
	14:15 - 14:20	STAN LOONA (PH)	Mechanica Navitas El Electricia (MNE) (MY)
	14:20 - 14:25	USAHAWAN (MY)	Q&A session for teams
	14:20 - 14:55	Q&A session for teams	
	14:55 - 15:00	Announcement for Day 2	

Plastic Waste & Natural Resources Session
Moderator: Captain Faiz Kamaludin
Panelists: Dr. Joanna Coleman, Ms. Anisa

Energy Session
Moderator: Prof. William Chen
Panelists: Assoc Prof. Alessandro Romagnoli, Dr. Rivellini Laura-Helena

Day 2: 5th November 2020

Food & Agriculture, Earth Science and Space Economy Session

	Time	Contents
12:55-13:00 Opening of 2nd day		
		Topic: Food & Agriculture
Session 3 Food & Agriculture	13:00 - 13:05	Introduction by Moderator
	13:05 - 13:10	Hydrosol (MY)
	13:10 - 13:15	FAROAHS (SG)
	13:20 - 13:25	NMH Bio Group (JP)
	13:25 - 13:30	CORONA (SG)
	15:30 - 15:55	Q&A session for teams
	13:55 - 14:00	Break
Session 4 Space and Earth Science		**Topic: Space & Earth Science**
	14:00 - 14:05	Introduction by Moderator
	14:05 - 14:10	Lunar Expedition (JP)
	14:10 - 14:15	NITIC Astronomy Club (JP)
	14:20 - 14:25	Salesio Gakuin High School (JP)
	14:25 - 14:30	EMRYS (II) (MY)
	14:30 - 14:55	Q&A session for teams
	14:55 - 15:00	Break
Closing Ceremony	15:00 - 15:30	Closing ceremony

Food & Agriculture Session
Moderator: Ms. Anisa Azizah
Panelists: Prof. William Chen, Ms. Juhi Singh

Space and Earth Science Session
Moderator: Captain Mohammed Faiz Kamaludin
Panelists: Dr. Huang Weimin, Dr. Chen Zhi Hao

O-01

Plastic Waste

Investigation Of The Effect Of Different Chemicals On The Growth Of Bacteria

School	School of Science and Technology, Singapore
Presentator(s)	Chia Howie, Sung Yeji, Lim Xuan Wei Joel
Group Name	HICKAM

Abstract

Our group researching the effect of different killing agents on the growth of bacteria from our school canteen with the aim to benefit the cleaners, school's hygiene, and the world. Hence, we designed an experiment to determine which cleaning chemicals are effective in killing bacteria. The one that kills most germs would be the deciding factor as the most effective cleaning agent. This helps protect us from disease-causing pathogens, viruses and the new COVID-19 Virus. From our experiment, our group could conclude that Clorox was the most effective chemical in killing with an average Killzone of 2 cm2 after four days of observation followed by Mr Muscle, Dettol, Jif and Mamalemon with their respective average kill zones of 1.7, 1.6, 0.9 and 0.8 cm2. This is useful to science as our group now know which killing agents are more effective in killing bacteria. Next we went on to testing the effectiveness of Clorox in different concentrations and concluded that ⅘ Clorox was almost as effective as the undiluted one with an average Killzone of 2.5 cm2 after four days of observation. This information can be shared with the public to increase their awareness of cleaning agents. This will also help reduce the number of illnesses linked to unsanitary environments.

Background, Hypothesis, Uniqueness

Background

Experiment A

Sanitation is vital to every human as it is healthy. With, adequate sanitation, one can reduce the risk of infecting diseases to his body. In light of this, we aim to find out information about various common cleaning detergents and their effectiveness in killing bacteria and sanitising. This project aims to benefit our knowledge and to provide a cleaner environment for students in our school. We want to confirm which chemicals are active in killing bacteria are most effective in killing the germs in our everyday lives. Thereafter, we hope to improve the school and the world's sanitation by finding out which types of soaps are the most efficient.

Experiment B

In this further experiment, we assess different concentrations Clorox (which contains bleach) to determine the amount of concentration needed from the Clorox to effectively kill bacteria. This will allow us to cut cost by using a bottle of Clorox for a longer time. We would also be able to prove that a lower concentration of Clorox is as effective as the undiluted Clorox in killing viruses like the 2019 coronavirus on surfaces.

Hypothesis

Experiment A: The hypothesis is the more acidic the chemical is, the less likely bacteria will survive.
Experiment B: The hypothesis is the less concentrated Clorox is equally as effective as the fully concentrated Clorox in killing bacteria.

Independent variable

The type of cleaning product tested to kill the bacteria

Dependent variable

The diameter of the inhibition of bacterial growth

Controlled variables

Experiment A: Source of bacteria used, The time is given for the bacteria to grow, Mass of chemical used
Experiment B: The volume of dilute used, The time that is given for bacteria to grow, Source of bacteria used

Uniqueness

We are researching the effect of different killing agents on the growth of bacteria from our school canteen. Our other research is on investigating whether the concentration of the best killing agent (Clorox) in the first experiment is equally as effective as the undiluted one on the growth of bacteria. We want to see whether a lower concentration of Clorox is as effective as the original concentration of clorox.

Passion for this project

We designed this experiment to determine which cleaning chemicals are effective in killing bacteria. In the current COVID-19 situation, this experiment will help us protect from disease-causing pathogens, viruses and the new COVID-19.We designed an experiment to determine which cleaning chemicals are effective in killing bacteria. The one that kills most germs would be the deciding factor as the most effective cleaning agent.

O-02

Recycle - Plastic

Research Of The Handy Pod's Materials Possibilities

▶ School: Koka Gakuen High School

▶ Presentator(s): Yuzuka Tamaoka, Yui Tanaka, Kanon Keino, Kinuka Tomono

▶ Group Name: MizuU

Abstract

Our project is based on the idea of Handy Pod, which is used in Cambodia. Microorganisms in the pod clean water. With NGO WaterAid's support, we have researched how it works. We used to focus on the pod made of plastic, but as problems of marine plastic are getting more serious, we started to consider the possibility of making it with other materials. Referring to essays, we proposed that stainless steel should be the best material that can replace plastic. Therefore, we made two Handy Pods, the plastic one and the stainless steel one. By using them, we had an experiment to research weather stainless steel Handy Pod works as well as plastic one. At first, we filled the one-third of pods with mud to promote activities of microorganisms and filled the rest of them with water. We put adequate amount of miso soup everyday. This is because, to clean water, it should be staying in the pods for a week. During this term, we also tested water quality by using COD. We have been measuring the water temperature in the pods everyday since our experiments had started. As a result, the water wasn't cleaned in the stainless steel pod very much. We think the reason of this is that the length of the time for which water temperature in the stainless pod reached between 36 to 38 degrees was much shorter than in the plastic one. We will have the same experiment to confirm this result.

Background, Hypothesis, Uniqueness

Background

In Lake Tonle Sap, people live on the water and live with the water of the lake. This means that their main transportation is boat and they use its water to live and they pour the water they used into the lake. This cycle causes the water quality become worse. Because of this problem, not only adults but also many children get sick and some of them dye. Handy Pod is thought as the important item to purify dirty water and solve this problem. We think that more people should be able to access the clean water.

Hypothesis

We think that the experiment of stainless steel Handy Pod will succeed if we can control the water temperature in the pod. We also expect that stainless steel Handy Pod will be more useful than plastic one, considering marine plastic problem.

Uniqueness

Handy pod was produced by NGO WaterAid and we made them by ourselves for the first time in Japan. Handy Pod is made of plastic but we think we should make it without plastic because of marine plastic problem. Therefore, we got into the first team that made stainless Handy Pod.

Passion for this project

We learned the status quo in Cambodia two years ago and we were very shocked at that time because the water quality in Japan is one of the most highest level in the world so it is usual for us to get clean water. However, like Lake Tonle Sap, there are regions where people cannot access the clean water. We thought that as members of the same planet, we have responsibilities to try to help and support them. We also learned the reality of marine plastic problem and we thought that this should be solved as soon as possible. Then, we noticed that Handy Pod is made of plastic so we decided to think about other material to make it. We strongly believe that our activities should achieve positive impact for sustainable society. Therefore, we planned this project.

O-03

Natural Resources

Subcritical Carbon Dioxide Fluid Extraction Of Copras (Cocos nucifera linn.) Oil

School	Father Saturnino Urios University-Bp. Pueblos Senior High School
Presentator(s)	Bernard Louis Montemor, Rophe Dea Lynzekieth Ampo, Shiena Marie C. Celedena, Gem C. Estopito, Mariez Thresha G. Umpad
Group Name	STAN LOONA

Abstract

Cocos nucifera linn. fruit is commonly known as a staple and a food additive or flavoring in the Philippines. Though a handful of studies both in local and international have looked into its oil composition, the identification of dominant polar and non-polar molecules is the primary goal of this study. The dried coconut flesh was obtained from a local source, sun-dried, and its moisture content reduced. It underwent Subcritical Carbon Dioxide extraction with the given parameters: 10 Minutes, 20 Minutes, and 30 Minutes with a constant temperature and pressure of -10C and 2.5MPA. A total of nine (9) different samples were used throughout the extraction. The overall average oil yield is 1.05%. All nine (9) oil samples were then analyzed using paper chromatography to identify the nature of the components in the oil, such as Polarity, and to determine the significant difference between the two different solvents used. It was then found out that low retention factor values which peaked at 0.11 Rf have shown during the exposure of the sample to Ethanol, which suggests that there is a low concentration of polar compounds in the sample. High retention factor values which peaked at 0.97 Rf have shown during the exposure of the sample to Hexane, which also suggests that there is a high concentration of non-polar compounds in the extracted sample. It's also shown that there is a significant difference in retention between the two solvents used. Correlating the data with an existing GS-MS analysis of coconut oil, the oil sample yielded may be one important source of fatty acid, that can be incorporated in a diet.

Background, Hypothesis, Uniqueness

Background

Subcritical and Supercritical fluid extraction (SFE) is the most effective and efficient method used for separating hydrocarbons or a certain component from a certain matrix (Sapkale et.al, 2010). These methods can be used as a sample preparation step for analysis, separate unwanted material from a certain product, or collect a desired product such as essential oils (Sapkale, et. al, p1). This method is effective in decaffeination, and dry cleaning. Additionally, Supercritical and Subcritical fluid extraction aim to reduce the usage of harmful hydrocarbons that are used for standard extractions such as Soxhlet, which the fumes are eventually expelled into the atmosphere, further worsening the problem of greenhouse gases. However, little is known about it (McHugh & Krukonis, p197).

Hypothesis

- Ho1 – There is no significant difference between the percent oil yield and the parameters with respect to time.
- Hα1 – There is a significant difference between the percent oil yield and the aforementioned parameters.
- Ho2 – There is no significant difference between the retention of oil from the different parameters under Hexane.
- Hα2 – There is a significant difference between the retention of oil from the different parameters under Hexane.
- Ho3 - There is no significant difference between the oil sample retention from the different parameters under Ethanol.
- Ha3 - There is a significant difference between the oil sample retention from the different parameters under ethanol.
- Ho4 - There is no significant difference in retention between Ethanol and Hexane.
- Ha4 - There is a significant difference in retention between Ethanol and Hexane

Uniqueness

Generally, Supercritical and Subcritical fluid extraction is a subject that is not popular in the Philippines. There are a handful of studies that discuss the components of Cocos nucifera oil, but in terms of the method of extraction, most specifically via Subcritical CO2, this is the first research endeavor in the Philippines.

Passion for this project

Science is all about going beyond the box, and personally, delving deeper into the world of super and subcritical fluid extraction has fueled my passion, as well as my co-proponents into realizing the feasibility of this study. One thing that also drove us into finishing the study, is the dearth need for knowledge about how subcritical fluids behave in such a manner that gives the possibility to extract essential components without the use of harmful and environmentally detrimental chemicals such as liquid hydrocarbons, and the like.

O-04

Natural Resources

Utilization Of Natural CO2 Extracted From Biogas Produced By Natural Treatment Of Palm Oil Mill Waste Water (POME) For Commercial Use

School	Sekolah Menengah Usahawan Al-Amin Ulu Klang
Presentator(s)	Salman bin Saifurrahman, Ahmad Danish Khwarizmi bin Ahmad Faizal
Group Name	Usahawan

Abstract

This project looks at utilization of natural CO2 extracted from biogas produced by natural treatment of palm oil mill waste water (POME) for commercial use, to replace CO2 produced from fossil fuel. As CO2 extracted from the POME mill is true a natural source, without any chemicals, this is a true alternative by utilizing available source which otherwise goes to waste. In order to execute this project, we assumed that CO2 extraction is a techno-economically viable process to be applied in the palm oil mills. We also assume that the price of liquified CO2 per tonne will continue to rise from USD 20 (2020) to USD 35 (2030) to USD 85 (2050. The methods used involves literature reviews on POME waste treatment, biogas technology, carbon capture technology, pricing and Malaysia Palm Oil mills, qualitative and quantitative analysis using excel spreadsheet and interviews with a renewable energy engineer in the palm oil industry. The introduction of carbon capture technology to capture the CO2 produced in the POME plant results in significant reduction in CO2 release from palm oil mills. An estimated production of 4 million tonne liquified CO2 with a sales potential of RM 300 million per mill per year which will generate an income of palm oil company. In total there are approximately 400 mills all over Malaysia, which means that this is a RM 146 billion cost saving initiative. The CO2 extraction project can reduce the amount of CO2 in the atmosphere to combat climate change and global warming. If proven successful in Malaysia, this technology can be deployed to other countries such as Indonesia.

Background, Hypothesis, Uniqueness

Background

First of all, we are very passionate on this research project as we care for the environment and would like to think of ways to reduce carbon footprint and climate change in Malaysia. As we learn about the palm oil industry, and the fact that palm oil is one of Malaysia's biggest commodities, we now understand that there is a significant CO2 emission from POME plants, that has a potential to be used in other industries, as an alternative to CO2 produced from fossil fuel.

Hypothesis

In order to execute this project, we assumed that CO2 extraction is a techno-economically viable process to be applied in the palm oil mills. From the environmental regulation point of view, although at this point of time, there is no limit of the release of CO2 from palm oil mills in Malaysia, it is just a matter of time that the UN Climate Change Requirement will be gazetted in Malaysia. We also assume that the price of liquified CO2 per tonne will continue to rise from USD 20 (2020) to USD 35 (2030) to USD 85 (2050)

Uniqueness

This project has not been applied in Palm Oil mills in Malaysia before. Although the methane from the POME biogas is used in the biogas plant, the CO2 is currently released to the environment. This project will be the first to utilize carbon capture technology in palm oil mills in Malaysia.

Passion for this project

First of all, we are very passionate on this research project as we care for the environment and would like to think of ways to reduce carbon footprint and climate change in Malaysia. As we learn about the palm oil industry, we now understand that there is a significant CO2 emission from POME plants, that has a potential to be used in other industries, as an alternative to CO2 produced from fossil fuel. There is also an opportunity to export the CO2 which can create new job opportunity and can greatly boost the Malaysian economy from where it is today to more than expected by creating more jobs. We feel that it is a win-win solution.

O-05

Energy

Ignite.Ly

School	Ryan International School, Vasant Kunj, New Delhi
Presentator(s)	Sidhant Sidana
Group Name	StingTec

Abstract

In today's world, there is a veering demand for energy and its production at the same time. Fossil fuels like petroleum, coal as well as natural gas are currently the world's elementary energy source. Formed from organic material for millions of years, fossil fuels have fueled global economic development over the past century. Yet they are non-renewable finite resources and they can also irreparably and inevitably harm the environment and the natural ecosystem. The true costs of coal, natural gas, and other fossil fuels are not always obvious but their effects and impacts could be disastrous. Green-House gases like carbon dioxide and methane produced due to the burning of fossil fuels lead to global warming, increasing frequency of extreme weather events (like storms, floods), changes in amount and pattern of precipitation, acidification of the oceans, dramatic changes of ecosystems, expansion of tropical diseases, and change of global agricultural patterns. Unraveling this tangled web is as complex as it is urgent if we are to avoid the frightening consequences of runaway climate chaos. We must decarbonize our global economy by mid-century to avoid the worst possible outcomes. The research project focuses on reducing toxic emissions and greenhouse gases from fossil-fuel powered vehicles and industries. Collectively, cars and trucks account for nearly one-fifth of all US emissions, emitting around 24 pounds of carbon dioxide and other global-warming gases for every gallon of gas. The proposed project tackles this grave issue by using hydrogen as an energy carrier. Hydrogen has the highest of calorific value of all known fuels and does not give rise to any greenhouse gas. Hydrogen is an environmentally friendly alternative to fossil fuels and can be used to power just about any machine needing energy. Our proposed hydrogen kit is to be used in engines of motorcycles and cars and its industrial application includes its installment in electricity generators to make them cost-effective.

Background, Hypothesis, Uniqueness

Background

The project is designed to solve:-
The energy conservation i.e. the low usage of fuel (petroleum) in the existing combustion engine and the fuel that will serve the demand of energy would be hydrogen which will be obtained from water and we will be producing on-demand hydrogen which prevents us from storing the highly combustible fuel and hydrogen is the cleanest fuel with the highest calorific value among the available sources. The project will allow vehicles to emit fewer emissions and hence will help in conserving the environment. The project will serve both the energy sector and the environment as well The petroleum demand will be deduced hence resulting in the conservation of the environment, fuels, and mines.

Hypothesis

The primary idea behind the research project was to find different ways to utilize hydrogen as a fuel for transportation(to be used in automobiles) in order to reduce the use of fossil fuels which would ultimately lead to reduction in pollution and emission of toxic particulate. Since it is neither safe nor feasible to utilize stored hydrogen, the process of electrolysis of distilled water is utilized to produce on demand hydrogen. This freshly produced hydrogen will not be a complete alternative but only a partial one, and will be used as an additive (around 30%-50%) to petrol/diesel in the combustion engine of the vehicle.

Uniqueness

Our kit overcomes the problem of reducing the expense of use of hydrogen as a fuel. Although hydrogen cells are now being used to power hybrid cars, it's still not a feasible source of fuel for everyone. We have designed our kit in such a way that it can be used as an additive to the existing engines of motor vehicles.Hydrogen energy and fuel cell power will be clean, abundant, reliable, affordable, and an integral part of all sectors of the economy in all regions of the world. Therefore, our proposed product is one of the non-paralleled kits that can do the very least to secure a clean, healthy, and sustainable future for us, our future generations, and our very own planet, Earth.

Passion for this project

I am an avid reader. I read the newspaper, journals, and books almost daily. Once I came across a statistic published in the newspaper which stated that about 68% of air pollution in India is from the consumption of fossil fuels by automobiles like cars and trucks. On further reading, I was in shock to find out that air pollution caused by vehicles causes staggering 55,000 deaths in the US, directly and by its implications. This made me wonder that something like cars which I believe almost everyone owns in a country like India has such dreadful impacts. Although vehicles may not directly pose such serious and far-fetching problems, its implications are grave. We cannot just give up automobiles. Hence, I passionately began exploring different alternatives that can be easily brought into our lives and have such a positive impact on society, environment, and eco-systems. This was the reason because of which I started working on my research project.

O-06

Energy

The Development Of A Slow Drift Motion-Based Water Turbine

School Philippine Science High School - Main Campus

Presentator(s) Vaughn Ramos, Dona Marabe, Tom Alipio

Group Name Turbinobabies

Abstract

Electricity has become essential to modern life with the rise of technology in medicine, education, business, and even simple household tasks. However, despite its necessity, electricity generation is still a major issue especially in rural and coastal communities from developing countries like the Philippines. This study aims to develop a way for communities along shores to generate electricity by utilizing their location and common source of living. The Slow drift motion-based Water Turbine (SWT) harnesses the passive back and forth slow drift motion experienced by ocean vessels using a motor and a turbine blade, which is based upon the design of the Waterotor. It turns this motion into power, which can then be stored once it passes through a load or battery. All turbine components were 3D printed and combined using epoxy. The prototypes used a 7.5V motor connected to a circuit, and were manually tested using multimeters in a wave pool to simulate motion in open seas while maintaining a controlled environment. The results have proven the SWT capable of producing voltage, albeit in small amounts so far, with the mean of the initial prototype at 26.97 mV. Although the output of the final prototype was not as steady and consistent as the initial, results have shown that increasing the size of the turbine blade is essential to increasing output, with the final prototype's mean at 173.38 mV. A few improvements and changes to the design should prove it capable of generating larger scales of electricity.

Background, Hypothesis, Uniqueness

Background

Slow drift motion is a large, low-frequency motion caused by non-linear hydrodynamic forces that affect objects floating at sea. The Waterotor is a water turbine designed to harness energy from beds of slow moving water sources, like riverbeds. The Oscillating Water Turbine incorporates a rod that is meant to naturally create small vortices upstream from the turbine blade. Sustainable electricity generation is commonly absent in coastal communities. With the sea as their staple, a combination of the aforementioned principles to create a small, accessible, cheap, and green water turbine can help ease this problem by utilizing their resources and surroundings.

Hypothesis

The Slow Drift Motion-based Water Turbine can yield voltage outputs high enough to serve as a secondary source of electricity for people in coastal communities.

Uniqueness

Slow drift motion is something already normally experienced by seafaring vessels, and yet it is not harnessed in any form. This project utilizes this phenomenon by turning it into a portable, easy access source of renewable energy. The created turbine also floats on the surface, and is relatively small, so it may be attached to large boats and vessels, which allows it to freely generate electricity while the vessel is idle. The design is also simple and dynamic, so it may be easily scaled up to also produce larger outputs.

Passion for this project

A core concept in Physics which everyone probably knows is that "energy is neither created nor destroyed." This has always been the foundation of our team. All of us take up Physics as a core subject in our high school, but while physics is part of everything and is literally everywhere–it's still so hard to look for research ideas that have relevant impacts in our world today. At the time of our project proposal submissions, power outages scattered all around our country–even in major cities. This made us wonder how worse it probably is for people who have just grown used to not even having power at all, most of whom are from rural or coastal communities since they are far from main power plants. These realizations, combined with simply wanting to spend more time closer to the ocean, made our team determined to find a sustainable solution that could somehow reach even those in isolated islands. As scholars of the Philippines for Science and Technology and aspiring engineers, it's always been part of our goal to give back to our communities in all the ways we can. Aside from this, with every success and every failure, from the first 3D printing mishap and not knowing that we have to mix the resin and hardener before applying it, to all the late night turbine assemblies with scheduled sleep shifts while Netflix plays in the background, to the last test that thankfully yielded good results, we undeniably enjoyed every step of the way. This enjoyment, the hope and love we have for our simple prototypes, was there from conceptualization– and much like energy in basic Physics, the enjoyment and memories we've experienced with this project can never be taken away from us!

O-07

Energy

Mechanica Navitas El Electricia

- School: Sekolah Menengah Sains Seri Puteri
- Presentator(s): Priyasini Vilayan, Sharifah Nurliyana Binti Syed Mohd Firdaus, Shajetrra Nair A/P Sevan, Yasmin Malihah Binti Shahariza
- Group Name: Mechanica Navitas El Electricia (MNE)

Abstract

Demand for electricity in the world is increasing as the world population and socio-economics also grow. However, the present sources of generating electricity (fossil fuel) has become a threat to human existence through the emission of carbon dioxide. According to Institute for Energy Research, electricity generated from this source has been estimated 80% of the total world electricity generated. Mechanica Navitas El Electricia (MNE) is a prototype that describes the mechanism of mechanical energy. Sound waves could also be used to generate electricity as it is a type of mechanical energy which has never been used as a form of electric generator. In this project, we convert sound waves which is in the form of vibration to electrical signal which later is generated through transducers. As sound energy in our daily activities, it could give us abundance of ways to decrease the rising percentage of pollution. The prototype works when the presence of sound acts as a switch to light up a LED light. The prototype uses an arduino nano board to show the similar concept of how sound can be used to generate electricity. If this project is proven to generate electricity, then a better model could be build without any external source and will be installed in areas which have high levels of sound frequency such as highways and malls to generate the sound waves produced by even the slightest sound. All in all, this project helps to overcome the environmental issues involving electric generation globally.

Background, Hypothesis, Uniqueness

Background

According to Godfrey, Bob & Janet, 2003, the energy from non-renewable sources has taken over the major supply of the world energy consumption. Energy from fossil fuel had been estimated to be 80% of the total energy supply worldwide while nuclear energy produces 17%, with the remaining percentage from other sources. Electricity is a very important energy that must be sustained as it has invaded our lives and has become vital in all aspects of society today. It could be described as the pillar of all nations' economic growth as developed, developing and undeveloped countries need electricity for their survival. The reason that non-renewable resources are "non-renewable" is because there is a finite amount available on earth. Fossil fuels, the most commonly used resource will eventually cease to exist on the planet if constantly consumed. Moreover the government has to spend a big amount of money to build large plantations which consume a wide space of area to be installed to generate electricity by using renewables sources of energy. This means that eventually, a new and simpler alternative energy generators will be needed.

Hypothesis

Sound waves could also be used to generate electricity as it is a type of mechanical energy which has never been put up to be used as a form of electric generator. Sound can be defined as a vibration that propagates as an audible wave of pressure, through transmission mediums such as gas, liquid or solid. Sound waves are described according to its characteristics such as frequency, amplitude, speed of sound and direction of sound source.

Uniqueness

Most of people think that sound is useless in our daily life, meanwhile we are able to make use of the sound by converting them to electricity. This conversion is hard to be executed and if we succeed, we will be the first in Malaysia to be able to do so.

Passion for this project

In this modern world, there is lot of noise pollution all over the nation, from roads to airports and industrial areas. We wondered what if we could convert all those noises into something beneficial. We also thought about how difficult life is without electricity. With that, we came up with the idea of our research project, Mechanica Navitas El Electricia which can convert sound energy into electrical energy. Besides that, the villages in the rural areas of Malaysia are facing electrical problems such as insufficient supply of electricity. Our project is able to store electricity similar to solar panels but is easier to be installed and comparatively cheaper. Thus, we think that our research project would be beneficial to the villagers.

O-08

Food & Agriculture

Greenhouse Smart Grow (GSG)

School	Science Selangor Secondary School
Presentator(s)	Nur Azrinadhirah Binti Shahril Nizam, Nurain Binti Hamdan, Nur Athirah Syabilah Binti Azeman, Ungku Elleen Zarra Binti Ungku Zanedreef Shah
Group Name	Hydrosol

Abstract

Urban gardening is an agricultural method practiced in the area limited as in the city or suburbs whether using land or landless. This method of urban gardening allows the residents who are interested in cultivating crops such as vegetables in residential areas whether flat, apartment or condominium. Although they have limited space, residents can still grow vegetables in creative ways such as vertically, suspended or even tiered as long as the plant gets sunlight. Greenhouse Smart Grow designed to apply 3 technologies namely hydroponic, solar and greenhouses are expected to be used to grow vegetables indoors that are narrow. Built multilevel and variable is effective to use for the long term. This project has produced healthy, pesticide-free and can be harvested over a period of time. Fast in turn helps save household expenses in a continuous way. Also, vegetable maintenance methods are minimal with the availability of hydroponic technology and greenhouses on this model because fertilization is done periodically, there is no disruption of disease or creature pests and continuous yield harvest. Use of LED lights is an electronic device that works using a light source sun (solar system). Solar panels will collect energy from light from the sun and convert it to the next electric energy which will give extra light to the crop at night. Here increase photosynthesis and stimulate mature plants faster. Greenhouse Smart Grow can benefit users in the future because it uses an independent source i.e. solar power, without land (hydroponic concept) and safe (greenhouse concept).

Background, Hypothesis, Uniqueness

Background

The project called Greenhouse Smart Grow was created as an alternative option for those who want to grow their own vegetables in their homes. It is created for residents who cannot afford to grow vegetables or flowers because their house does not have enough space. However, this model can also be used for large-scale agricultural purposes in the event of land mismatch problems, insufficient land area and shortage of manpower. This project uses solar energy as a substitute for sunlight and also does not use pesticides compared to other cultivation techniques. This project has produced lush vegetables, healthy, free from pesticides and can be harvested over a period of time.

Hypothesis

Our designed Greenhouse Smart Grow Project is expected to produce crops that grow faster than conventional methods. Crops can be harvested in less than a month but depending on the specific type of vegetable. The crops produced are more fertile and healthy because there are no pesticides or hazardous chemicals used in this project. The application of three technologies (hydroponics, solar and greenhouses) produces 'urban gardens' innovations that are more suitable for continuous cost of living savings. It is expected that this model can be used or commercialized in the future at minimal and reasonable cost (marketability).

Uniqueness

We use the combination of hydroponic technology and solar system to make this Greenhouse Smart Grow project. Solar panels will collect energy in the morning or noon for certain hours to generate energy to the LED light at night. Therefore, GSG will still be operating at night using solar energy. We use planting techniques using Hydroponic technology to reduce water usage. This project is very helpful and has many advantages. For example, the plant will have abundant and high quality results. Hence the users will have the chance to eat their own outcome which is a lot healthier as it has no chemical fertilizer and is free from pesticides. In addition, we also install wheels under the GSG model to make it portable. GSG users can carry this model wherever as long as it is placed close to the sunlight. This shows that the Greenhouse Smart Grow model is unique as it has many advantages and can be used anywhere, anytime, at ease.

Passion for this project

We produced this project because we are very interested in vegetable farming activities. Our interest has been hampered because the living area we live in is apartments that is does not have ample space to grow our own vegetables. To overcome this problem we have innovated the method of hydroponic cultivation by building Greenhouse Smart Grow which is a multi-story hydroponic shelf like cupboards. This GSG model solves our problem because it does not require a lot of space. Also, we had problems in accelerating the growth of vegetables because our apartment did not have a balcony that provided sunlight to the plants. Therefore, we added a solar panel system to the GSG model and placed led lights as one of the mediums to accelerate the growth process of the vegetables. Finally, we created this project to produce vegetables that are free of chemical pesticides compared to vegetables sold in stores.

O-09

Food & Agriculture

Investigation Of How Different Rice Types Affect The Fermentation Process To Make Rice Wine And Its Alcohol Content

School	School of Science and Technology, Singapore
Presentator(s)	Chua Zhe Lei, Favian Loh Dai Yong, Jayden Tu Sheng Jie
Group Name	FAROAHS

Abstract

This is an investigation about how different types of rice affect the fermentation process of rice wine. Four different species of rice were used to make rice wine. Based on the results obtained, we concluded that rice wine made using different types of rice have different alcohol by volume percentages (ABV). However, the data and statistics also show that on final measurements of the rice wine showed a very minor difference in the alcohol content produced. We conducted the experiment over a period of 13 days. Measurements were taken on the third day and the thirteenth day of the experiment. At the end of the experiment, Thai Glutinous Rice had the highest ABV percentage at 25%, while Thai Hom Mali Rice had the lowest ABV value at 21%. Japanese Short Grain Rice and Pakistani Basmati Rice had ABV values of 24% and 22% respectively. Also, we found that the total amount of alcohol in the rice wine will decrease over time as the alcohol content remains the same while the total amount of liquid increases, which decreases the proportion of alcohol in the rice wine. By knowing the different alcohol contents of rice wine, people will be able to home-brew rice wine that suits their needs with the knowledge of the alcohol content in the wine.

Background, Hypothesis, Uniqueness

Background

Rice wine is an alcoholic beverage, which is fermented and distilled from rice, traditionally consumed in East and Southeast Asia. Fermentation of rice wine is made by the fermentation of rice starch that has been converted into sugars. Rice wine is most commonly used in Asian cooking and in a religious and ceremonial concept (Huang, 2000). So far, no research has been found to prove that having a higher amount of starch content will result in a higher alcoholic level of the rice wine made froma particular type of rice. Based on our research, we found that the total carbohydrates in Japanese Short Grain Rice per 100 grams is 78.8g, while the total carbohydrates per 100 grams in Thai Hom Mali Rice and Pakistani Basmati Rice is 79.0g. The total carbohydrates per 100 grams in Thai Glutinous Rice is 75.5g. Based on our background research, we have not found any usable evidence that the type of rice will affect its alcohol content. It is stated on many sources that the average alcohol by volume percent (ABV) content in rice wine is about 18 to 25% (LeBlanc, 2018). Our research will help consumers to decide which type of rice wine to purchase for consumption on the basis of the type of rice used to fermentate it. Rice wine has many health benefits, however, the negative effects of rice wine on the body have not been heavily explored in scientific research, which makes it less accessible (Rucker, 2007). By being able to gauge the alcohol content, this will prevent possible heavy intoxication or overdose cases (Jorge, 2012). Knowing the alcohol content of rice wine can also help chefs prepare their dishes better as they will be able to decide on which type of rice wine to use so as to bring out the best taste in their dish. By determining the amount of alcohol in different rice wine made using different types of rice, people who home-brew rice wine will be able to know what type of rice to use to create rice wine, as according to their personal preference and alcohol tolerance, so as to prevent heavy intoxication. We wanted to find out how different rice types affect the fermentation process to make rice wine and its alcohol content.

Hypothesis

The hypothesis is that different types of rice will give varying levels of alcohol content, and that the Japanese Short Grain Rice will give the most amount of alcohol. This is because most people use Japanese Short Grain Rice to make rice wine for drinking.

Uniqueness

Our research is unique as no other report has been found online about the alcohol level of rice wine that takes the type of rice used into account. Our research also provides unique benefits such as choosing the type of rice to make rice wine for different foods or occasions.

Passion for this project

This research project came as a suggestion firstly from the teachers-in-charge when we were doing our Investigative Skills in Science (ISS) Module as part of our Science curriculum. We realised that rice wine is a unique type of alcohol, is very traditional to the Asian culture, and we grew up with our relatives always using it. After we did some research, we found out that it encompasses a lot on organic chemistry as well as biology, which was very interesting to us, and thus we pursued this research project to find out more.

O-10

Food & Agriculture

Fish Meat Cell Culture ~ Solving The Problem Of Food Shortage ~

School	Nagasaki Prefectural Nagasaki Minami High School
Presentator(s)	Shuta Nishikawa, Shoichi Inokuchi, Arisa Matsuo, Hinata Miyagami, Moe Shiramizu
Group Name	NMH Bio Group

Abstract

There are many parts of the world that suffer from food shortages. Therefore, we thought that if animal cells could be cultivated instead of the animal themselves, it would be possible to obtain meat without killing livestock, and without using vast amounts of land, grain and water to raise livestock. From this, we thought we could solve this problem by cloning fish meat using a cell culture technique we developed in our school. At Nagasaki Minami High School, we have been researching and developing a way to regenerate individuals of parts of endangered plants using our own cheap and simple cell culture method. We thought that if our method can successfully clone parts of plants, it could be possible to clone parts of animals as well. We did a cell culture experiment using cheap materials such as multivitamins and egg as substitutes for expensive materials used in cell culture experiments done in research laboratories. As a result, we succeeded in growing cells of smallscale blackfish, but further testing must be done to see if these cells can develop into meat. This experiment is based on five of the seventeen SDGs.

Background, Hypothesis, Uniqueness

Background

Food shortage is a global problem caused by many factors, such as overfishing and lack of resources to raise livestock. Cell culture, a method for growing cells outside of their natural environment, has been used to clone plants as one way to solve this problem. We thought that we could apply cell culture to clone animal cells as well. From this, we thought we could solve the problem of food shortage by cloning fish meat. Using a cell culture technique we developed in our high school, we tried cloning fish meat of smallscale blackfish, a commonly found fish in Japan.

Hypothesis

At Nagasaki Minami High School, we have been researching and developing a way to regenerate individuals of parts of endangered plants, such as the Nagasaki Giboushi, using our own cheap and simple cell culture method. We thought that if our method can successfully clone parts of plants, it might be possible to clone parts of animals as well. We hypothesized that if we could clone fish cells using our cell culture method, then it would be possible to obtain meat without needing to raise and kill fish.

Uniqueness

Cell culture done in research laboratories use specialized but expensive culture mediums, such as DMEM and L-15. To mimic these mediums, our research used a mix of multivitamins which have the same components found in L-15 as the medium. Our research also used parts of an egg to substitute other expensive materials used in cell culture done in research laboratories. Fetal bovine serum, which is used as a growth factor for proliferating cells, was replaced with egg yolk, and antibiotics, which are used to disinfect the inside of petri dishes, were replaced with egg whites. These substitutes can be found in any supermarket.

Passion for this project

We were inspired by our senior's research on cloning the Nagasaki Giboushi, so we went to Nagasaki University to learn more about cell culture. After, we thought that if we could clone plants at our school, it might be possible to also clone animals. We also listened to a lecture about the SDGs in our first year, and we were interested in solving world hunger. So, we thought about doing this experiment.

O-11

Food & Agriculture

Investigation Of The Effect Of pH Levels On Enzyme Activity

School	School of Science and Technology, Singapore
Presentator(s)	Cherelle Goon, Ramesh Eniya, Teo Chuan En
Group Name	CORONA

Abstract

The hypothesis is that pH level 6.7 to 7.0 is the optimum pH level for amylase to function the best on starch. The purpose of the experiment is find out the optimum pH level to make amylase breakdown starch the fastest to find out what pH level types of food can improve people's diet for a healthier lifestyle. Each experiment consisted of mixing the amylase solution and starch solution. Then adding the pH level buffer solution and waiting every 10 seconds to drop an amount of solution into a spot palate and adding iodine to see if it will turn yellowish-brown from blue-black. After the experiment, a graph was plotted to take note/the average time for amylase to break down the starch. From the graph, pH level 6 is the optimum value for making amylase break down the starch the fastest.

Background, Hypothesis, Uniqueness

Background

The human body produces energy for its day-to-day activities through the digestion of food. Digestion is a complex process which breakdowns large, insoluble food molecules into small, water-soluble molecules using mechanical and chemical processes (BBC Bitesize, n.d.). Chemical processes involve enzymes which are proteins that function as biological catalysts. Enzymes can break down nutrients into small, soluble molecules that can be absorbed by Amylase, which is produced in the Salivary glands catalyse the breakdown of starch into maltose in the mouth and small intestine. The glucose that results after carbohydrates are broken down completely is used by the human body for energy, and it is the preferred source of energy for the brain and nervous system. Amylase is found in greatest quantities in the pancreas, liver and small intestine. Amylases are classified into Alpha-amylase, Beta-amylase and glucoamylase (Science Direct, n.d.). Based on their three-dimensional structures, these enzymatic reactions occur in an aqueous environment, where many factors are involved, including the pH levels (USGS, 2019). pH is a measure of how acidic or basic water is. It measures the relative amount of free hydrogen and hydroxyl ions in the water. The range of the pH levels goes from zero to fourteen. pH levels from zero to seven indicate acidity, with zero being the most acidic and seven being neutral. pH levels greater than seven and up to fourteen are alkaline. Water that has free hydrogen is acidic, while water that has more hydroxyl ions are more alkaline. Since pH levels can be affected by chemicals in the water, pH is an important indicator of water that is changing chemically. Past research has shown that pH levels can affect enzymatic activity (From H.J., 1975 and Worthington, 2019). Enzymes are affected by the changes in pH levels. The most favourable pH value, the point where the enzyme is the most active, is known as the optimum value. The optimum pH value will vary greatly from one enzyme to another, leading us to this investigation. This investigation seeks to find out how pH affects the breakdown of starch into maltose by amylase. The procedure will be done using a buffer solution covering a range of pH levels, iodine, amylase and starch on white tiles. After that, a graph will be plotted to take note the average time for amylase to break down the starch. From the graph, which pH level is the optimum value for making amylase break down starch the fastest, can be determined.

Hypothesis

The hypothesis is that the pH level of 6.7 to 7.0 is the optimum pH level for amylase to function the best on starch.
Independent variable: The independent variable is the pH level
Dependent variable: The dependent variable is the time taken for amylase to break down.
Controlled variables: (a) Iodine (b) Amylase (c) Starch (d) Type of Test Tube (e) Teat pipette

The pH level is the independent variable as it is the one which can be altered from pH 2 to pH 8. It fits the hypothesis which is that pH level 6.7 to 7.0 is the optimum pH level for amylase to function the best on starch as there is a wide range of pH levels which will help determine if the hypothesis is proven right or wrong. The dependent variable is the time taken for amylase to break down as the time depends on the pH level that is being tested to see if the pH level 6.7 to 7.0 is the optimum level for amylase to function. It can be predicted that the mouth has an average pH level of 6.7 as it might be slightly acidic and 7 is the neutral pH level, making 6.7-7.0 the optimum pH range. If the optimum pH value is found to be lower than seven, the consumption of acidic food based on the pH level could improve digestion and metabolism. If the optimum pH value is found to be higher than seven, the consumption of alkaline food could improve digestion and metabolism. Knowing the optimum pH level can help society to better decide on the types of food which could improve their diet, to develop a healthier lifestyle.

Uniqueness

We were inspired by the group of people in Singapore with the risk of high blood pressure as we wanted to know more about why they are suffering from such a condition. We did some research in regards to the root cause of high blood pressure which is the high amount of sugar found in their blood. From there, we brainstormed and tried to use various pH levels to determine which is level is most effective to break down sugar.

Passion for this project

In this day and age, many people experience excess carbohydrate intake. Due to this, their bodies may have continually high levels of blood sugars, which may lead to risks such as weight gain, poor metabolic health and an increased risk of heart diseases. Thus, to counter this issue, we had decided to research and investigate the effect of pH levels on enzyme activity to find out what is the optimum pH level for the breakdown of starch.

O-12

Space

Lunar Reflection Spectrum And Lunar Rock Types

School	Kamo Senior High School
Presentator(s)	Natsumi Imazu, Yuina Ohata
Group Name	Lunar Expedition

Abstract

The moon is the only satellite on earth. On the moon's surface are the white "highlands" and the dark "seas." From the rocks collected by the American lunar survey, it is known that the "highlands" are composed of plagioclase and the "seas" are composed of basalt. Also, the difference in the types of lunar rocks is closely related to the origin of the moon. Therefore, we investigated the composition of lunar materials using the reflection spectrum of the moon. The observation took place on January 10, 2020, which was a full moon. After that, the spectrum of the sun, the reflection spectrum of the "sea" of the moon, the reflection spectrum of the "highlands" of the moon, the reflection spectrum of basalt and the reflection spectrum of plagioclase were graphed and compared. As a result, the "highlands" and plagioclase were almost in agreement, and the "sea" and basalt were also in agreement. We found two things in this survey. The first is that the moon has a high reflectance for long wavelength light and a low reflectance for short wavelength light. The second is that the lunar "sea" is composed of basalt and the lunar "highlands" is composed of plagioclase.

Background, Hypothesis, Uniqueness

Background

From the rocks collected by the American lunar survey, it is known that the "highlands" are composed of plagioclase and the "seas" is composed of basalt. Therefore, we examined whether it is possible to prove that the "highlands" are composed of plagioclase and the "seas" is composed of basalt from the comparison of reflection spectra. In addition, the exploration of planets requires huge amount of money, time and people. In this study we identified lunar rocks using only a telescope and a spectrophotometer. So, we also aim to prove that the research can be carried out by ourselves.

Hypothesis

From the rocks collected by the American lunar survey, it is known that the "highlands" are composed of plagioclase and the "seas" is composed of basalt. Therefore, we believe that the comparison of reflection spectra will give the same result as the American lunar survey that the "highlands" composed of plagioclase and the "seas" composed of basalt. We also think that it is possible to identify the rocks of the moon by the reflection spectrum, because the reflected light differs depending on the substance.

Uniqueness

The uniqueness of our study is to observe the lunar reflection spectrum and the rock reflectance spectrum with a telescope and a spectrophotometer and compare them to identify the lunar rock.

Passion for this project

The moon is the only satellite on earth. The moon is located 3.8×10^{8}m away from the earth. The diameter of the moon is 3.4×10^{6}m, which is the same diameter as one quarter of that of the earth. The mass of the moon is 7.3×10^{25}g, which is the same mass as one eighth of that of the earth. In addition, on the moon, there are white “highlands” and dark “seas”. These differences are caused by the different types of rocks that make them up. These facts are closely related to the origin of the moon. Therefore, the investigation of the rocks that make up the moon is an important clue to clarify the origin of the moon. So, we focused on identifying lunar rock types by their reflection spectra, because that method makes it possible to do lunar research with a telescope and a spectrophotometer.

Space

O-13

Attitude Estimation For Nasmyth Telescope Using Deep Learning Image Recognition

School	National Institute of Technology, Ibaraki College
Presentator(s)	Kamolphat Intawong
Group Name	NITIC Astronomy Club

Abstract

Nasmyth telescope is a telescope for people in a wheelchair. Ibaraki Kosen astronomy club automatized it so it can be used in actual observation. However, because of Nasmyth's narrow field of vision, it is difficult to get the target star into view. Therefore, we worked on developing a program that allows us to know which direction the telescope is facing by analyzing the image of the stars observed from Nasmyth's field of vision. That is the Attitude Estimation Program. In the first step, we succeed in creating a program that recognizes the three constellations from the image data. And we are experimented with how the accuracy changes when the quality of the test data is changed. The program is developed using Python Tensorflow's Keras and the recognition model is a Convolutional Neural Network. It consists of four layers, which are the Input layer, two Dense layers, and the Output layer. The program is currently called the Constellation Pattern Recognition Program. This program can accurately predict the constellation in the data with the best average accuracy is near 0.970. The best activation function combination is the ReLU function for the first and the third layer and the Softmax function for the fourth layer. The average validation accuracy is 0.8661. The best epochs are 7 with the average validation accuracy of 0.9744. The prediction accuracy varies according to the quality of the test data, which are Magnification and Brightness.

Background, Hypothesis, Uniqueness

Background

Ibaraki Kosen astronomy club is working on the astronomical observation in both the technological side and the contribution to the local community. We regularly hold the astronomical observation and its main is Nasmyth telescope, which is adapted for people in a wheelchair. However, it is difficult to get the target star into view. Therefore, we worked on developing a program that allows us to know which direction the telescope is facing. If succeeded, the Nasmyth telescope will be more useful for us students in academic purpose, and for the people in the community to observe the astronomical objects.

Hypothesis

This program can accurately estimate the attitude of celestial objects and predict the constellation included in the images. The accuracy is 0.90 or more. The best activation function combination is the ReLU function for the first and the third layer and the Sigmoid function for the fourth layer. The prediction accuracy varies according to the quality of the test data. The 4 to 8 times magnified data's prediction accuracy is the highest. And the darker the images (the less light-polluted) is the more accurate the program can predict.

Uniqueness

Firstly, the project applies the usage of Deep Learning which is the technology that the world is paying attention to. Secondly, The final purpose of the project is Attitude Estimation which is the technology that JAXA is researching to apply to the spacecraft. And we high-school students are also working on it, but with different objectives, tools, and algorithms. Finally, The objectives of the project make it unique and special. This project is a part of the contribution to the community. It also serves the academic purpose of program development and astronomical study.

Passion for this project

I started this project because of the technical problem that the Nasmyth telescope is facing in real astronomical observation. Through this project, the telescope will be more comfortable for many people to use (including people in a wheelchair). And that would allow a lot more people to experience the interest of astronomy. I am a student in a computer science course, so I want to apply my skills to help. Also, this project is related to Deep Learning, Pattern Recognition, and the Attitude Estimation technology that JAXA is researching. I found this very interesting and challenging. Through this project, I will gain more useful experiences. Also, the project can be developed into a bigger scale project in the future. Finally, this project has many benefits to the world in many ways such as computer technology, astronomical study, community contribution, etc.

O-14

Earth Science

Studies On Lybia Tessellata And Sea Anemones Held In The Crab's Scissors

School Salesio Gakuin Senior High School

Presentator(s) Ryosuke Yamada, Masateru Sakakibara, Seita Yamaguchi, Katsuya Endo, Hayato Fujiwara

Group Name Salesio Gakuin High School

Abstract

Lybia tessellata is a crab of the genus Lybia of the family Xanthidae, with a carapace length of 1-2 cm, that inhabits the shallow, warm waters of the Pacific and other waters. It has been reported that it holds a specific sea anemone on both scissors legs, which it shakes to threaten when an enemy is present. Last year's research revealed that Lybia tessellata doesn't select specific sea anemone, but rather keep any species that live around them; that the cause of sea anemone's bleaching (the phenomenon of zooxanthellae escaping from the body) is thought to be stress being trapped; anARd that sea anemones are sometimes used as emergency food and a tool to get food, and that the two species have a commensalism relationship. In this year's study, we examined changes in the amount of zooxanthellae and cnidarians before and after Lybia tessellata holds sea anemone, which was confirmed in the previous year's study on bleaching, by preparing and observing tissue samples of the anemone. We confirmed numerically that anemone is bleaching under stress. In the future, we will also test the possibility that Lybia tessellata are mimicking a sea anemone by analyzing their threatening behavior. When they threat up other creatures, they hold up the anemone in their hands to make themselves seem to be a real sea anemone. We'll also examine the feeding capacity of sea anemones to elucidate the commensalism relationship and test whether sea anemone's bleaching is beneficial to Lybia tessellata.

Background, Hypothesis, Uniqueness

Background

Our current knowledge on this species is that it harbors and lives on a specific anemone. If we can clarify the relationship between this species and anemones, we can clarify the ecology of this species and contribute to the understanding of the symbiotic relationships that many dissolved species have. Previous studies have shown that anemones trapped by this species bleach. Therefore, if we can elucidate the causes of sea anemone bleaching in parallel with our study of this species, we may be able to gain useful knowledge for elucidating the bleaching phenomenon in corals, a member of the same family.

Hypothesis

The purpose of this study is to clarify the relationship between sea anemones and the Lybia tessellata. The previous year's study suggested a possible unilateral relationship between this species and the sea anemone. However, the results were merely observational and didn't provide scientific proof of this relationship. In this year's study, we'll examine how the amount of zooxanthellae and cnidarians required for anemone growth changes before and after the anemone is retained by this species, and more scientifically prove the results of the previous year's study by making tissue samples and observing the changes.

Uniqueness

The uniqueness of this study is that we focus on a very unique marine creature, Lybia tessellata, possibly the most unique creature in the world. It holds sea anemone in it's scissors which should be very important to crabs but why they continue to have them is still unknown. This enigmatic biology is also fascinating. They also hold sea anemones in both hands, but those anemones are always bleached while being held. However, when they are released from their claws, they gradually try to return to their original parental state, which means that while they are being held, they are in a strange state of bleaching and still able to sustain life, making this curious relationship between the two species unique. In addition, a unique feature of this study is that it provides a broad view of Lybia tessellata and the held sea anemone from both ecological and histological aspects.

Passion for this project

The first reason why I decided to start this research was because it looked interesting when I saw a special feature on this creature on TV. However, Lybia tessellata is not a creature that has been extensively studied in the first place, and as I studied Lybia tessellata, I realized that there is much that is not known about its relationship with the sea anemone that is held in the scissors of the crab and its ecology. Initially, my research was just curious, but as I uncovered the lack of information about the sea anemone and its strange relationship to the sea anemone and its ecology, I became fascinated by the endless possibilities of discovery of this creature. Lybia tessellata is also very popular as an ornamental species. We enjoy keeping these creatures, which have not yet been established, with new discoveries every time we keep them.

O-15

Earth Science

Aumentar

School	Sekolah Menengah Sains Seri Puteri
Presentator(s)	Raiesa Ameerah binti Zulhasmi, Sanchana a/p Teruselvam, Zafirah binti Zakaria, Nurul Rahwani binti Razlye, Anisa Najwa binti Mohd Khairi
Group Name	EMRYS (II)

Abstract

All plants need an adequate amount of necessities to grow healthily which makes the person need to monitor their plants from time to time. This is why the number of damaged plants keeps increasing day by day as people do not have time to monitor their plants due to their packed schedules. This case goes unreported because it is not considered as a serious issue. However, it may lead to an imbalanced ecosystem if it keeps happening and this is why we came up with our project. Aumentar consists of a few sensors that can detect the right amount of necessities needed by plants and Internet of Things (IoT) that enables users to control the pesticides pump via phone.

Background, Hypothesis, Uniqueness

Background

Nowadays, a lot of individuals are actually interested in planting but could not proceed as they are always busy due to variables such as work, school, household management, and other extracurricular activities. Because of this, not many people are willing to sacrifice their time just to involve themselves in gardening or planting. In addition, those individuals that had attempted to garden in the past realized they couldn't continue to take care of their plants due to various time constraints and, consequently, had stopped. This is also due to the lack of knowledge in planting. Hence, the plants do not grow well as they did not receive the right amount of basic necessities.

Hypothesis

Aumentar has the ability to ease people by saving their time, money and energy. By using Aumentar, people mainly gardeners would not face any problems to grow and monitor their plants as Aumentar has all the features to keep the plants in a good condition. Aumentar supplies water and pesticides, makes sure the humidity, temperature and the moisture of the soil is at optimum.

Uniqueness

Aumentar is highly beneficial for everyone especially for those who are busy with their daily jobs like school and office work. Next, users are also able to control this tool anywhere and anytime via phone. Finally, the novelty for this product is that the price is reasonable to be purchased. Aumentar costs RM199 which is a reasonable price as it consists of a few sensors and IoT.

Passion for this project

Aumentar eases people particularly gardeners in monitoring their plants as they can monitor it from afar instead of having to worry about the plants while on vacation, when they are busy working or while doing other things. It ensures the good condition of plants. The plants will receive all necessities required such as water since there is an automated water pump. Aumentar also can help people to save money and time as it is an automated working machine that is reasonable and easy to use. The cost of this product is reasonable based on its functions. It is also very user-friendly as it is very simple to understand and operate it effectively.

GTS | GREAT TEACHER SEMINAR

"Let's Make STEM Education Great Again"

Program Details

Date: 21st November 2020 (Saturday)
Time: 10:00 - 17:00
Stream on : zoom
Zoom Online Platform

International speakers from Japan will join us to share the knowledge

International e-Certificate is provided

Fees for Teachers/Parents:
RM 20
Inclusive of e-Booklet

REGISTER ONLINE :
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Feature Activities


Panel Discussion 1:
The *Importance of STEM Education for Future Career*


Workshop 1 :
Enhancing Teaching and Learning Science through Integrated STEM and Inquiry-Based Learning


Panel Discussion 2:
Role of Companies and Organisation in Supporting STEM Activities


Workshop 2:
Turning Everyday Wonder Into Scientific Adventure

About GTS

Great Teacher Seminar (GTS) is a platform for teachers and parents to discover effective and innovative approaches to enhance STEM education. We invite speakers from local and international organisations to discuss and share their expertise and knowledge on ways to encourage students to be interested in STEM Education.

Organizer: Leave a Nest
Gold Partner: aerodyne
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