Universiti Kebangsaan Malaysia
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NARATIF BAHARU UKM
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KEMENTERIAN PENDIDIKAN
BAHAGIAN PERMATA

PERMATA @Pintar Negara

iFSC 2024

13th International Future Scientists Conference 2024

"Frontiers of Discovery: Unveiling Tomorrow's Scientific Marvels."

3 - 5 December 2024

Pusat PERMATA@Pintar Negara
Universiti Kebangsaan Malaysia

Welcoming Remarks by the Director of Pusat PERMATA@Pintar Negara, UKM

International Future Scientists Conference 2024 (iFSC 2024)

In the name of Allah, the Most Gracious and the Most Merciful.

It is a great honor to welcome you to the 13th International Future Scientists Conference (iFSC 2024), proudly organized by Pusat PERMATA@Pintar Negara, Universiti Kebangsaan Malaysia. I would like to express my deepest gratitude to all the speakers, presenters, and participants who have gathered here, united in the pursuit of scientific excellence and innovation.

The theme of this year's conference, **"Frontiers of Discovery: Unveiling Tomorrow's Scientific Marvels,"** highlights the critical importance of exploring new frontiers through a multidisciplinary lens. In today's rapidly evolving world, complex challenges demand solutions that span across Science, Technology, Research, Engineering, Arts, and Mathematics (STREAM). This conference is designed to holistically nurture invention and innovation among young researchers, emphasizing interdisciplinary collaboration to shape the future of science.

iFSC 2024 provides an invaluable platform for students to share their latest research, ideas, and discoveries. It is also an opportunity for young researchers to grow as thinkers and decision-makers, honing the interpersonal and intrapersonal skills that will equip them to meet future challenges.

As you immerse yourselves in the insightful presentations, discussions, and interactive exhibits, I encourage you to embrace this opportunity for learning, collaboration, and innovation. I have no doubt that the work presented here will inspire meaningful contributions to STEM fields and beyond.

Thank you once again for being a part of iFSC 2024. Let us look forward to a conference filled with discovery, inspiration, and groundbreaking ideas.

Thank you

YBhg. Prof. Dr. Ismanizan Ismail
Director
PERMATA@Pintar National Gifted Centre
Universiti Kebangsaan Malaysia

OPENING CEREMONY

MAJLIS PERASMIAN

International Future Scientists Conference 2024
Date: 03rd December 2024 (Tuesday)
Venue: Auditorium PPPN

TIME	AGENDA
02:30 PM	Arrival of Guests *Ketibaan Tetamu*
02:45 PM	Arrival of Director of Pusat IDEA UKM *Ketibaan* *Pengarah Pusat IDEA UKM*
03:00 PM	National Anthem 'Negaraku' and 'Varsiti Kita' *Lagu 'Negaraku' dan 'Varsiti Kita'*
03:10 PM	Recitation of Doa *Bacaan Doa*
03:20 PM	Montage Presentation *Tayangan Montaj*
03:30 PM	Welcoming Speech by the Director of Pusat PERMATA@Pintar Negara, UKM *Ucapan Aluan oleh* *Pengarah Pusat PERMATA@Pintar Negara, UKM* YBhg. Prof. Dr. Ismanizan bin Ismail
03:45 PM	Officiating Speech by Director of Pusat IDEA UKM *Ucapan Perasmian oleh* *Pengarah Pusat IDEA UKM* YBhg. Prof. Dr. Jamia Azdina Jamal
04:00 PM	Opening Gimmick / Teaser *Gimik Pelancaran / Teaser*
04:10 PM	Performance by the Students of Kolej PERMATA@Pintar Negara, UKM *Persembahan oleh* *Pelajar Kolej PERMATA@Pintar Negara, UKM*
04:20 PM	Photography Session *Sesi Fotografi*
04:30 PM	Dismissal *Bersurai*

CLOSING CEREMONY
MAJLIS PENUTUP

International Future Scientists Conference 2024
Date: 05th December 2024 (Thursday)
Venue: Auditorium PPPN

TIME	AGENDA
02:00 PM	Arrival of Guests *Ketibaan Tetamu*
02:15 PM	Arrival of the Director of Pusat PERMATA@Pintar Negara, UKM Ketibaan *Pengarah Pusat PERMATA@Pintar Negara, UKM* YBhg. Prof. Dr. Ismanizan bin Ismail
02:30 PM	National Anthem 'Negaraku' and 'Varsiti Kita' *Lagu 'Negaraku' dan 'Varsiti Kita'*
02:40 PM	Recitation of Doa *Bacaan Doa*
02:50 PM	Montage Presentation *Tayangan Montaj*
03:00 PM	Closing Speech by the Director of Pusat PERMATA@Pintar Negara, UKM Ucapan Penutup oleh *Pengarah Pusat PERMATA@Pintar Negara, UKM* YBhg. Prof. Dr. Ismanizan bin Ismail
03:15 PM	Presentation of Awards *Penyampaian Hadiah*
04:00 PM	Performance by the Students of Kolej PERMATA@Pintar Negara, UKM Persembahan oleh *Pelajar Kolej PERMATA@Pintar Negara, UKM*
04:15 PM	Photography Session *Sesi Fotografi*
04:30 PM	Dismissal *Bersurai*

CONFERENCE AGENDA

13th International Future Scientists Conference 2024

03 December 2024 (Tuesday)	
Time	**Agenda**
09:00 AM	Registration *Pendaftaran*
10:00 AM	Morning Break *Minum Pagi*
10:30 AM	Exhibition Setup *Persediaan Pameran*
12:30 PM	Lunch Break *Rehat dan Makan Tengahari*
02:30 PM	Arrival of Participants *Ketibaan Peserta*
02:45 PM	Arrival of Guests *Ketibaan Tetamu Jemputan*
03:00 PM	*Opening Ceremony *Majlis Perasmian 13th International Future Scientist Conference 2024
04:30 PM	Dismissal *Bersurai*

04 December 2024 (Wednesday)	
Time	**Agenda**
08:00 AM	Exhibition Setup *Persediaan Pameran*
09:00 AM	Presentation and Evaluation (Session 1) *Pembentangan dan Penilaian (Sesi 1)*
10:00 AM	Morning Break *Minum Pagi*
10:30 AM	Presentation and Evaluation (Session 2) *Pembentangan dan Penilaian (Sesi 2)*
01:00 PM	Lunch Break *Rehat dan Makan Tengahari*
03:00 PM	**Workshop 1 ***Bengkel 1* PM ChM. Ts. Dr. Norzahir bin Sapawe Nature-Inspired Catalysis: Exploring Innovative Solutions for Environmental Remediation
04:30 PM	Dismissal *Bersurai*

*Live streaming available via Facebook Pusat PERMATApintar Negara
https://www.facebook.com/pusatPERMATApintarnegaraUKM?mibextid=LQQJ4d
**Online participants to join via Zoom (link will be given prior to the date)

05 December 2024 (Thursday)	
Time	**Agenda**
08:30 AM	Arrival of Participants *Ketibaan Peserta*
09:00 AM	**Workshop 2 ***Bengkel 2* Prof. Ir. Ts. Dr. Suraya binti Abdul Rashid Superheroes in Science: The Future is in Your Hands
10:30 AM	Morning Break *Minum Pagi*
11:00 AM	**Workshop 3 ***Bengkel 3* PM Dr. Nur Adlyka binti Ainul Annuar Our Universe in X-ray Vision
12:30 PM	Lunch Break *Rehat dan Makan Tengahari*
02:00 PM	Arrival of Participants *Ketibaan Peserta*
02:15 PM	Arrival of Guests *Ketibaan Tetamu Jemputan*
02:30 PM	*Closing Ceremony **Majlis Penutup* 13th International Future Scientist Conference 2024
04:30 PM	Dismissal *Bersurai*

*Live streaming available via Facebook Pusat PERMATApintar Negara
https://www.facebook.com/pusatPERMATApintarnegaraUKM?mibextid=LQQJ4d
**Online participants to join via Zoom (link will be given prior to the date)

A COMPARATIVE ANALYSIS OF WATER QUALITY AND ITS IMPACT ON VIGNA RADIATA'S HEALTH AND GROWTH

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ABSTRACT

A field experiment was conducted to study the impact of water quality on herbaceous plants by using three types of water (river water, zam zam water and tap water). These three types of water were subjected for water analysis such as Ph, conductivity and elemental analysis at Pusat Penyelidikan dan Analisis Air (ALIR), Fakulti Sains dan Teknologi, Universiti Kebangsaan Malaysia. The objective of this experiment is to evaluate the impact of different water properties on the growth and development of *Vigna radiata* (mung bean) plants. By analyzing the relationship between water properties and plant height, this study aims to determine the optimal water properties for maximizing the growth efficiency. *Vigna radiata* seeds were planted, watered daily with three types of water, and the growth of were recorded. The plants are observed by height, number of leaves, and conditions of leave. The growth data are analyzed after a 20-day period to determine which water source has a greater impact on the growth of plants. Based on the water analysis results, Zam Zam water had the highest pH rating (8.15), followed by tap water (6.91) and river water (5.77). Based on observations of the plant's leaves and stem, the result demonstrates that the lower pH level, conductivity, and salinity and water component has an impact on the growth of the plant because it causes the plant to grow to its maximum height and can withstand drying out. The study concludes with an explanation of the best-performing water type having a positive impact, potentially considering its pH, mineral composition, and suitability for the specific seeds.

Keyword: *water quality, pH, water component, growth of plant*

EXCESSIVE NITROGEN AND PROMOTION OF LEAF GROWTH

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ABSTRACT

Nitrogen is one of the main nutrients for plants. We looked into how plants grow when excessive amounts of nitrogen are given. In the research, Japanese mustard spinach was regenerated and grown in hydroponics. As a liquid fertilizer, a solution mixed with potassium nitrate was produced. The concentration level of nitrogen in the solution was changed from 0.2% to 1.0%. The reason why the concentration was set at the level is that the average amount of nitrogen in the soil is from 0.1% to 0.6%. The regenerated cultivation was conducted in an incubator for about one week. The inner temperature was kept at 25℃ and the spinach remained illuminated. When fully grown, the size of the leaf was measured and compared. As a result, it was found that all the spinach withered, and crystals of potassium nitrate could be found on sections of the stems and leaves when they were cut. Also, the size of the leaf became largest when the concentration was 0.8%, and when the concentration was 0.6%, the leaves melted. The reason might be that the concentration of nitrogen was so high that the leaves withered before they were fully grown. In the next experiment, Japanese mustard spinach is going to be grown from seeds using the same level of concentration of nitrogen, and more experiments will be necessary in order to increase the reliability of the data. We are also like to grow Japanese mustard spinach with a liquid fertilizer whose concentration of nitrogen is lower.

Keywords: *nitrogen; Japanese mustard spinach; potassium nitrate; regenerated cultivation*

ANATOMY OF THE FIBONACCI SEQUENCE

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ABSTRACT

Our research was started to find a new rule or similarity in the Fibonacci sequence and the Tribonacci sequence. For example, it is already known that when a number in the Fibonacci sequence is divided by the number two ahead and multiplied by 360, the obtained value is close to about 137.5, which is called the "golden rule." So we found a similar property of the Tribonacci sequence: When a number in the Tribonacci sequence is divided by the sum of all the numbers that precede three terms before and multiplied by 360, the value is close to about 126.72. As the golden rule can often be seen in the natural world, for example, the angle of leaves, the value 126.72 might have some significant meanings, too. Also, based on previous research that found that the two adjacent numbers in the Fibonacci sequence are prime, it was found in our research that three adjacent numbers in the Tribonacci sequence, if they are larger than the third term number, are also prime. This finding was proven by the law of transgression. In future research, we would like to do the following three things. The first one is to use an initial number other than 0 and 1 and find what kind of change can be found. The second is to find how many more similarities the two sequences have in common. The third one is to find new regularities of the two sequences if binary and ternary systems are used.

Keywords: *the Fibonacci sequence; the golden rule; adjacent numbers; transgression; binary*

BLOOMIND: USING BOARD GAMES TO PROMOTE MENTAL HEALTH AWARENESS AND LITERACY

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ABSTRACT

Gifted students at Kolej PERMATA@Pintar Negara UKM often face unique challenges due to their advanced cognitive abilities and the expectation of surroundings. Often dismissed as minor inconveniences, stress and anxiety are genuine concerns that can have detrimental effect on mental well-being. While academic stress is often highlighted, it is important to acknowledge that family and relationship issues can also be significant sources of stress for students, affecting both their academic performance and personal lives. Given these challenges faced by students, fostering mental health awareness is essential for their healthy development. The study is to address this issue by providing an educational platform for mental health awareness. A game is created aims to raise mental health awareness, cultivate empathy, and encourage open dialogue about mental well-being. Data collection was conducted through a survey method, employing a qualitative scoring approach to categorise responses. Out of 520 students, only 24% of students responded, resulting in a sample size of 125. In the study, it has found that 71.2% of students scored low on the mental health literacy assessment, suggesting that the students could benefit from further development in improving their mental health literacy and encourage help-seeking behaviours. On the other hand, 16% of students scored below average, while 12.8% of students achieved average or high scores. The survey findings indicate that a significant number of students have limited mental health literacy, highlighting that further education in this area is necessary. Implementing mental health education and training enabled students to acquire knowledge and understanding about mental health conditions.

Keywords: *mental health; awareness; gifted students; game-based learning; mental health literacy*

THE IMPACT OF MUSIC GENRES ON GENDER AND AGE IN SHAPING ACADEMIC PERFORMANCE OF GIFTED STUDENTS

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ABSTRACT

Many students enjoy listening to music while studying, believing that listening to music while studying can enhance their concentration and learning effectiveness. However, the specific effects of different music genres on cognitive performance remain unclear. This research explores the impact of various music genres containing pop, electronic dance music (EDM), lo-fi, classical music, and the absence of music on students' academic performance. It aims to investigate how these genres influence the concentration and memory retention of gifted students while examining the role of gender and age as contributing factors. The study involved gifted students who studied texts while listening to each of the four music genres (pop, EDM, lofi, classical) and no music (control). After each session, they completed a test to assess concentration and study effectiveness. Breaks were provided between sessions to minimize carry-over effects. The study found that the no music condition was the most effective for enhancing concentration and memorization, followed by classical music. Electronic dance music also facilitated effective studying, indicating the stimulation of dopamine that EDM causes helps with study sessions. Lo-fi music showed limited effectiveness, while pop music was the least beneficial due to its distracting nature. Gifted students were able to perform relatively well across all music genres but still achieved the best results with the no music condition, free of any distractions. This study helps students understand how their choice of music impacts their learning, with findings showing that age and gender play a role in these effects. By recognizing how different genres influence their focus and performance, students can make better music choices to create study environments that match their needs and improve their academic outcomes.

Keywords: *music genres; gifted students; concentration; learning effectiveness; gender; age*

THE RELATIONSHIP BETWEEN LIFESTYLE AND ACADEMIC PERFORMANCE AMONG KOLEJ PERMATA INSAN STUDENTS

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ABSTRACT

The purpose of this study was to examine the relationship between the lifestyle factors towards academic achievement. This study was conducted at the Kolej PERMATA Insan as a gifted and talented institution in Malaysia. Data were collected through a questionnaire using Google Form which was distributed to 104 respondents among form 4 students in Kolej Permata Insan which consisted of 47 male and 57 female students. Data was analysed using Jeffrey's Amazing Statistics Program (JASP) version 0.19.0. The statistics used by the researchers are descriptive analysis and pearson correlation. The findings show that there is significant relationship between time management and sports activity with student academic achievement however there was negative relationship for social activity as the relationship is weak. This study reveals that time management and involvement in sports are positively correlated with academic performance, while social activities have a negative association. These findings underscore the importance of lifestyle in student success, suggesting that educational institutions—from preschools to universities—should consider lifestyle factors in fostering academic excellence. For students at Kolej Permata Insan, in particular, adopting balanced habits with a focus on time management and sports may enhance academic outcomes. Future studies could broaden this research by exploring additional lifestyle factors and expanding the sample to include students from various Malaysian institutions.

Keywords: *lifestyle; physical activity; social activity; student academic achievement*

THE IMPACT OF ACADEMIC STRESS ON MENSTRUAL CYCLE PATTERNS AMONG MATRICULATION STUDENTS

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ABSTRACT

Recognizing that academic life introduces various stressors such as exams, assignments, and adjustment to a new college environment, this study seeks to understand how these factors influence students' menstrual cycles and investigates the relationship between stress inflicted by academic demands as well as menstrual cycle changes among matriculation students. Data was collected through a qualitative survey conducted via Google Forms, targeting Semester 1 matriculation students. A total of 150 participants shared experiences regarding their stress levels and any notable changes in their menstrual cycles during stressful periods. Results indicate a significant correlation between elevated stress levels and disruptions in menstrual patterns. Specifically, 31.3% of respondents reported moderate stress levels, 44% reported high stress, and 21.3% reported experienced very high levels of stress throughout their matriculation studies. Out of 150 respondents, 28.9% strongly agree, 37.6% agree, and 32.2% are neutral that academic stress affects their menstrual cycle. Regarding menstrual changes, 36% of respondents reported frequent cycle changes during high-stress periods, while 38% indicated occasional changes. Additionally, 45 students experienced missed periods, 98 students reported delayed periods, 56 students noted heavier flows, and 43 students reported lighter flows. Common stressors were identified, with exams (127 responses), assignments (102 responses), and adjusting to college life (56 responses) cited as the primary triggers. These findings suggest that stress levels can profoundly affect menstrual cycles, likely due to physiological changes in brain activity. To conclude, elevated stress is a prevalent issue among matriculation students, with exams emerging as the most significant trigger, markedly disrupting menstrual health. The study underscores the importance of addressing mental health and stress management among students, as prolonged stress not only impacts academic performance but also has potential consequences for physical health. Increased awareness and support systems within educational institutions are essential for helping students manage stress effectively.

Keyword: *stress; menstrual cycle; period; matriculation students; academic pressure; examinations*

ASTRONOMICAL SITE TESTING AT BROGA HILL: A FIRST NIGHT SKY BRIGHTNESS, CLOUD DISTRIBUTION AND GEOGRAPHICAL ANALYSIS

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ABSTRACT

Astronomical site testing is mainly conducted to study the characteristics of certain sites for astronomical purposes, which include astronomical research, astronomical site monitoring, or (recently popular) astrotourism. We have conducted an astronomical site testing at Broga Hill to assess its potential as an astrotourism site in Selangor. We have chosen the Yaka Camp Site (2° 54 '39"N 101° 55' 16"E, elevation: 130 meters above sea level) as our test site, due to its easy access and safety. We measured the night sky brightness using a Sky Quality Meter (SQM-LU), which ran overnight from 10:30 PM until 6:30 AM. The SQM device was set to calculate the night sky brightness every 5 minutes. We also manually observed the cloud percentage of the sky every 15 minutes. Finally, we used a photometer device, called TESS Auto Scan Sky Sensor, to measure and generate an all-sky brightness distribution map which was later used to relate night sky brightness with geographical factors. The outcome showed that the average value of MPSAS at Bukit Broga is 18.10 MPSAS. We also discovered that the night sky brightness is affected by cloud distribution percentage where the cloud percentage brightens the night sky brightness. The geographical factors significantly influenced the night sky brightness. The result of the TESS Auto Scan Sky Sensor showed that the night sky brightness is higher in the northwest direction/region. Geographically, there are three main cities located in that region, which are Semenyih (9.44 KM), Kajang (17.48 KM), and Kuala Lumpur (35.08 KM).

Keywords: *astronomical site testing, night sky brightness, cloud distribution percentage, geographical factor, Broga hill*

RECYCLING WASTE COOKING OIL INTO COMMERCIALIZED PRODUCTS: FILTERING AND USING WCO WASTE FOR PRODUCTION OF SOAP THROUGH SAPONIFICATION

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ABSTRACT

WCO (Waste cooking oil) is produced when cooking oil is heated and contaminated during frying. While oil could be reused once more with no significant harm to the body, oil that is already reused should not be used for food production and is considered a hazard to human health due to changes in the oil molecular structure caused by high temperatures during the frying process. With the rise of WCO production, researchers and individuals alike are finding methods to reuse purified WCO waste into commercialized products such as cleaning products. This experiment aims to purify WCO waste through eco-friendly and cheap methods to inspire WCO-based commercialized products, initializing WCO-recycling programs, and educating the masses about the potential and benefits of recycled WCO waste therefore reducing WCO pollution all around the world. This experiment includes a comparison between purified and unpurified oil, creating products from WCO waste, and the benefits of reducing WCO waste pollution to the environment. Steps for oil purification will also be optimized for the masses using easy and locally sourced ingredients to inspire local producers and to normalize recycling WCO waste among local communities. The purified WCO oil will be tested by its water (moisture) content, acid value, FFA (Free-Fat Acid) concentration, and pH value. The purified WCO will then undergo a saponification process where it is vigorously mixed with a strong base to form glycerol and salt (soap). The soap produced will be tested and graded based on its chemical properties and cleaning potential. This experiment not only encourages local communities to reduce WCO waste by recycling it for commercial products but inspires local entrepreneurs to start WCO-based products and therefore reduce WCO waste while ensuring a safe and healthy environment for future generations.

Keywords: *waste cooking oil; purification; commercialization, saponification, waste management*

INVESTIGATING INSECT DIVERSITY: A COMPARATIVE STUDY ACROSS DIFFERENT ECOSYSTEMS

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ABSTRACT

Biodiversity refers to the variety of living things in an ecosystem and is important for maintaining a healthy and balanced environment. This study aims to explore the diversity of Hymenoptera within a specific area to predict why these insects gather more abundantly in certain locations. The main objectives include estimating the number of different Hymenoptera species, understanding how environmental factors may affect their diversity, and conducting a comparison of Hymenoptera diversity across different areas within the ecosystem. To achieve these goals, we plan to use targeted methods to collect Hymenoptera, such as bait traps, Malaise traps, and sweep netting, across multiple sampling plots. In each plot, we will measure environmental factors like temperature, humidity, and light intensity to analyse how these variables might relate to Hymenoptera diversity and abundance. The collected specimens will be sorted and identified to the species or genus level to assess the composition of Hymenoptera communities. We expect to find a significant diversity of Hymenoptera species, with variations across different plots. Areas with favourable environmental conditions, such as suitable nesting sites, flower abundance, and adequate moisture, are likely to support a greater diversity of Hymenoptera. We anticipate that certain groups within Hymenoptera, such as bees and ants, will be more prevalent in areas with specific habitat features. Additionally, we predict that rare or previously unrecorded species may be found, underscoring the ecological value of these habitats. In conclusion, this study aims to highlight how Hymenoptera contribute to essential ecological functions like pollination and pest control. By stressing the importance of their habitats, we hope to emphasize the need for conservation efforts. Protecting these ecosystems will help ensure the continued benefits that Hymenoptera provide to our environment and promote overall biodiversity.

Keywords: *biodiversity, insects, Hymenoptera, ecosystem*

BLACK SOLDIER FLY PREPUPAE AS AN ALTERNATIVE PROTEIN SOURCE: A NUTRITIONAL ANALYSIS FOR FOOD INNOVATION

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ABSTRACT

The rapid increase in population poses a major challenge for food technologists to develop new innovations to boost food production and meet the rising demand. Past research has shown the significance of *Hermetia illucens*, Black Soldier Fly (BSF) larvae in become animal nutrients. However, only a few studies have been done to study the significance of BSF pupae for human nutrients. This study aims to increase food production using BSF pupae, to study the nutrients inside BSF pupae through a spray-drying process, and to promote the study of BSF pupae for food production. The study begins by identifying the BSF pupae and their diet. The pupae are then dried after being removed from the ethanol solution, blended, and their remaining material is analyzed for nutrient content. Based on the analysis, suggestions are made for potential human consumption applications. The study showed that BSF pupae can effectively boost food production, offering a sustainable protein source. Nutrient analysis confirmed high levels of essential proteins and fats. Moreover, the research emphasized the growing interest in BSF as a viable option for future food security efforts. With the global population growing rapidly, the need for sustainable and alternative food sources is becoming increasingly critical. While Black Soldier Fly (BSF) larvae have gained attention for their use in animal feed, the potential of BSF pupae as a nutritious option for humans has not yet been fully explored. This study seeks to explore how BSF pupae can contribute to food production and provide valuable nutrients for human consumption By expanding our understanding of BSF pupae, we can provide new options for sustainable food sources that could help meet the rising demand and contribute to a more secure future for global nutrition.

Keywords: *Black Soldier Fly pupae; animal nutrients; spray-dried; Hermetia illucens*

A COMPARATIVE ANALYSIS OF RICE STRAW AND RICE HUSK BIOCHAR IN SANDY LOAM SOIL FOR ENHANCED AGRICULTURAL SUSTAINABILITY

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ABSTRACT

This research was conducted to compare the effectiveness of rice straw biochar and rice husk biochar on soil properties in sandy loam soils in order to identify which biochar provides greater benefits for agricultural sustainability. This research also aims to explore an environmentally friendly alternative use for rice husk and rice straw, which are often burned in the field, massively contributing to air pollution in several countries. Rice straw biochar and rice husk biochar were incorporated into a sandy loam soil and separated into 21 pots which contained different percentages of biochar. An iron wire was inserted into the base of the pot before adding 700g of soil and planting water spinach. The pH, temperature, moisture, and sunlight absorption of the soil are recorded daily using a 4-in-1 soil electrical conductivity, temperature, pH and sunlight absorption tester whereas the water retention was measured manually using a cylindrical cone to collect water passing through the soil. Application of rice straw and rice husk biochar exhibited increased water retention and in the case of sandy soils. Rice husk biochar proved slightly better in retaining moisture in the soil. Soil pH remained relatively stable with both treatments. Sunlight absorption remained unaffected. Crop productivity was not directly measured in this study, but the improved water retention and stable pH suggest a potential for enhancing crop growth in water-scarce environments. The comparison of rice husk and rice straw biochar in sandy loam soils demonstrates that both materials have potential to be valuable soil amendments. Rice husk biochar displayed a slight advantage in water retention, which may be particularly beneficial in hot climates where moisture conservation and temperature control are critical. Rice straw biochar contributed to a slightly more consistent maintenance of soil pH, which could be advantageous in soils which are susceptible to pH fluctuations.

Keywords: *biochar; rice husk; rice straw; pH soil*

CREATING BIODEGRADABLE PLANTING CUPS FROM FRUIT PEELS FOR SUSTAINABLE GARDENING

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ABSTRACT

In this era of technology, many people overlook the effect of plastic pollution on our daily life and on the ecosystem itself. Plastic itself is harmful because it threatens the life of people with microplastics being the main cause of health disease among people. In addition, plastic requires a long time to fully decompose which is about 20 - 500 years. Our project aims to decrease the usage of plastics and reduce the probability of health disease among people which is mainly caused by microplastics. By repurposing fruit peels, we can make plastic that consists of nutrients and fibers in the fruit while also contributing to waste reduction and promoting a better economy.
The biodegradable plastic can be made by extracting the starch from the fruit peels, which is then mixed with glycerin as a plasticizer and vinegar to modify the texture of it. Various drying methods such as air drying, sun drying and the use of dehydrators are used to form the final product. The result will come out as a form of plastic that acts similarly to regular plastic, but it will naturally decompose and break down in the environment. After initial tests, results show that the complete degradation of the plastic can be observed within a week. This project explores the use of biodegradable plastic while maintaining a minimum cost of effort and energy. With that, this innovation is suitable for other students to research and any further experiments can be done. In the near future, our research will focus on optimizing the plastics strength, durability and water resistance to expand the use of it in daily life.

Keywords: *biodegradable plastic, food waste, sustainability, environmental impact, plastic pollution*

DEVELOPMENT OF FIRE STARTER THAT IS SYARIAH COMPLIANCE

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ABSTRACT

This study is conducted to prepare a fire starter that is syariah complied. At present, the commercial fire starters are made from agriculture or plant fibre and followed by a fatty material such as porcaine lard. Porcaine lard is a fatty acid from pigs that has a high calorific value. Therefore, it is the best choice as a binder to make fire starters. Besides wax paraffin (WP), palm oil distillated (PFAD) as a by-product of the palm oil process, is used as a binder and burning liquid. Extrusion and molding methods are used for the preparation of the product to the shape of a small cube with the ratio of ingredients studied. Moreover, during combustion there is a very high possibility that toxic gas will be produced and released. At the same time, it can create nature hazards. Stearin is a wax additive that is used in candles to make them burn more evenly and with high thermal stability. Coconut coir is used because of its good waterproof properties, suitable for those who like to go hiking and camping. Besides that, the hydrophobic qualities of the coating material enhanced by the addition of palm stearin (PS) to prevent agglomeration during storage. To ensure it is syariah complied we used palm stearin because palm stearin, derived from palm oil, is stable and commonly used in processed foods and it has high calorific value. The firestarter is expected to be shorter ignition time, non-toxic, easy to ignite, high in quality, slow burning, less smoke and syariah complied.

Keywords: *firestarter; syariah complied; coconut husk fibre; palm stearin*

EFFECTS OF LIVING ENVIRONMENT ON RAT'S INTELLIGENCE AND MEMORY

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ABSTRACT

Mice are utilized in many scientific experiments as substitutes for humans, typically to conduct research into their biological or psychological properties. Many products created for human usage are initially tested using mice as subjects. However, these mice are raised in isolated environments, which might not accurately represent natural human growth. Hence, this study aims to determine whether the living environment of a rat affects its mental capabilities and identify whether its diet affects its mental capabilities. Four identical mazes are designed for the mice to navigate. The mazes will be constructed out of wire mesh and Plexiglas. We will also raise 4 different rats in various living conditions with factors that might affect their intelligence. Afterwards, we will record the time taken by each of the various rats to complete the mazes and compare each rat's individual time to observe if the differences in living conditions have any effect on the rats' intelligence and cognitive abilities. The rat which consumed a diet with a higher amount of nutrients beneficial to cognitive function such as omega-3 fatty acids performed the best and achieved the fastest time on the maze. This was followed by the rat living under normal conditions, and then the rats living with different light intensities which took the longest time to complete the maze. Mice raised with healthier diet and more stable amounts of light intensity have better cognitive performance. However, further research is needed to explore the effects of light intensity and diet on the intelligence and mental capability of rats.

Keywords: *mice; maze; intelligence*

SECUCASH: CASHIER SECURITY SYSTEM

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ABSTRACT

The potential of experiencing a robbery is a concern nearly every store has to be wary of. Employees and late-night robbers alike are especially likely to steal the money from the cashier machines. Furthermore, most cases are reported only to fail to identify the culprit and recover the stolen money. As a result, a solution to reduce the number of cases was put in place in the form of security cameras that have been strategically positioned across the counter. However, this being the only accessible method has a number of drawbacks, such as the possibility of blind spots in the security cameras' field of view and inefficient security systems caused by the lack of alarms being sounded whenever a theft occurs. SecuCash, which is our proposed solution, is a secure cashier machine with a built-in camera that constantly records and sends the recording files directly to the office as evidence in the event of a robbery or any suspicious employee activity. Furthermore, its money compartment can only be unlocked by an appropriate employee ID card, which is determined by shift. The cashier will alert the office if there is any invalid access. With our solution, more criminals would be caught in the act owing to the alert system and identify the ones that escaped with the recorded footage. Additionally, we are able to reduce the number of employees secretly taking money from the cashier with the threat of being caught by the recording. In conclusion, SecuCash is successful in achieving the goal of increasing the security of cash registers to reduce the issue of loss of money following a robbery.

Keywords: *cashier; security; recording; alert; robbery*

TEMFISHURE: TEMPERATURE SENSOR SYSTEM

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ABSTRACT

TemFishure is a temperature sensor system that evaluates the water quality of small house aquariums. This system is created because maintaining an aquarium is hard work that requires high maintenance. Aquatic life that lives in aquariums depend on the water quality to survive. Good water quality requires many factors to consider and conditions to be met, such as ensuring stable water temperature, having low turbidity, and evaluating overall water level. However, managing the water quality can be challenging for beginner aquarists who must consider all of these factors and conditions. TemFishure primarily addresses the temperature aspect of this issue by maintaining the ideal temperature for aquariums. It uses a peltier module (thermoelectric module) to control the water temperature. The module works by having an electric current pass through the module, creating a "Peltier effect", which allows it to either absorb or radiate heat and change the water temperature. Users can set the ideal temperature for the peltier module to adjust to by using an app connected to the TemFishure system. The app displays an activity log that tracks the temperature change every minute, and additionally tracks the turbidity and water level of the aquarium. It operates using Raspberry Pi and is designed and coded with Flutterflow. The project results show that when using the app, TemFishure is able to successfully control the water temperature by heating or cooling it. The water temperature remains as the one set in the app, and the turbidity and water level of the aquarium are tracked accurately. Thus, TemFishure is able to assist beginner aquarists in managing their aquariums and ensure the survivability of aquatic life in aquariums.

Keywords: *aquatic life; temperature; aquarium; mobile application; raspberry pi*

PLANZT: SMART GARDENING COMPANION FOR BEGINNERS

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ABSTRACT

Beginner gardeners find that it is difficult and time consuming when growing plants. This is because they lack knowledge about the plant and how to take care of it. To solve this problem, we invented Planzt, a project designed to make gardening easier for beginners by using sensors and an app to advise on how to take care of plants. The main goal is to be an aided tool for beginners to start gardening without feeling overwhelmed and to save time when it comes to taking care of their plants. Sensors are used to sense the humidity and temperature around the plants, and the app will guide them on what to do next, like when to water or move the plants. To create this, we used a humidity and temperature sensor that connects to an app. We use Wi-Fi to communicate and transfer data between the sensors and the app. The app also gives simple tips on how to take care of the plants. This helps users know exactly what their plants need without having to guess. The sensor automatically monitors the plant's condition, so users don't have to check on it frequently. Based on our early results, the Planzt system makes plant care more manageable, especially for people who are new to gardening. The app's guidance helps users prevent typical errors and maintain the health of their plants. It also saves time by letting users know what to do right when their plants need it. In conclusion, Planzt helps beginners and students take better care of their plants with less effort.

Keywords: *gardening; aided tool; plant care; beginner gardener; IoT*

PHYSIS: PLANT HUMIDITY AND TEMPERATURE SENSOR

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ABSTRACT

Farmers go to great lengths to restore the world's natural greenery. However, uncertain weather conditions and climate change can cause numerous problems related to plant health. Farmers are also unaware of how humid or hot their plants are, which can lead to the death of many plants. This is where our project comes in. Our project, PlantCare, measures both humidity and temperature to determine how well your plant is doing, and the information can be viewed and managed via a mobile app. So, farmers no longer have to worry about their plants dying as they grow. Our goal is to reduce the number of dying plants by helping farmers determine the optimal time to water their plants and by making it easier for farmers to find out about the condition of their plants. PlantCare uses a moisture and temperature sensor to measure soil and air conditions, accompanied by mobile applications that provide real-time updates on the condition of the plant. The application alerts users to water their plants when the soil is dry, or the temperature is hot but advises not to water if the soil is too wet or the temperature is cold. Otherwise, it says that the plant is in a normal condition. Overall, PlantCare, the humidity and temperature sensor, will greatly help farmers and plant hobbyists in taking care of their plants, reduce the death rate of trees and boost the production of higher quality plants.

Keywords: *farmer; humidity; temperature; sensor; applicatation*

HEIGHTECTOR: AN AUTOMATIC HEIGHT DETECTOR

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ABSTRACT

Height is important both in health and educational assessment; it often has to be measured manually by marking height on the wall or using stadiometers, prone to human errors. This may eventually lead to incorrect data entry, inconsistencies in the student records, and poor health evaluations. Inadequate security might result in sensitive data leakage and could hence breach privacy standards. These are some of the issues that need a solution that will not only reduce human error but also ensure security and accuracy of data in a setting involved with education. Thus, coming forth with the desire for this requirement, we developed the "Heightector," an automatic height measurement system integrated with IoT technology. This innovative device aims at facilitating the process of measuring height to be more accurate, efficient, and secure. Rather than normal stadiometers, which involve human interference, the operation of Heightector is fully automatic, saving a lot of time taken in measuring the heights. The system is based on a Raspberry Pi microcontroller; hence, its main working element is the ultrasonic sensor used for exact height measurements. Further, it will securely record such data with the help of a mobile application connected to it, which has the implementation of cybersecurity to let access take place only by the authorized person. This novelty offsets not only technical challenges concerning the measurement of height but also involves another crucial topical area: data security. Thus, with the help of Heightector, it is possible to enhance the health assessment process in educational establishments and provide records that are accurate, with further protection of sensitive information about school students for the creation of a safer and more reliable environment in schools.

Keywords: *height; ultrasonic sensor; accuracy; security*

CARTANDGO: AN AUTOMATED BILLING SYSTEM TROLLEY

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ABSTRACT

A recent survey found that the typical consumer spends almost two hours per week shopping for groceries and visits a retail establishment at least three times. They spent two hours in the retail outlets to find the things they needed and pay for them. Our innovation, CartandGo aims to ease customers' shopping experience in retail stores. The process of payments can be facilitated by allowing customers to pay anywhere in the supermarket using the trolley without needing to queue at the counter. This system incorporates an RFID reader and an ESP32 to scan products and add them to the shopping list. According to recent studies, households in Malaysia typically spend RM 900 per month, of which only a portion is used and a quarter is squandered due to lack of proper financial planning. Therefore, a unique monitor has been created and is mounted on the trolley's handle. This monitor's functions include receipt history, product listings, payment history, and product navigation. Customers can use this to safely record their payment history online and set budget limitations prior to making payments. The products navigation feature helps save time to locate specific products in the store. Cybersecurity elements are also integrated with the payment system to secure customer data and privacy. In conclusion, both user convenience and security are improved by the incorporation of cybersecurity safeguards into IoT-enabled smart trolleys like CartandGo. Furthermore, the incorporation of secure data storage safeguards the privacy of customers, guaranteeing a seamless and secure experience. All things considered, CartandGo provides a clever, effective, and safe solution.

Keywords: *retail; navigation; payments; shopping*

QUAKEALERT: AN EARTHQUAKE ALERT APP

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ABSTRACT

QuakeAlert is an innovative mobile application developed to address the critical need for real-time earthquake information in Malaysia, a region where seismic activity is relatively infrequent but potentially catastrophic. Despite the low frequency of earthquakes, the lack of awareness can leave residents unprepared for seismic events. This project aims to fill this gap by providing an accessible and reliable source of earthquake updates, specifically for Malaysian users, travellers, and the general public who may be unaware of current seismic activities. QuakeAlert is designed to keep people informed about ongoing earthquakes by giving them information on locations and magnitudes to help them stay aware of potential risks. The app offers real-time notifications, detailed earthquake data, users' current locations, hotline numbers, educational resources and a user-friendly interface. It uses a magnitude sensor connected to a Raspberry Pi to gather and process seismic data, which is then delivered to users through the app. QuakeAlert is developed with Dart language on Flutter and provides a reliable platform for sharing crucial information. A survey of potential users showed strong support with 82% of the respondents agreeing with QuakeAlert abilities which highlights that the app meets the need for real-time earthquake updates in Malaysia. With its ability to deliver fast and accurate information, the app plays a key role in enhancing public safety and preparedness during an earthquake. By combining advanced technology with a focus on user needs, QuakeAlert is set to become a useful tool for earthquake awareness in Malaysia. Safety is the foundation upon which a nation's strength is built, and we believe QuakeAlert would have a positive impact towards the community.

Keywords: *earthquake; mobile application; sensor; alert*

BRILLYPARK: LEVELLING UP PARKING ASSIGN SYSTEM

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ABSTRACT

Research indicates that about 38% of drivers need help finding available parking spaces in malls, leading to conflicts, wasted time, and increased carbon emissions. This project aims to address these issues by protecting the rights of disabled individuals, reducing misunderstandings among drivers, and cutting down the time spent searching for parking, ultimately lowering carbon footprints and enhancing accessibility for everyone. BrillyPark is an efficient parking system that assigns parking sequentially and it features ground navigation lights indicating the parking direction. Only authorized individuals can park in the disabled parking area by scanning their card. Also, each slot has an LCD screen displaying the assigned car's number plate and is equipped with a built-in plate recognition feature. Furthermore, BrillyPark offers a mobile application that enhances customer convenience by enabling easy OKU registration, an overall view of the availability of the parking slot in real-time, and seamless payment transactions through their smartphones. After implementing our technology, we found out that BrillyPark significantly reduces the time drivers spend searching for parking in crowded areas. By providing real-time information about parking availability, drivers can better plan their travel and avoid unnecessary delays. The system ensures fair treatment for all drivers, including penalizing those who occupy disabled parking spots without permission. Additionally, improved and systematic parking management eliminates conflicts between drivers, ensuring a smoother and more organized experience for everyone. In conclusion, BrillyPark streamlines the parking experience by reducing search time, and preventing conflicts. It ensures fair access to parking, particularly for disabled individuals, through features like plate recognition, real-time availability updates, and easy payment via a mobile app. This system improves convenience, accessibility, and efficiency for all drivers.

Keywords: *parking; assign; disabled individuals; smart parking system; real-time*

USING AUTOMATIC DEVICES: A NEW WAY OF REDUCING ELECTRICAL WASTE

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ABSTRACT

In the modern era, a lot of electrical waste is wasted, this is due to events such as people forgetting to turn off appliances when leaving the room. To fix this, we will be using our product, which is EcoRoom to help monitor the appliances to reduce electrical waste. EcoRoom is an automatic device that can automatically handle all electrical appliances that ensures the electricity is not wasted due to the carelessness of students and teachers. EcoRoom is placed at the top of a door, it can detect how many people are in the room. When the device detects that there are people in the room it will therefore automatically turn on appliances or electronic devices in the room and send a notification to the owners' device (phone) via Gmail every time there are multiple people entering or exiting the classroom within a close time interval. EcoRoom uses a combination of cameras as sensors and automated control systems that are coded into it. The sensors detect movement and count individuals, while the control system manages electrical appliance operations. The notification feature utilizes Gmail's API to send alerts directly to the owner's device. EcoRoom manages to reduce energy consumption by automatically taking over the electrical device operations. The notification system provides timely updates, enhancing user awareness and control over room activity. Carrying out this experiment will take 2 weeks. From that, the amount of electrical waste that is prevented is calculated. Hence, the study is not only able to reduce electrical waste, but also ensuring a better environment.

Keywords: *electrical waste; appliances; EcoRoom*

MEOWSURE: A PET FOOD LEVEL SENSOR

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ABSTRACT

Pet owners, especially working adults, often face challenges when it comes to consistently monitoring their pet's feeding habits. Traditional methods, such as manually checking food levels, can be inconvenient and lead to instances where pets may go without food if their needs are overlooked. The "Meowsure" sensor provides a solution to this issue by automatically measuring the amount of food left in a container. This device is compatible with various food containers and collects data to calculate the average food consumed, track eating behaviour, and predict when refills are needed. It also offers recommendations on food portions based on the pet's habits. The sensor connects to a mobile application that notifies the user when it's time to refill the container, making it easy to stay updated on their pet's needs. Targeted at working adults between the ages of 20 and 35, Meowsure is designed for those who want to monitor their pet's eating patterns without sacrificing their focus on work. The device is priced competitively, with a cost of RM44 per unit and a retail price of RM170, offering more features and flexibility compared to other products in the market. By providing an affordable and effective solution for busy individuals, Meowsure ensures that pets are never neglected, fostering a worry-free environment for pet owners and their beloved pets alike.

Keywords: *pet food sensor; IoT; pet care; automation; eating behaviour monitoring*

EXTRACTING COLLAGEN FROM CHICKEN FEET AS SUPPLEMENT

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ABSTRACT

Chicken feet are one of the most wasted domestic products in the organic waste category. They are deemed as gross and unhealthy. Although they are often discarded as a waste product, they are common cuisine in various places around the world, including Mexico, South Africa, Asia, Jamaica, and Trinidad, where you can find them as street food or a festive dish. This is because chicken feet are rich in nutrients such as collagens. Thus, we planned to extract the collagens from them and then used the extracted collagen in supplements for beauty purposes. We will use the Hydro-extraction method to extract the collagens from the chicken feet. They first need to be cut into small sizes. The hydro-extraction method has 3 main stages. Firstly, they will be treated with NaOH solution, aimed to eliminate other non-collagen substances. Next, they will go through hydrolysis with acetic acid to change the structure of collagen fibres to facilitate the extraction process. Lastly, they will be washed with distilled water until neutral. The extracted collagen will be in a solution form. Therefore, we need to freeze dry them to obtain dry collagen. The collagen extracted can be used in many aspects in daily life, such as in beauty as mentioned above. We highly recommend the use in collagens because they are proved to have many benefits, such as in tissue repair, immune response, cellular communication, and cellular migration. Besides that, intake of collagen supplements can also boost our mood. This is because one of the amino acids in collagen called glycine, is known to increase your serotonin levels without simultaneously raising your dopamine levels.

Keywords: *chicken feet, hydro-extraction method, collagen extract, collagen in beauty*

DEVELOPMENT AND EVALUATION OF A NATURAL LOTION FORMULATED WITH *ADENANTHERA PAVONINA* EXTRACT

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ABSTRACT

This research aims to evaluate the effectiveness, safety, and stability of *Adenanthera pavonina* seeds in developing lotion. Objectives include assessing skin benefits, safety through dermatological tests, and stability over time. This research applies an experimental design involves extracting the bioactive compounds from *Adenanthera pavonina* seeds through a solvent extraction process, followed by incorporating the extract into a lotion base. The preparation of lotion is a mixture of oil phase and aqueous phase chemical. We hypothesise that lotions with Adenanthera pavonina seed extracts will offer superior moisturising and anti-inflammatory benefits, be safe for various skin types, and exhibit enhanced stability. It is expected that the lotion formulated with extracts from *Adenanthera pavonina* will provide significant hydration, improve skin texture, and enhance elasticity. We anticipate that users will experience a reduction in dryness and irritation, leading to smoother and healthier-looking skin with consistent application. The natural properties of *Adenanthera pavonina* are expected to contribute to these positive effects, demonstrating its potential as a key ingredient in skincare formulations. Furthermore, we hope to expand global awareness of *Adenanthera pavonina*, promoting its benefits and applications in skincare around the world. Significantly, this study introduces a natural, locally sourced ingredient to the Malaysian skincare market, aligning with eco-friendly consumer trends and preserving cultural heritage. It does not only contribute to a deeper comprehension of the bioactive compounds found in *Adenanthera pavonina*, but also plays a crucial role in advancing scientific knowledge regarding their potential applications in dermatology, particularly in developing new treatments and therapeutic approaches for various skin conditions.

Keywords: *Adenanthera pavonina, skincare, moisturising, anti-inflammatory, eco-friendly*

BOTANIC LIFELINE: SMART PLANT SENSOR WITH USER-FRIENDLY APP

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ABSTRACT

In the era of globalisation, gardening has become a trend among urban residents. However, not everyone has a natural talent in gardening. Many struggle to maintain this new hobby of theirs and stopped it halfway due to the lack of knowledge about plants' essential needs and the factors influencing their health. Through our research, we found that the most overlooked factor is the plants' soil moisture. Most individuals simply water their plant without knowing the appropriate amount of water to use. Botanic Lifeline provides a comprehensive solution to this problem by combining Internet of Things (IoT) technology. Our sensor is paired with a mobile application to make plant care accessible at all times. The sensor continuously monitors environmental temperature and humidity, as well as the soil's moisture. It then transmits real-time data, allowing users to be instantly informed of their plants' needs through the app. The Botanic Lifeline app offers various features to make plant care easier. It provides suggestions for actions users can take for their plants, allows users to set up personalised reminders for essential tasks and displays plants' health levels to keep users updated on their plants' current condition. Botanic Lifeline also provides a space for users to document their plants' growth journey and track their milestones over time. This way, it not only makes gardening more engaging and enjoyable, but also lets users learn from mistakes and improve their skills. In conclusion, Botanic Lifeline bridges the gap between technology and nature by integrating the Internet of Things (IoT) technology. Aligned with SDG 11, our solution aspires to widen green spaces in urban areas and make cities sustainable. By making gardening inclusive for everyone regardless of their level of experience, Botanic Lifeline contributes to expanding cities' green spaces and shaping sustainable communities.

Keywords: *soil moisture; sensor; IoT; mobile application; plant care*