UTHM

FKEE INNOVATION DAY

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

13 JAN 2026

INTEGRATED DESIGN PROJECT (IDP) SHOWCASE DAY

Semester 1 Session 2025/2026

Program Book

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BACKGROUND OF INTEGRATED DESIGN PROJECT (IDP)

The Integrated Design Project (IDP) is an engineering course (code: BEE40803) where the students must provide a feasible solution for a given complex engineering problem (CEP) based on a specific theme, engage with a related industry or community, and produce a product that reflects a deep understanding of the CEP. The IDP activities, on the other hand, involve real-life problem-solving that must consider public health and safety, technology, the environment, the economy, as well as project management.

The students must understand a given problem under a specific theme, create an engineering sketch of the product, transform the sketch into an engineering model, and deliver the product in the form of a product prototype. They will perform engineering design and testing activities to produce a working product. These tasks require students to possess the skills of handling various engineering tools, including both software and hardware. The final working product will be evaluated at the end of the course in the IDP Showcase by a set of academician and industrial panels. The IDP Showcase, organized by the FKEE Capstone Committee, is held to recognize the hard work and dedication of the students and to celebrate knowledge and innovation. Furthermore, this showcase can serve as a platform to discover potential products to enter innovation competitions.

In conclusion, the CEP process in the IDP course trains students to integrate multidisciplinary knowledge in solving a given problem statement. Moreover, the new knowledge and skills acquired in the IDP course will prepare the FKEE students to face the current and future global challenges in their careers.

DEAN'S FOREWORD

Assalamualaikum w.b.t and Greetings,

First and foremost, I would like to congratulate all of you, the IDP students of FKEE, on successfully participating in the IDP Showcase for Semester 1, 2025/2026. This event is one of the various strategies employed by the faculty to spur research activities, nurture innovation and creativity, and instill awareness of good engineering practices among students.

As some of you might know, FKEE strives to be an Industrial-Driven Faculty in a few years' time. Now is an appropriate time for the faculty to start building ties and engage in its activities with the industries. Furthermore, IDP is one of the courses in the faculty that requires students to undergo active knowledge acquisition to produce multiple solutions to address the complexity of problems faced by the industry.

This semester, the Capstone Committee of FKEE has decided to focus on the themes Smart Home/Cities, Smart Health, Smart Agriculture, and "Energy Efficiency. A total of 247 students have registered for this course. They are grouped into 55 groups. Each group is supervised by an academician. The students would tackle real-life, complex engineering problems and work in teams. Multiple stages of assessments would evaluate their performance, commitment, and achievement.

I would like to applaud the students who have worked hard to produce a working product for the showcase. I strongly hope that the knowledge and experiences you have gained will be beneficial in the future.

Finally, my deepest appreciation goes to the Capstone Committee of FKEE for the tremendous efforts in organizing this event. Well done!

Thank you.

Best Wishes,
Prof. Ts. Dr. Asmarashid bin Ponniran
Dean
Faculty of Electrical and Electronic Engineering
Universiti Tun Hussein Onn Malaysia

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ACKNOWLEDGEMENT

The Capstone Project Committee of FKEE would like to extend its gratitude to the Dean and management of FKEE for their full support and financial assistance in organizing this event. On behalf of the committee, we would like to thank all generous sponsors, including The IET Malaysia Local Network, for the certificates to be given to the winner.

Special thanks to the IDP supervisors and assistant engineers for sharing their knowledge and providing guidance to the students, which enabled them to complete their work.

Finally, our deepest appreciation to the wonderful students of FKEE for their hard work, time, and energy spent participating in the IDP Showcase of Semester 1 2025/2026. May all be rewarded accordingly.

Yours sincerely,

Capstone Project Committee of FKEE
Faculty of Electrical and Electronic Engineering
Universiti Tun Hussein Onn Malaysia

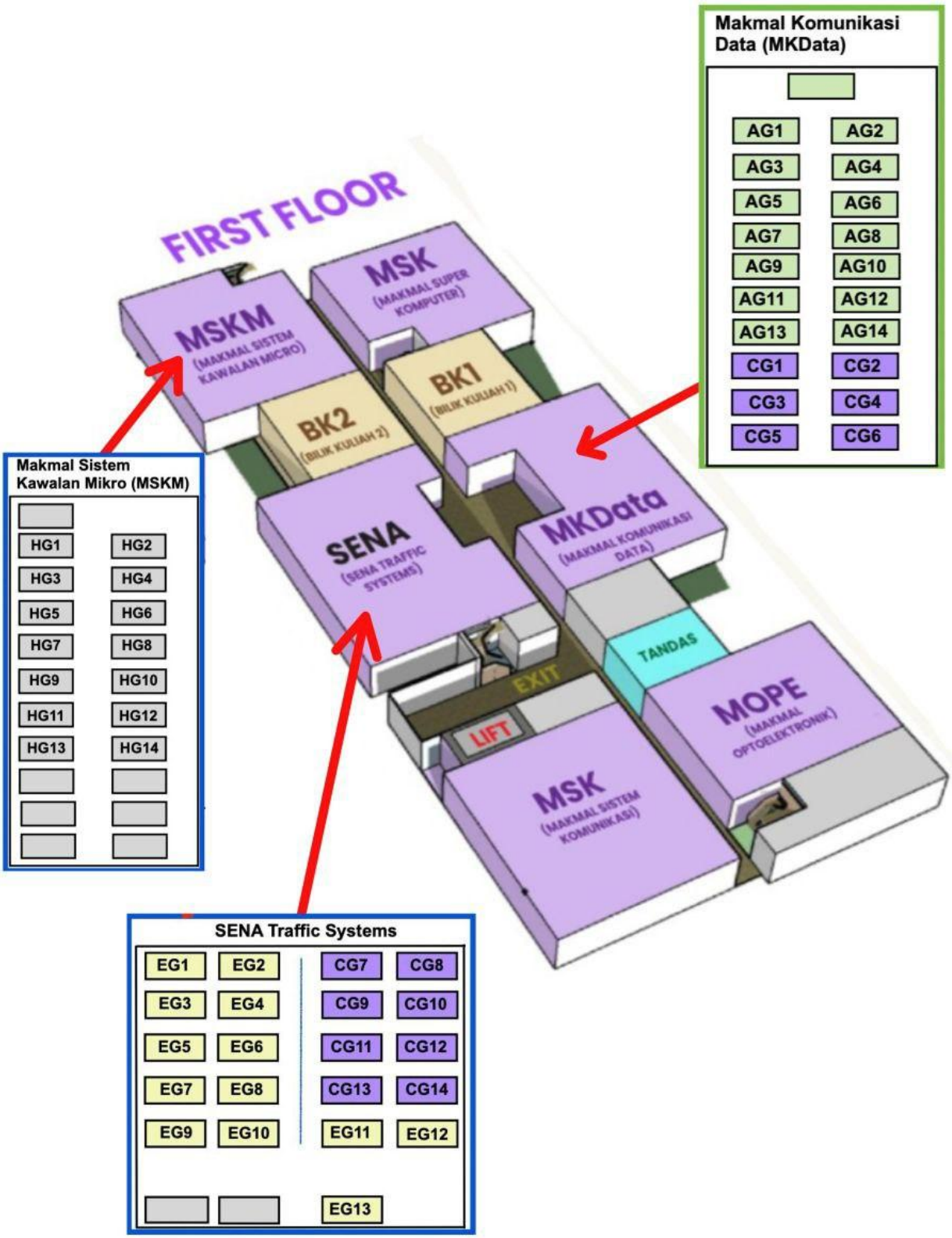
PROGRAM TENTATIVE

FKEE INNOVATION DAY 2026
BLOK QB, FKEE
13 JANUARI 2026, 8:30 PAGI - 4:30 PETANG

Masa	Masa (Sub)	Aktiviti	Lokasi
8:30 pagi - 9:00 pagi		Pendaftaran Penilai industri IDP Showcase	Foyer Blok QB, FKEE (Depan Lif)
9:00 pagi - 10:00 pagi	9:00 pagi - 9:50 pagi	1) Kata alu-aluan Dekan FKEE 2) Taklimat Penilai IDP Showcase & FYP Industrial Award 3) Taklimat HEPA	Bilik Seminar, Blok QB
		Minum pagi	
	9:50 pagi 10:00 pagi	Sesi bergambar	Bilik Seminar, Blok QB
10:00 pagi - 12:00 tgh hari	-	Penilaian IDP Showcase	MKSM, MKD, SENA
12:00 tgh hari - 2:00 petang	-	Rehat dan Makan Tengahari	Bilik Seminar, Blok QB

Masa	Masa (Sub)	Aktiviti	Lokasi
2:00 petang - 4:00 petang	2:00 - 2:30 petang	1) Ketibaan Pelajar dan Pengurusan FKEE	Foyer blok QA (Khemah)
	2:30 - 2:40 petang	2) Nyanyian lagu Bangsa Johor Negaraku, Gemilang UTHM	
	2:40 - 2:45 petang	3) Bacaan doa	
	2:45 - 3:00 petang	4) Ucapan Dekan FKEE	
	3:00 - 3:50 petang	5) Penyampaian hadiah 3MT	
		6) Penyampaian hadiah IDP Showcase	
		7) Penyampaian hdiah FYP Industry Award	
	3:50 - 4:00 petang	8) Sesi bergambar	
4:00 petang - 4:30 petang	-	Minum petang dan bersurai	Bilik Mesyuarat, Blok QB, FKEE

IDP SHOWCASE LAYOUT BLOCK QB, FKEE



JUDGING GUIDELINE

IDP PRODUCT EVALUATION
IDP SHOWCASE SEMESTER 1, 2025/2026

1. INTRODUCTION

On behalf of the Organizing Committee, we would like to express our sincere appreciation to all appointed judging panels for their time, commitment, and willingness to participate in the IDP Product Evaluation – IDP Showcase, Semester 1 2025/2026. This section serves as an official guideline to assist judging panels in conducting the evaluation process smoothly, consistently, and effectively.

2. ASSIGNMENT OF IDP GROUPS

Judging panels are required to refer to the Judging Schedule (Page ix), which outlines the IDP groups assigned to each panel. Each judging panel will be assigned to evaluate two (2) or three (3) IDP groups, as specified in the Judging Schedule. Panels are advised to take note of the Group Tag (e.g., HG1), as it will be used consistently throughout the presentation and evaluation process.

3. IDP PROJECT PRESENTATION

Each IDP group is allocated five (5) minutes to present their project, followed by a Question and Answer (Q&A) session with the judging panels.

For panels evaluating **ONLINE** presentations, the presentation video links are provided on Page xiii of this program book.

4. PROJECT EVALUATION PROCEDURE

All evaluations, for both physical and online presentations, shall be conducted ONLINE using the official Google Evaluation Form.

The evaluation link will be shared in the IDP Showcase WhatsApp Group during the event. Judging panels are required to ensure that the correct Group Tag is selected before submitting the evaluation form. The list of group tags is available within the form for reference.

5. EVALUATION SCHEDULE

The IDP Showcase is scheduled to take place on 13 January 2026.

The evaluation session will take place during the following time:

Time: 9:00 a.m. – 12:00 p.m.

Judging panels are kindly requested to complete all assigned evaluations by 11:30 a.m. to ensure the timely compilation and processing of results.

JUDGING SCHEDULE

GROUP	INDUSTRY PANEL	FKEE PANEL
HG1	EN. MIFZAL BIN MOHAMAD ZAMRI QUANTUM MEDICAL SOLUTION/ KLINIK KESIHATAN NEGERI SEMBILAN DR. SUSAMA BAGCHI CHITKARA UNIVERSITY, PUNJAB, INDIA (ONLINE)	PROF. IR. DR. SOON CHIN FHONG CIK MASNANI BINTI MOHAMED
HG2		
HG3		
HG4	PN. NYAANALECHUMI VIJAYAN CELESTICA PLATFORM AND CLOUD SOLUTIONS MALAYSIA ,BAYAN LEPAS DR. NURLIYANA MOHAMAD ARIFIN MILA UNIVERSITY (ONLINE)	TS. DR. MUHAMMAD HAZLI BIN MAZLAN PROF. MADYA DR. NURMIZA BINTI OTHMAN
HG5		
HG6		
HG7	EN. SATSIMRAN SINGH SUKHDARSHAN SINGH SAGEPODS PLT TS. MAIZAR BIN MUHAMAD KOLEJ KOMUNITI AMPANG (ONLINE)	PROF. MADYA IR. DR. CHIA KIM SENG PROF. MADYA TS. DR. SIM SY YI
HG8		
HG9		
HG10	EN. VIKRAM KUMAR MANOHAR TENAGA NASIONAL BERHAD EN. MN AZRI BIN AHMAD SEATRIUM (SG) PTE LTD (ONLINE)	DR. WARSUZARINA BINTI MAT JUBADI PROF. MADYA DR. NABIHAH @ NORNABIHAH BINTI AHMAD
HG11		
HG12		
HG13	EUR ING IR. TS. SANMARKAM DHANA SIGH PENGERANG REFINING COMPANY SDN. BHD. PN. NORHAFIZA BINTI SHAROM POLITEKNIK MERLIMAU MELAKA (ONLINE)	PROF. MADYA DR. WAN MAHANI HAFIZAH BINTI WAN MAHMUD IR. TS. DR. NURFARINA BINTI ZAINAL
HG14		

GROUP	INDUSTRY PANEL	FKEE PANEL
CG1	PN. SITI AISHAH BINTI YUSUF PN. SHERINATASHA BINTI JEONMANI JABATAN PEMBANGUNAN KEMAHIRAN (ONLINE)	TS. SHARIFAH BINTI SAON PUAN NURULHUDA BINTI ISMAIL
CG2		
CG3		
CG4	PN. SITI NOR HAFIZAH BINTI SA'DON OMEGA INTEGRATION SDN BHD TS. DR. SYLVIA ONG AI LING TS. WONG SIE WOO POLITEKNIK KUCHING SARAWAK (ONLINE)	PROF. MADYA IR. DR. ABD KADIR BIN MAHAMAD DR. RAHMAT BIN TALIB
CG5		
CG6		
CG7	PN. NUR SYAHIDA BINTI SHAHDAN MATRIX CONCEPTS HOLDING BERHAD EN. WAN MOHD BADRIL AMIN BIN WAN SAID POLITEKNIK KUALA TERENGGANU (ONLINE)	DR. ROSHAYATI BINTI YAHYA @ ATAN PROF. MADYA IR. DR. NOR HAFIZAH BINTI NGAJIKIN
CG8		
CG9		
CG10	IR. TS. MUHAMMAD FAISAL BIN MUHAMMAD YUSOFF SURUHANJAYA TENAGA DR. MUHAMMAD FIRDAUS BIN MOHD ZUBLIE POLITEKNIK SULTAN AZLAN SHAH (ONLINE)	PROF. MADYA DR. SHAHARIL BIN MOHD SHAH DR. NORSHIDAH BINTI KATIRAN
CG11		
CG12		
CG13	EN. MOHAMAD NOR IZAKI BIN SUDARMAN ZF ASIA PACIFIC (MARINE) PTE LTD SINGAPORE PN. NUR SYAFIQAH BINTI ARIPEN AMBANG WIRA SDN BHD (ONLINE)	DR. MOHD HAFIZ BIN A. JALIL @ ZAINUDDIN DR. ARIFFUDDIN BIN JORET
CG14		

GROUP	INDUSTRY PANEL	FKEE PANEL
AG1	PN. NURIN QISTINA BINTI FAIZAL TABSQUARE.AI PTE LTD DR. SANJOY KUMAR DEBNATH CHITKARA UNIVERSITY, PUNJAB, INDIA (ONLINE)	PROF. MADYA DR. NORAN AZIZAN BIN CHOLAN TS. DR. JONG SIAT LING
AG2		
AG3		
AG4	PN. NUR RAFIQAH BINTI RIDZUAN EDAG HOLDING SDN BHD EN. MUHAMMAD AL-IMRAN BIN ABDUL RAHIM MALAYSIA COMPETITION COMMISSION	PROF. MADYA IR. DR. SITI ZARINA BINTI MOHD MUJI DR. NIK SHAHIDAH AFIFI BINTI MD TAUJUDDIN
AG5		
AG6		
AG7	EN. MOHAMAD ARIF BIN AHMAD SHALKAWI VCOMM DIGITAL SDN BHD EN. MOHD RIZAL BIN MOHAMAD ALIAS POLITEKNIK SULTAN MIZAN ZAINAL ABIDIN (ONLINE)	DR. MOHAMAD HAIROL BIN JABBAR TS. DR. SHAMSUL BIN MOHAMAD.
AG8		
AG9		
AG10	PN. NURSHAZAMUZAKKIR BINTI IBRAHIM DNV MALAYSIA SDN BHD DR. NOOR HIDAYAH BINTI MOHD YUNUS UNIVERSITI KUALA LUMPUR BRITISH MALAYSIAN (ONLINE)	PUAN NOR'AISAH BINTI SUDIN PUAN ZARINA BINTI TUKIRAN
AG11		
AG12		
AG13	PN. NURULAIN FITRAH BINTI BASIR BROWNFIELD ENGINEERING SDN BHD TS. MUZIMAH AIDA BINTI MD MUSTAFA POLITEKNIK KOTA BHARU (ONLINE)	DR. ANSAR BIN JAMIL PROF. MADYA DR. MAISARA BINTI OTHMAN
AG14		

GROUP	INDUSTRY PANEL	FKEE PANEL
EG1	EN. MASRON AHMAD PETRONAS EN. MUHAMMAD RASYDAN BIN MOHD ROSLEE AKHDAR ENERGY SDN. BHD.(ONLINE)	DR. NORDIANA AZLIN BINTI OTHMAN TS. MUHAMMAD NAFIS BIN ISMAIL
EG2		
EG3		
EG4	EN. MUHAMMAD AZIM ALAM SHAH BIN MOHD ZOLKEFPELI CBRE GWS SDN BHD DR. NOR ASRINA BINTI RAMLEE UNIVERSITY OF TECHNOLOGY SARAWAK (ONLINE)	DR. ROZIAH BINTI AZIZ DR. AFARULRAZI BIN ABU BAKAR.
EG5		
EG6		
EG7	EN. MUHAMMAD ANAS SYAFIQ BIN ISHAK JIMAH POWER PLANT DR. NURUL 'ATIQAH BT AHMAD TAYLOR'S UNIVERSITY (ONLINE)	TS. DR. AHMAD FATEH BIN MOHAMAD NOR PROF. MADYA TS. DR. SITI AMELY BINTI JUMAAT
EG8		
EG9		
EG10	PN. SITI NURHAZIQAH BINTI ABD MAJID POWER METAL TECHNOLOGIES (M) SDN BHD EN. MOHD MUS'AB BIN MOHD RASIDI EPC SYNERGY SDN BHD (ONLINE)	TS. DR. ZURAIDAH BINTI NGADIRON PROF. MADYA DR. KHAIRUL ANUAR BIN MOHAMAD.
EG11		
EG12	DR. NUR ADILAH BINTI ABD RAHMAN UNIVERSITY OF CYBERJAYA EN. M. ANWAR FAKARUDDIN BIN M. JALALUDIN KOLEJ KOMUNITI ROMPIN PAHANG (ONLINE)	PROF. MADYA DR. SHAMSUL AIZAM BIN ZULKIFLI PUAN ROHAIZA BINTI HAMDAN
EG13		

LIST OF IDP PROJECTS – POSTED ON YOUTUBE

No	Group	YouTube Link
SMART HEALTH		
1	HG1	https://youtu.be/OSsu6mcHDgc
2	HG2	https://youtu.be/chPSDg1_BFo
3	HG3	https://www.youtube.com/watch?v=dXMVLBtG_hw
4	HG4	https://youtu.be/Cgvx05zPG5U
5	HG5	https://youtu.be/TGj3SpOG4xU
6	HG6	https://youtu.be/D8SbW76bGBE
7	HG7	https://youtu.be/e9_CIsZfAII
8	HG8	https://youtu.be/kWIfxi7MNd0
9	HG9	https://youtu.be/vR2sYgXvKDQ
10	HG10	https://youtu.be/IZqUhoiDdjQ
11	HG11	https://youtu.be/-BsbgjgCpZ0
12	HG12	https://youtu.be/-OTsd2lBRN8
13	HG13	https://youtu.be/egWuNM9Ir30
14	HG14	https://youtu.be/mAo4b0OJdeA
SMART CITIES/HOME		
15	CG1	https://youtu.be/QIbmlk9pGHY
16	CG2	https://youtu.be/5f1RHk3Rmro
17	CG3	https://youtu.be/8DptBoV3IeQ
18	CG4	https://youtu.be/GsXJUS1PFWw
19	CG5	https://youtu.be/fEBeG3jYqu4
20	CG6	https://youtu.be/X2kE0WLSvEk
21	CG7	https://youtu.be/dGOb0EqHt4g
22	CG8	https://youtu.be/BFjtgrynvRU
23	CG9	https://youtu.be/2KISCEdXZ4I
24	CG10	https://youtu.be/6qiRBf1mBsI
25	CG11	https://youtu.be/DSQOzK_u-iA
26	CG12	https://youtu.be/UWWnz9lw-qc
27	CG13	https://youtu.be/kVq526Zv6Js
28	CG14	https://youtu.be/WPGp-jBJtqI

No	Group	YouTube Link
SMART AGRICULTURE		
29	AG1	https://youtu.be/MPl1CUf1dzc
30	AG2	https://youtu.be/mWw_dcXCvvw
31	AG3	https://youtu.be/L9u4bPIhHEg
32	AG4	https://youtu.be/GKT2J6zk-TI
33	AG5	https://youtu.be/HolZo-lx9wc
34	AG6	https://youtu.be/QBbvJJxi4Ks
35	AG7	https://youtu.be/9F62bFNpvTM
36	AG8	https://youtu.be/aEglVUnBND0
37	AG9	https://youtu.be/l3ezZWwV1rA
38	AG10	https://youtu.be/xK_4HdLD5Ws
39	AG11	https://youtu.be/0qGAKnYKjPE
40	AG12	https://youtu.be/wwKKHtqVYKg
41	AG13	https://youtu.be/T8jiLpjBQJs
42	AG14	https://youtu.be/ft0o0u4-nrc
ENERGY EFFICIENCY		
43	EG1	https://youtu.be/zfmRwU0Uggk
44	EG2	https://youtu.be/rZ5Zrbs8Gi8
45	EG3	https://youtu.be/PidpjPi94Nc
46	EG4	https://youtu.be/JCBShq2EATY
47	EG5	https://youtu.be/Usj8ToW6-Sk
48	EG6	https://youtu.be/C8zyfDWt0J0
49	EG7	https://youtu.be/SBjxfgWjd3o
50	EG8	https://youtu.be/C_TdkO3jQJ0
51	EG9	https://youtu.be/dsA-Wq6hrrU
52	EG10	https://youtu.be/08NbAYfRA5I
53	EG11	https://youtu.be/jhaHMVcUp6c
54	EG12	https://youtu.be/H38DltRx0ck
55	EG13	https://youtu.be/WY0Qz49Cq5U

LIST OF IDP PROJECTS

THEME – SMART HEALTH

(HG1) BIO-FUNCTIONAL ANXIETY DETECTION SYSTEM

Team : AE220105 ABDIRAHMAN JAMA WARSAME
CE220023 ABNER JAWIH ANAK MICHAEL
AE220029 ADAM RAIMI BIN KANUREZMIN
CE230026 AFIFAH BINTI ALIAS
AE220028 MUHAMMAD HAFIZ BIN HALIM

Supervisor : Dr. ASHOK VAJRAVELU

Abstract : The growing use of anxiety disorders has resulted in the need for convenient and sustained monitoring methods outside clinical practices. This project proposes a Bio-Functional Anxiety Detection System, a wearable embedded system designed for real-time, non-clinical monitoring of physiological indicators related to anxiety. The system features an ESP32 microcontroller as its central processing and communication unit, along with a heart rate sensor and a heart rate variability (HRV) sensor (ECG), a temperature sensor, and an inertial measurement unit (IMU) sensor, which measure heart rate, body temperature, and movement, respectively. Basic signal conditioning, filtering methods, and decision logic, based on a threshold, are used to collect and process physiological data in real-time, categorizing the user's condition as normal, physical activity, abnormal temperature, or possible anxiety. The system provides breathing instructions in the form of vibrations when abnormal patterns are detected, along with wireless data visualization of the information on the Blynk mobile application, to increase user awareness. The suggested system illustrates a low-cost, miniature, and energy-efficient wearable technology for monitoring early anxiety individually, aiding proactive mental health monitoring, but not clinical assessment.

(HG2) IOT-BASED MEDICATION REMINDER

Team : CE230101 ADRIANA SYAZWANI BINTI MOHAMMAD FAISAL
CE230157 AHMAD AKRAM AZFAR BIN LAKHADAR BRAHIMI
AE220077 OLIVER WONG PAK LUM
CE230151 AHMAD AMMAR NAZHAN BIN MOHD BADLI
AE220017 AHMAD ALIF AIMAN BIN MOHAMMAD

Supervisor : PROF. MADYA Ts. Dr. NUR ANIDA BINTI JUMADI

Abstract : In this work, a prototype for a medication reminder system based on Internet of Things (IoT) technology has been designed. The objective is to improve drug adherence in senior patients, and those with dementia. It consists of an ESP32 microcontroller, a real-time clock (RTC), and an IoT platform designed using the Blynk App. The proposed system features visualization and auditory alarms, designed using LEDs, buzzers, and LCD displays. It also includes a user-friendly interface designed with a push button for verifying patient compliance with taking their medications. This is done to ensure accuracy and minimize the possibility of a patient missing a dose. The prototype is battery-powered, making it both cost-effective and portable.

(HG3) RECAL: APPS FOR REHAB ASSIST AND CALORIES SCANNER

Team : DE220138 AHMAD HAZIQ BIN AHMAD NIZAM
CE210131 AHMAD KHAIRURRAZIN BIN HAIRUNIZAM
DE230078 AHMAD FIRDAUS BIN AHMAD FUZI
AE220021 AHMAD SOLEHEIN BIN MOHD RADZI

Supervisor : PROF. MADYA Dr. HISYAM BIN ABDUL RAHMAN

Abstract : This project combines two health-focused solutions into a single platform: a rehab assistant application and an AI-powered calorie tracker. The rehab assistant utilizes smartphone sensors, such as gyroscopes and accelerometers, to measure tilt angles (pitch and yaw) during rehabilitation exercises. This feature offers customizable time and angle settings, along with a history log for progress tracking. Meanwhile, the calorie tracker utilizes AI and mobile camera technology to recognize food items, instantly calculate calories, and compute Body Mass Index (BMI) for personalized daily goals, complemented by weekly visual progress graphs. Together, these features provide a simple, integrated tool that helps users manage rehabilitation activities and monitor nutrition effectively using only their smartphone.

(HG4) REHADRIVE SMART REHABILITATION CAR CONTROLLED BY HAND GRIP FORCE

Team : CE230052 AHMAD FITRI BIN ALIAS
CE230140 MUHAMMAD AMIRUL HAZEEQ BIN FAIZALIZAN
CE230090 NUR HANNAN AFIQAH BINTI 'EMRAN
CE230045 NURUL FATIN NABILAH BINTI ISHAK

Supervisor : PROF. MADYA Dr. HISYAM BIN ABDUL RAHMAN

Abstract : The proposed project is RehaDrive, an intelligent robotic vehicle system developed to support rehabilitation for individuals with hand weakness or coordination impairments. Traditional rehabilitation exercises are often repetitive and monotonous, which can lead to reduced user engagement. RehaDrive addresses this issue by enabling robotic control through hand grip force and gesture-based movements. The system employs a custom electronic hand dynamometer with an HX711 load cell amplifier and an MPU6050 accelerometer and gyroscope to measure grip strength and hand orientation. An ESP32 microcontroller processes the sensor data and wirelessly transmits control commands to a robotic car equipped with DC motors and a servo-controlled gripper. Through gamification, RehaDrive transforms conventional rehabilitation into an interactive and motivating experience.

(HG5) SMART MEDICATION DISPENSER

Team : AE220129 AMMAR HAIKAL BIN FAZRUL HISYAM
AE220061 ANGELINA GOH XINN NI
AE220034 AKMAL HAIQAL BIN KALAM
CE230095 AMIRUL HAIKAL BIN NAHRUL KHAIR
DE220126 ALIF MUHAIMIN BIN MOHAMAD SAHLAN

Supervisor : PROF. MADYA Ir. DR. NABILAH BINTI IBRAHIM

Abstract : Medication non-adherence results from forgetfulness, confusion, and lack of supervision, and it is very common in elderly individuals and patients with long-term diseases. This may cause them to miss doses or take incorrect amounts of medicine, which can be very dangerous to their health. This project presents a Smart Medication Dispenser that automates the dispensing of solid and liquid medications using embedded systems and Internet of Things (IoT) technology. The system utilizes an Arduino and ESP32 with a Real-Time Clock (RTC), sensors, motors, a buzzer, and LEDs to ensure accurate and timely medication dispensing. By using the Email platform for remote monitoring, caregivers can be immediately notified of any changes in a patient's condition, and they also have an easy way to get in contact with them. Through this, caregivers can view updated information about the patient and see details concerning the medication given to the sick person. The suggested system addresses medication compliance, patient protection, and caregiver comfort as an affordable and easy-to-use solution for medical care, also reducing additional expenses.

(HG6) DESIGN AND IMPLEMENTATION MOBILE-BASED MEDICINE REMINDER APP FOR PATIENT ASSISTANCE

Team : AE220118 AISYAH BINTI MOHAMAD ALYASA'
DE220169 AZIQTAZRY BIN FAIDZLI
CE230050 PUTRI FAZRYYN AZAHARA BINTI MOHD FAUZIMAN
CE230089 BATRIESHA BINTI AZMI
CE230158 ASRI NORHAFIZ BIN AHMAD

Supervisor : Ts. WAN NUR HAFSHA BINTI WAN KAIRUDDIN

Abstract : Medication non-adherence is a critical health issue, with an estimated 50% of patients with chronic illnesses experiencing this issue, high morbidity, high healthcare expenses, and poor health outcomes. In this project, one of the suggested applications is the creation of a mobile-based medicine reminder app for patient assistance, designed to address the widespread problem of missed medication doses among working adults, students, and elderly groups. The app utilizes the Flutter framework for cross-platform mobile development, and Firebase provides secure, cloud-based backend services that enable users to manage their personalized medication. Its main characteristics include secure user authentication, custom reminder notifications, visual identification of medications with the aid of image uploads, and a user-friendly dashboard for tracking the medication schedule daily. In comparison to traditional reminder methods such as paper notes or generic phone alarms, the solution provides in-depth, medication-specific information, accurate data management, and smart notification systems that identify and inform users about missed doses. The system operates on Android-based devices, focusing on medication reminders and tracking, but does not include diagnostic or prescriptive features. The development approach will include system architecture design, utilizing flowcharts and block diagrams, as well as the implementation of Flutter and Firebase integration, and Android platform testing. The initial findings indicate an intuitive interface with key features, including log-in and account creation, medicine registration with image assistance, dashboard administration, personalized reminder settings, and real-time push notifications.

(HG7) SMART BLOOD PRESSURE MONITORING AND ANALYSIS SYSTEM

Team : AE220065 BEH ZHI SHENG
AE220062 CHAN ZI WEI
AE220060 CHONG KAH LOK
CE210109 FUADI DANIAL BIN FUADIRIDZA
AE220022 DANISH SHAHMY BIN SUNNY SHAHROS

Supervisor : Dr. SHIPUN ANUAR BIN HAMZAH

Abstract : Hypertension is one of the most common risk factors for cardiovascular diseases and requires regular monitoring for effective long-term management. However, clinical-based measurements are often inconvenient and may be affected by the White Coat Effect, leading to inaccurate blood pressure readings. This project proposes a low-cost, IoT-based Smart Blood Pressure Monitoring System designed for continuous, home-based blood pressure monitoring. The proposed system integrates a modified commercial digital blood pressure monitor with an ESP32 microcontroller to acquire cuff pressure signals. The ESP32 processes the measured data and transmits the results wirelessly via Wi-Fi or Bluetooth to a mobile application developed using MIT App Inventor. The application enables real-time data visualization, basic history logging, and trend observation, allowing users to better understand their blood pressure patterns over time. The system emphasizes affordability, portability, and ease of use, making it suitable for daily monitoring and potentially useful for elderly users. Preliminary testing focuses on validating wireless data transmission, user interface functionality, and the feasibility of system integration. Overall, this project demonstrates the potential of a simple IoT-based solution to bridge the gap between conventional home blood pressure monitors and costly clinical systems, while supporting improved health awareness and reduced reliance on clinic-based measurements.

(HG8) IOT SMART HEATED BLANKET FOR BABIES

Team : AE220067 CHEONG KAH SHEN
AE220071 CHEW KHAI QIAN
AE220044 RAFIQ IQBAL BIN ZUL HABRI
CE230094 HAFZELHAM BIN MUE'IZUDIN
DE230066 FARIIS FIQWAN BIN FARIZMAN

Supervisor : Dr. MOHAMAD NAZIB BIN ADON

Abstract : This project proposes the design and development of an IoT smart heated blanket for babies with the aim of providing a safe, controlled, and comfortable thermal environment for infants. The system integrates temperature sensing, microcontroller-based control, and wireless monitoring to ensure that the blanket's temperature remains within a predefined safe range. Real-time temperature feedback enables automatic regulation of the heating element, reducing the risks of overheating and insufficient warmth. The proposed solution assists parents and carers by enhancing infant comfort while emphasising safety, reliability, and energy efficiency.

(HG9) DEVELOPMENT OF A LOW-COST TRIAGE KIOSK WITH VITAL SIGN MONITORING AND REAL-TIME DATA SYNCHRONIZATION

Team : AE220072 CHING LI BAN
DE230064 DHIAIZ RIFQI BIN SALLEHIN
CE230008 IKLIL NAJAA BINTI TALIP
CE230046 HAZIM BIN MOHD RAZALI

Supervisor : PROF. MADYA Ts. Dr. NAN BIN MAD SAHAR

Abstract : In modern healthcare environments, manual triage processes are often time-consuming and prone to human error, particularly in low-resource clinical settings. This project presents the development of a low-cost triage kiosk designed for automated vital sign monitoring and real-time data synchronization. The system utilizes an ESP32-CAM microcontroller, integrated with an MLX90614 infrared sensor for non-contact body temperature measurement, and a MAX30102 sensor for monitoring heart rate and oxygen saturation (SpO2). Instead of relying on traditional local display units, the proposed system utilizes a Blynk IoT mobile and web-based dashboard as the primary user interface, allowing both patients and medical personnel to remotely monitor vital sign data in real-time. An automated emergency alarm and push notification mechanism is incorporated to alert healthcare staff whenever abnormal readings, such as elevated temperature, irregular heart rate, or low SpO2 levels, are detected, allowing for timely medical intervention. Additionally, all collected data are synchronized with a Firebase cloud database to support long-term record storage and data management. The experimental results demonstrate that the proposed system provides a contactless, accurate, and cost-effective solution (approximately RM138.88) for patient screening and prioritization. Overall, the developed triage kiosk enhances clinical efficiency, reduces the workload of healthcare staff, and supports digital health transformation in modern healthcare environments.

(HG10) PHYSICAL STRESS DETECTION SYSTEM USING HEART RATE AND GSR

Team : CE230105 EDWARD RAJ A/L PAUL
DE230088 RAHUL A/L MUHANTHAN
CE230025 INTAN NUR ANIS BINTI NORAZMAN
CE230049 ISZUANNUL IRZAN BIN RAZAIN

Supervisor : PROF. MADYA Ir. Dr. FARHANAHANI BINTI MAHMUD

Abstract : This project focuses on the design and development of a Physical Stress Detection System that monitors and classifies the stress levels in real-time using the physiological signals. The system combines a MAX30100 sensor, which measures heart rate, with a Galvanic Skin Response (GSR) sensor controlled by an ESP32 microcontroller. To improve accuracy, a personalized calibration process is implemented to establish baseline values for each user, enabling the system to detect changes effectively associated with physical stress. The collected data is transmitted wirelessly to the Blynk application, where the user can easily view and monitor their stress levels through a mobile application. Overall, this project system offers a low-cost, portable solution that provides an alternative to self-reporting for stress assessment. The experimental results show that the system is capable of continuous stress monitoring, making it suitable for personal health management, workplace wellness programs, and academic stress evaluation.

(HG11) SMART ELDERLY WALKING STICK

Team : CE220042 HARIVINTHIRAN A/L MURLY
DE220086 KAMILIA BINTI ABD RAHIM
CE230085 ISMAIL BIN IBRAHIM
AE220058 LOH WEI KIAT

Supervisor : PROF. MADYA Ir. Dr. TEE KIAN SEK

Abstract : The aging population in Malaysia is increasing gradually, and this demographic shift presents growing health and safety challenges for elderly individuals, particularly the risk of falls due to reduced balance and physical strength. While traditional walking sticks provide basic support, they lack advanced safety and monitoring capabilities. Thus, to address this issue, this project proposes a Smart Elderly Walking Stick designed to enhance both independence and personal safety for senior users. Essentially, the systems are developed using a microcontroller-based platform and integrate sensors for obstacle detection, fall detection, and real-time location tracking, operating under two main systems: the obstacle detection system and the remote monitoring system. Hence, this device can provide immediate user feedback and generate emergency alerts when abnormal events are detected. Moreover, through Internet of Things (IoT) connectivity, alert information and location data can be transmitted out, enabling caregivers to monitor the elderly remotely. Further, experimental evaluation indicates that the system operates reliably, while survey findings reveal strong

user interest and acceptance of automatic safety alerts. Overall, the proposed smart walking stick offers a practical and affordable solution that combines physical assistance with proactive safety monitoring for the elderly.

(HG12) TRACKABLE SMART PILL BOX

Team : CE230143 HO JIA WEI
DE220007 RUVINDER RAJ A/L RAVISELWEN
DE230114 KUGANESS A/L SIVAJOTHY
CE230150 MOHAMAD FAHMI BIN MOHD SHAIR

Supervisor : PROF. MADYA Ir. Dr. AUDREY HUONG KAH CHING

Abstract : Medication non-adherence remains a major healthcare challenge, particularly among elderly individuals and patients with chronic illnesses who require strict medication schedules. Missed or incorrect medication intake can lead to serious health complications, increased hospital admissions, and higher healthcare costs. This problem is further intensified as many elderly individuals live independently or lack continuous supervision from family members or caregivers. Conventional pill organisers and mobile reminder applications are often inadequate due to the absence of real-time monitoring and confirmation of medication intake. This project presents the design and development of a Trackable Smart Pill Box, an Internet of Things (IoT)-enabled device designed to improve medication adherence through automated detection, visual guidance, and remote monitoring. The system utilizes an ESP8266 microcontroller, along with reed switches and magnets, to detect access to the pill compartment. An OLED display provides medication reminders, while real-time notifications are sent to caregivers via Telegram using Wi-Fi connectivity. The proposed system emphasises simplicity, affordability, and reliability, making it suitable for elderly users with minimal technological interaction.

(HG13) SMART PILL DISPENSER WITH WIFI MODULE AND CLOUD COMPUTING FOR VULNERABLE PATIENTS

Team : CE230039 AYU ADRIANA ANOR BINTI MOHD RASHID
CE220076 AMIRAH NAJIHAH BINTI MD ZAIN
CE230114 PREVEEN KUMAR A/L V ARUMUGAM
DE230139 MAWADDAH HASDALILA BINTI MOHD HUSNI

Supervisor : DR RAHMAT BIN SANUDIN

Abstract : Medication adherence is a critical factor in managing chronic conditions, especially among elderly and vulnerable patients. This project introduces a Smart Pill Dispenser system that utilizes the ESP32 microcontroller, combined with a Real-Time Clock (RTC), a stepper motor, and cloud communication technologies, to automate medication dispensing and facilitate remote health monitoring. The device dispenses pills precisely according to a scheduled timetable, delivers instant reminders to patients through the Telegram platform, and uploads medication intake records to ThingSpeak, allowing caregivers and healthcare providers to track adherence remotely. By integrating Internet of

Things (IoT) and cloud computing solutions, the system aims to reduce missed or incorrect dosages, decrease medication waste, and improve healthcare efficiency. Comprehensive testing confirmed the system's accuracy, mechanical reliability, and effective communication, demonstrating its potential as a scalable, affordable, and user-friendly healthcare tool.

(HG14) AUTOMATED IV MONITORING and DATA LOGGING SYSTEM

Team : DE220069 MOHD KHAIRUL NIZAM BIN JUMIATI
CE230077 MUHAMAD AMIRUL FARHAN BIN OTHMAN
CE230132 MUHAMAD HAIKAL BIN MICHAEL @ MOHD ZALI
DE230130 AMIR HAZIQ BIN MAT RAHIM

Supervisor : PROF. MADYA Dr. MARIYAM JAMILAH BINTI HOMAM

Abstract : The Automated IV Monitoring and Data Logging System is an IoT-based system that improves patient safety while reducing the strain on healthcare professionals during intravenous (IV) therapy. Traditional manual monitoring of IV fluid levels is time-consuming, prone to human error, and can cause therapeutic delays. This device overcomes these obstacles by utilizing a load cell sensor and an HX711 amplifier, coupled with an ESP32 microcontroller, to automatically measure and track IV fluid weight in real-time. Data is wirelessly delivered to the Blynk cloud platform for real-time monitoring and alert messages, while also being entered into Google Sheets for secure, time-stamped recordkeeping. Maintaining accurate and continuous IV infusion records enable the medical team to generate patient reports with greater precision and reliability, supporting better clinical decision-making and documentation.

THEME – SMART HOME/CITIES

(CG1) SMART DUMPSTER WITH LORA-BASED MONITORING SYSTEM

Team : CE230159 KATHIRVEL A/L ARMUGAM
AE220083 KEE YONG HIANG
DE230118 MOHAMAD HAIKAL BIN HUSSEIN
DE230070 CHARLES FELIX ANAK HORISON
DE230111 MOHAMAD NADZRUL IRFAN BIN MOHAMAD NADZRI

Supervisor : ENCIK AIZAN BIN UBIN

Abstract : This project develops a smart dumpster with a LoRa-based monitoring system to address waste overflow and inefficient collection in urban areas such as Parit Raja. The system integrates ultrasonic sensors for fill-level measurement, RFID access control for security, and LoRa technology for long-range data transmission of up to 15 km, eliminating the need for local Wi-Fi. Experimental results confirm excellent performance, with the ultrasonic sensors providing consistent fill-level readings and the RFID module achieving 100% accuracy in identifying authorised users with a response time as fast as 0.5 seconds. Furthermore, the visual and audio alert system demonstrated reliable performance by signalling a 'Bin Full' status once waste reached a critical threshold of95%. Overall, the integration with the Blynk application enables real-time monitoring, optimizes collection schedules, reduces operational costs, and supports Malaysia's sustainable smart city aspirations.

(CG2) PARKING GUIDANCE SYSTEM (PGS) FOR SHOPPING MALLS

Team : AE220073 KHOO YONG JIAN
AE220059 LAU CHEN KIT
DE230099 EIZAZ SAFWAN BIN AIZIZI AZUAR
CE220010 MOHAMAD NAZRIN BIN AHMAD SOM

Supervisor : Dr. SITI HAJAR AMINAH BINTI ALI

Abstract : The increasing number of vehicles in Malaysia has resulted in severe parking congestion at high-density urban shopping malls. Visitors often face prolonged search times to find a spot and struggle to locate their vehicles upon returning. This project presents the design of a cost-effective Parking Guidance System (PGS) aimed at addressing these challenges. The proposed solution utilizes HC-SR04 ultrasonic sensors and ESP32 microcontrollers to detect parking bay occupancy in real-time. The system features a dual-output interface: an LCD display for entry guidance and a mobile application developed using MIT App Inventor. A key feature is the "Find My Car" function, which utilizes QR code scanning to help users locate their parked vehicles. Unlike expensive commercial cloud-based systems, this project operates entirely on a local Wi-Fi network, ensuring data privacy and eliminating the need for subscription costs. The prototype demonstrates that affordable IoT technology can effectively reduce search time, minimize carbon emissions, and improve the overall visitor experience.

(CG3) SOLAR POWERED SELF-SUFFICIENT SENSING

Team : AE220074 LEE CHENG CHONG
AE220063 LEE CHEONG LOK
AE220057 MOHAMAD YUSRI HAFIZ BIN YUSLAH
DE230133 HARITH AKMAL BIN PAIROLANI
AE220004 MOHAMMAD SYAIFUDDIN BIN ASLI

Supervisor : PROF. MADYA Dr. ROSLI BIN OMAR

Abstract : The rapid development of urban areas has increased the demand for sustainable infrastructure, as conventional lighting systems suffer from high operational costs and a reliance on the grid. This project develops a solar-powered, self-sufficient urban sensing hub system that integrates solar energy harvesting with Internet of Things (IoT) monitoring to create an autonomous smart city ecosystem. Utilizing a NodeMCU ESP32 microcontroller, the system monitors environmental conditions via DHT11, LDR, and air quality sensors while managing adaptive LED lighting to optimize power consumption. The hardware is powered by a 12V solar panel and battery storage, with real-time data visualized through the ThingSpeak cloud platform. Preliminary results confirm the system's ability to maintain stable energy flow and provide real-time environmental feedback, offering a scalable, low-carbon solution for modern urban management

(CG4) SMART TRAFFIC LIGHT SYSTEM FOR EMERGENCY VEHICLE PRIORITY

Team : AE220084 LEE SHU YU
AE220087 LEE SIEW SHUEN
AE220088 SIAW JUN WEI
CE230047 MUHAMMAD AZAMUDDIN BIN MOHAMAD AFANDI
DE230135 MUHAMAD HARITH AQIL BIN HASHIN

Supervisor : Dr. RAFIDAH BINTI NGADENGON @ NGADUNGON

Abstract : Traffic congestion in urban areas significantly affects mobility efficiency and delays emergency response services. Conventional traffic signal systems operate using fixed timing mechanisms and are unable to dynamically prioritize emergency vehicles, leading to increased response times during critical situations. This paper presents the design and implementation of a smart traffic light system for prioritizing emergency vehicles using Radio Frequency Identification (RFID) technology and an embedded microcontroller platform. Emergency vehicles are equipped with unique RFID tags, while RFID readers installed at road intersections detect approaching vehicles and transmit priority signals to a NodeMCU ESP32 controller. Upon detection, a finite-state machine-based priority control algorithm overrides the normal traffic light sequence by safely transitioning conflicting lanes to red and granting an immediate green signal to the emergency vehicle’s path. After the emergency vehicle clears the intersection, the system automatically resumes normal traffic

operation to minimize disruption. A small-scale prototype was developed and experimentally evaluated, demonstrating reliable detection, near-zero delays for emergency vehicle passage, and safe transitions at traffic signals. The proposed system is decentralized, cost-effective, and independent of continuous internet connectivity, making it a practical solution for improving emergency response efficiency and supporting intelligent transportation systems in smart city environments.

(CG5) BRIDGING THE CONNECTIVITY GAP: A CUSTOM WIRELESS SOLUTION FOR SMART CITY APPLICATIONS

Team : AE220079 LEE ZI YING
AE220066 LEONG EE QIAN
AE220047 MUHAMMAD AFIQ ASYRAF BIN AB RAHMAN
DE230059 MUHAMMAD DANIEL BIN MD ISA
AE220054 MUHAMMAD ALIF BIN GHAZALI

Supervisor : PROF. Dr. MUHAMMAD RAMLEE BIN KAMARUDIN

Abstract : This project presents the design and implementation of a Point-to-MultiPoint (PtMP) Wireless Bridging System operating in the 5 GHz band, aimed at addressing the persistent “last-mile” connectivity gap in rural and smart-city environments. The system leverages Wi-Fi 6 (802.11ax) technology and MikroTik L11UG-5HaxD router boards to enhance throughput and multi-user efficiency. Its architecture comprises a central Ethernet-connected access point (AP) wirelessly bridged to two remote station bridges, each distributing connectivity to end-users via AX1500 Next-Gen AX12 routers. The project also includes the integration of commercial 5GHz bi-directional antennas, the CAD-based design of a weather-resistant protective casing, and field deployment to validate system stability. Field tests confirmed robust performance in throughput, range, stability, and multi-client support. Client 1 (200 m) achieved 128.8 Mbps down/55.9 Mbps up, while Client 2 (100 m) reached 143.0 Mbps down/116.8 Mbps up, with low latency and minimal packet loss. These results demonstrate that the prototype meets the bandwidth requirements for essential smart-city and rural applications, such as HD video streaming and IoT backhaul. Consequently, this work presents a viable, low-cost, and scalable wireless solution for bridging the connectivity gap in underserved regions.

(CG6) SMART DUSTBIN

Team : DE230105 LO SI MIN
DE210062 LIM HUI EAN
AE220082 SIM KAI TICK
AE220026 MUHAMMAD ALIF NAJMI BIN MISBAH
CE230013 MUHAMMAD FAIEZ BIN MOHD SHUHAIMI

Supervisor : PROF. MADYA Dr. JAMALUDIN BIN JALANI

Abstract : This project presents the development of a microcontroller-based smart waste sorting system designed to automatically classify household waste into four categories: metal, plastic, paper, and wet items. The system utilizes multiple sensors, including an inductive proximity sensor for metal detection, an infrared sensor for plastic identification, and two ultrasonic sensors for detecting paper and wet items based on distance measurement. An Arduino microcontroller processes sensor inputs and controls four servo motors that direct the waste into the appropriate compartments. A priority-based decision algorithm ensures accurate classification, while a busy-state mechanism prevents simultaneous servo activation. Additionally, a 16×2 I2C liquid crystal display (LCD) provides real-time feedback on the detected waste category. The proposed system provides an efficient, cost-effective, and automated approach to waste segregation, thereby enhancing recycling efficiency and promoting improved environmental sustainability.

(CG7) SMART WASTE MANAGEMENT SYSTEM BY USING IOT

Team : CE220103 LOGEN A/L KARUNANITHI
AE220010 MAIDATUL MASYITAH BINTI MOHAMMAD TARMIZI
DE220185 MUHAMMAD AMIR RAFIQI BIN SHAMSUDDIN
CE230154 MUHAMMAD AMIRULASYRAF BIN KAMARULZAMAN
CE230098 MUHAMMAD FAZLEY BIN HANAPI

Supervisor : PROF. MADYA Dr. NOR SURAYAHANI BINTI SURIANI

Abstract : In conventional waste management systems, inefficiencies may occur due to the absence of real-time updates, leading to overflowing trash or wasteful waste collection operations. This proposed project, therefore, focuses on creating an IoT-based Smart Waste Management System using automated waste-level measurement and cloud communication functionalities for overcoming these logistics issues, which not only improves waste collection efficiency, allowing for smarter waste management, but also plays a significant role in the development of Smart Cities in a cost-effective and sustainable manner. For precise waste-level measurement, the proposed Smart Waste Management System utilizes an ESP32 microcontroller kit in conjunction with an HC-SR04 ultrasonic sensor, which transmits Wi-Fi data to an IoT Blynk app for real-time visualization of waste levels on its dashboard. Additionally, a threshold logic algorithm is used to generate push notifications on the user's mobile phone instantly once it reaches its waste-capacity threshold, indicating that it's already full and ready to be emptied. To further enhance the system, a Telegram bot

notification feature has been integrated to deliver instant alerts to waste collection drivers when the bin reaches 80% capacity, ensuring faster response times and more efficient collection planning. Experimental outcomes show considerable improvement in distance measurement accuracy and data synchronization, along with a reduced waste collection reaction time, thus increasing its efficiency by jumping from a reactive to a more proactive data-driven strategy for effectively implementing smart waste management systems in Smart Cities in a cost-effective and sustainable way

(CG8) IOT-BASED SMART DRAINAGE & FLOOD EARLY WARNING SYSTEM (IDFEWS) IN A RESIDENTIAL AREA

Team : CE230084 MAZLIN NAZIHAH BINTI MAZLAN
DE220130 MOHAMAD AZIFF BIN JOHAR
DE220008 SITI NAJIHAH BINTI MOHAMAD RAZIP
CE230080 MUHAMMAD HAFIZ BIN ABDULLAH
DE230115 MUHAMMAD ANAS SAFWAN BIN HASMAN

Supervisor : DR. TASIRANSURINI BINTI AB RAHMAN

Abstract : Countries located around the equator, such as Malaysia, will experience a hot and rainy climate, also known as an equatorial climate. Therefore, this can be confirmed by the Malaysian Meteorological Department, which indicates that Malaysia is expected to experience heavy rainfall at the end of the year, potentially leading to flooding. As we can see in newspapers and on social media, flooding has claimed numerous human lives and caused significant property damage. However, this disaster is not simply caused by continuous heavy rain; it can also be attributed to an inefficient and non-systematic drainage system. Improper disposal of debris can cause drainage systems to function poorly and prevent water from flowing properly. To address this problem, a system was designed that utilizes an HC-SR04 ultrasonic sensor to measure the level of debris in the drainage, a JSN-SR04T waterproof ultrasonic sensor to detect the water level, and a water level sensor to monitor the water flow. All components are connected to an ESP32 microcontroller, which serves as the central processing unit. The processed data from the microcontroller is transmitted via a LoRa module to a cloud platform, where it is visualized and used to notify users or relevant authorities through applications such as Blynk and Telegram Bot API.

(CG9) SOLARSYNC ADAPTIVE TRACKING SYSTEM FOR SMART CITY APPLICATION

Team : DE220011 MOHAMAD ZIKRY ZUBAIR BIN RUDY
AE220025 MUHAMMAD ARIEF DANIEL SHAH BIN MOHAMAD AFANDI
CE230103 MUHAMMAD HAZIQ RAMADHAN BIN ZAMRI
AE220038 MUHAMMAD AYASSHI ZAALAN BIN MUHAMAT

Supervisor : ENCIK NIK MOHD ASRI BIN NIK ISMAIL

Abstract : The SolarSync Adaptive Tracking System is designed to address the inherent inefficiencies of conventional fixed-angle solar photovoltaic (PV) panels, which are only optimally aligned with the sun for a limited portion of the day. This project proposes a functional prototype of a dual-axis solar tracking system to maximize energy capture by ensuring the panel remains perpendicular to the sun's rays throughout the day. The system utilizes an Arduino Uno as the main controller, integrated with four Light Dependent Resistors (LDRs) to detect sunlight intensity from different directions. Based on the sensor data, the controller drives two servo motors to adjust the horizontal rotation and vertical tilt of the panel. To ensure the system remains reliable for smart city infrastructure such as roadside lighting, the design includes an automatic backup charging feature. This safety system is managed by the controller, which monitors solar voltage and switches to an external power source to fill the battery whenever sunlight is too weak, such as on rainy or very cloudy days. By utilizing this secondary charging method, the system maintains continuous operation of the LED lights, regardless of the weather conditions.

(CG10) AI SMART TRAFFIC LIGHT FOR AMBULANCE PRIORITY

Team : AE210002 MOHAMED ALI ISSE
DE230123 MOHAMMAD HAFIZ BIN SAIPUL BAHRI
CE230152 MUHAMMAD IDLAN BIN ANUAR
CE230119 MUHAMMAD DANIAL AISY BIN ANIZAM

Supervisor : PROF. MADYA DR. WAHYU MULYO UTOMO

Abstract : Traffic congestion at road intersections often causes significant delays for emergency vehicles, particularly ambulances, which can negatively impact response time and patient outcomes. This project presents the design and development of an IoT-based smart traffic light system with AI-assisted ambulance detection, prioritizing emergency vehicles at signalized intersections. The system utilizes an ESP32-CAM module to capture real-time traffic images and applies an AI object detection model trained using the Roboflow 3.0 Object Detection framework to accurately identify ambulances. Upon detecting an ambulance, the ESP32 microcontroller automatically overrides the normal traffic signal sequence and provides a green light to the corresponding lane while switching other lanes to red, ensuring a safe and unobstructed path. A safe transition mechanism using a yellow-light phase is

implemented to enhance road user safety. The system is integrated with the Blynk IoT platform for real-time monitoring, status visualization, and manual override capability. Experimental results indicate that the proposed system operates reliably in real-time conditions, successfully detecting ambulances and dynamically controlling traffic signals. This approach demonstrates a cost-effective and scalable solution for intelligent traffic management systems and has strong potential for deployment in smart city applications.

(CG11) DEVELOPMENT OF A SMART PARKING MANAGEMENT SYSTEM FOR REAL-TIME PARKING SLOT AVAILABILITY

Team : DE230140 MOHAMMAD HANIF BIN SAIPUL BAHRI
CE220018 MOHD NUR AIMAN SULAIMAN
CE230096 MUHAMMAD FAKHRUDDIN BIN ABDUL HAMID
AE220013 MUHAMMAD FAQIH HAZIQ BIN AZMAN

Supervisor : DR. JAIS BIN LIAS

Abstract : Urbanization and the rapid increase in vehicle ownership have intensified parking congestion in modern cities, resulting in wasted time, increased fuel consumption, traffic delays, and adverse environmental impacts. Traditional parking management systems, which rely on manual monitoring and static allocation, fail to provide real-time updates on parking availability, resulting in inefficiencies and user frustration. This study proposes the design and implementation of a Smart Parking Management System that integrates Internet of Things (IoT) sensors, microcontrollers, and cloud-based platforms to deliver real-time parking slot information. Ultrasonic sensors detect vehicle presence, while ESP32 microcontrollers transmit occupancy data via Wi-Fi to a centralized cloud server. A mobile application, developed using Flutter, provides drivers with live slot visualization, vehicle management, and progressive billing features. Meanwhile, a web-based dashboard enables administrators to monitor occupancy and receive real-time security alerts. The system aims to reduce search time, optimize space utilization, and minimize traffic congestion and emissions. By leveraging IoT and cloud technologies, the proposed solution enhances urban mobility efficiency and improves user experience in parking facilities.

(CG12) SMART-DUSTBIN WITH FIRE AND DATA MONITORING

Team : DE220030 MUHAMAD AMIRUDDIN BIN VAEA
DE220045 MUHAMAD HAFIZUDDIN BIN RAMLAN
CE230078 SU ZHI JIAN
CE230100 NUR BALQIS BINTI RAZAK

Supervisor : Ts. REZA EZUAN BIN SAMIN

Abstract : The increasing demand for efficient waste management and public convenience has highlighted the limitations of conventional waste monitoring systems that rely heavily on manual inspections and scheduled waste collection. These methods often result in waste overflow, inefficient resource utilization, and delayed response to fire hazards. This project proposes the development of a smart bin monitoring system based on Internet of Things (IoT) technology to address these challenges. The system incorporates an ultrasonic sensor to track the waste fill level and a flame sensor to identify possible fire events. A microcontroller processes sensor data and sends real-time information to an IoT platform for remote observation. When the waste level exceeds a set limit or a fire is detected, immediate alert notifications are dispatched to the user via the Blynk platform. The system's performance is evaluated based on detection accuracy, response time, data transmission delay, and reliability. The findings indicate that the system can provide prompt and precise monitoring, thereby enhancing waste management effectiveness and improving safety. This project demonstrates the effectiveness of IoT technology in supporting smart city and environmental management applications

(CG13) SMART MEDICINE DISPENSING ROBOT FOR NURSING HOME

Team : CE230053 MUHAMAD SYAHMI AIMAN BIN MOHD ALI
DE230098 MUHAMMAD MUSTAQIM BIN JAMALUDDIN
DE230049 JANNAH SUFIAH BINTI NOR RHYMEE
DE230106 NUR SHAZA ALIA' BINTI HASADI TANI MANJA

Supervisor : PROF. MADYA Ir. Dr. HERDAWATIE BINTI ABDUL KADIR

Abstract : The administration of medicines in nursing homes is also finding itself under pressure due to the lack of healthcare staff, heavy workloads, and an increasing number of elderly patients who are mobility-impaired and cognitively challenged. All these factors significantly contribute to the potential for errors in medical administration. The topic of this project is to develop the concept and implementation of an intelligent medicine-dispensing robot designed to assist with medication administration in nursing homes in a semi-automated manner. The proposed concept involves utilizing human navigation to guide the robot to the point closest to the patient’s bedside, while the actual medication administration is to be accomplished using an actuator-controlled mechanism. An intelligent graphical user interface is also to be integrated to enable the scheduling of patients’ medication administration. The proposed interface would be able to schedule medicines at fixed time intervals, as well as at other

scheduled times. The proposed robot underwent testing to determine its ability to administer accurate medicine without placing additional burdens on healthcare professionals. The proposed technique is cost-effective and safe compared to fully autonomous robots. The potential use of semiautomatic robots in improving medicine administration management in nursing homes is presented.

(CG14) SMART PARKING MONITORING SYSTEM

Team : CE220029 KEEVAN RAIE SIVANESWAREN
CE230141 MAANISHA A/P MARDAID
CE230147 MUHAMMAD ZAIM AIQAL BIN ZAINURI
DE230132 SITI FARISAH NADIAH BINTI AMER
DE230108 NUR AQILAH BINTI MURAD

Supervisor : Ir. Dr. NOORHAMIZAH BINTI MOHAMED NASIR

Abstract : This IoT-enabled Smart Parking Monitoring System offers an affordable, real-time solution to urban parking congestion and its environmental impacts. Powered by an ESP32 microcontroller, the design integrates IR sensors for slot monitoring and ultrasonic sensors to automate toll gates via servo motors. By syncing data to a cloud-based dashboard, users can remotely check availability and pay a pre-arrival booking fee, while on-site drivers are guided by 16x2 LCD screens and dual-state LEDs. With a prototype cost of RM 160.40, this scalable system aligns with smart city initiatives (STEEP and NABC validated) to reduce fuel consumption and streamline urban transportation for establishments such as universities and malls.

THEME – SMART AGRICULTURE

(AG1) IOT-BASED ANIMAL INTRUSION DETECTION SYSTEM FOR SMALL-SCALE AGRICULTURE

Team : DE220019 MUHAMMAD AFIF IRFAN BIN MOHD ZAIDI
AE220130 MUHAMMAD AFIQ BIN MAZARUDIN
AE220009 MUHAMMAD FIRDAUS BIN ZAINAL ABIDIN
DE230081 NUR HAMIZAH BINTI NASNAWI
AE220052 MUHAMMAD HAFIZUL BIN AFFENDI

Supervisor : PROF. MADYA Dr. ZUHAIRIAH BINTI ZAINAL ABIDIN

Abstract : Animal and human intrusion is a major challenge faced by small-scale farmers, often leading to crop damage and economic loss. This project presents an IoT-based Animal Intrusion Detection System designed to provide real-time monitoring and alerts for agricultural areas. The proposed system integrates multiple sensors, including a Passive Infrared (PIR) sensor and an ultrasonic sensor to detect motion and distance, as well as a laser diode and Light Dependent Resistor (LDR) setup to act as a virtual boundary fence. The ESP32 microcontroller serves as the central processing unit, collecting sensor data and controlling alert mechanisms, such as a buzzer and LED. To ensure continuous and sustainable operation, the system is powered using solar energy, making it suitable for remote and rural farm environments. Upon detecting an intrusion, the system sends real-time notifications to the farmer via the Blynk IoT platform, utilizing Wi-Fi connectivity. Simulation results demonstrate that the system effectively detects intrusions and provides timely alerts. Overall, the proposed solution provides a cost-effective, energy-efficient, and reliable approach to enhancing farm security and promoting smart agricultural practices.

(AG2) URBANLEAF 4.0: AN INTELLIGENT MODULAR INDOOR HYDROPONIC

Team : DE220038 MUHAMMAD AFIQ FIRDAUS BIN MUHAMMAD
CE230072 SYAKIRAH BINTI SHAHRUL EFFENDY
CE230043 ISHAMINA BINTI MOHD SAHAIFUL BAHARI
DE230134 NURUL FAIQAH BINTI MOHD FUZI
DE230087 MUHAMMAD HAIKAL BIN YAZID

Supervisor : Ts. Dr. MOHAMMAD AFIF BIN AYOB

Abstract : Rapid urbanization has increased the demand for fresh food while reducing available agricultural land and creating challenges such as poor soil quality, unpredictable weather, and limited water resources. To support sustainable urban food production, this project presents UrbanLeaf 4.0, a smart and modular indoor hydroponic system. The system utilizes an ESP32 microcontroller to integrate specialized IoT sensors, including a TDS sensor for nutrient concentration, a DHT22 sensor for ambient temperature, and a water level float switch for reservoir monitoring. By leveraging the Blynk IoT platform, users can access real-time data and remotely monitor their devices via a mobile interface. Additionally, the system incorporates automated time scheduling for lighting and watering cycles to ensure optimal plant health. Ultimately, UrbanLeaf 4.0 enhances growth efficiency and reduces water consumption,

providing a compact, resource-efficient solution for students, homeowners, and small-scale urban farmers.

(AG3) PROTOTYPE OF A SMART IRRIGATION SYSTEM USING RAINWATER HARVESTING WITH SOIL AND TANK MONITORING

Team : DE220044 MUHAMMAD AFIQ SYAHMI BIN ABDUL WAHID
DE220021 MUHAMMAD AMIRUL FAHMI BIN MOHD REDWAN
AE220121 MUHAMMAD HANNAN BIN ABD SAMAD
CE230071 NURULAIN SYAFIQAH BINTI RUHAIFIZUL
DE230046 MUHAMMAD HARITH NURUDDIN BIN ABU ZAILANI

Supervisor : Ts. Dr. AIN BINTI NAZARI

Abstract : Water scarcity and poor irrigation practices have become significant challenges in both agricultural and urban agriculture practices today. Traditional methods of irrigation often rely on human effort or fixed schedules, which may lead to under-irrigation, excessive water application, and unnecessary water wastage. To address such issues with the help of automation and preventive water usage, this project explains the work of a prototype Smart Irrigation System based on Rainwater Harvesting with soil and tank monitoring. To monitor soil conditions and the availability of rainwater in real-time, the proposed system will comprise an ESP32 microcontroller with a Decision Tree Machine Learning model, working in conjunction with a DHT sensor, soil moisture sensors, and an ultrasonic sensor for measuring water levels. A water pump is only activated when the moisture level in the soil has decreased to a particular level, and the water in the rainwater tank is sufficient. The approach promotes eco-friendly practices and reduces dependence on municipal water supplies by utilizing gathered rainwater as the primary irrigation source. The prototype will aim to be affordable, user-friendly, and suitable for small-scale farms, offices, schools, and personal gardens. The system demonstrates how to utilize smart technology for sustainable agriculture and enhance irrigation efficiency by saving water and reducing the need for human labour.

(AG4) DESIGN AND DEVELOPMENT OF AN AUTOMATED PALM OIL SEED SORTING MECHANISM USING DURIAN ESP32

Team : CE230058 MUHAMMAD AMIRUL HELMY BIN SAHUDIN
DE220129 MUHAMMAD AMMAR BIN MUSTAFFA KAMAL
DE220171 SYED AHMAD IKHWAN RAFIQI BIN S MD SHAHIRAN
AE220104 OSAMAH ASHOOR SALEM DAAKIK
AE220039 MUHAMMAD HARRIS BIN RAHIM

Supervisor : Dr. NOOR AZIZI BIN MARDI

Abstract : The palm oil business requires a diverse range of seed varieties to achieve maximum crop production. However, manual sorting of the seeds is a tedious business process that is not only time-consuming but also prone to human error. This project aims to design and develop an automated palm oil seed sorting system utilizing a Durian ESP32 microcontroller. Its design includes a conveyor belt with a DC motor to move the seeds sequentially and a servo motor, which serves as a mechanical actuator to physically direct the bad seeds into a reject bin. The Durian ESP32 control logic utilizes input signals (the provided signals are illustrated in the form of a manual push-button trigger) to align the sorting action and update the real-time status on an LCD panel. The system will achieve this by substituting manual dependency with electromechanical automation to enhance throughput, improve sorting consistency, and reduce the overall costs of operational procedures in the long run. The presented project is a low-cost and scalable solution that will adapt agricultural processing to Industry 4.0 standards, increasing productivity and enhancing safety in the workplace.

(AG5) DESIGN OF AN ESP32-BASED PDLC SMART ROOF FOR VANILLA VINE GREENHOUSE

Team : DE220018 MUHAMMAD ARIF IRFAN BIN MOHD ZAIDI
AE220006 MUHAMMAD ASYRAF BIN AZAHAR
CE220008 MUHAMMAD HASIF BIN BAHRIN
CE230020 PUTRA HAMIZAN BIN KAMARIZAL
CE230087 MUHAMMAD HAZMIE BIN ZAINUDDIN

Supervisor : Dr. CHUA KING LEE

Abstract : Vanilla cultivation requires meticulous management of environmental conditions to ensure optimal growth and high-quality yields. However, traditional greenhouse methods, reliant on manual shading and ventilation, are inefficient and inconsistent in responding to dynamic weather patterns. This project presents the design and implementation of a smart roof system utilizing Polymer Dispersed Liquid Crystal (PDLC) technology for vanilla vine greenhouses. Controlled by an ESP32 microcontroller, the system integrates a DHT22 sensor and a UV sensor to continuously monitor temperature, humidity, and ultraviolet radiation levels. When predefined thresholds are exceeded, the ESP32 automatically activates the PDLC film, transitioning it from a transparent to an opaque state to regulate light intensity and heat transmission. This non-mechanical, adaptive shading mechanism offers a sustainable and cost-effective alternative to conventional automated systems. Preliminary results from simulated control logic confirm the system's functionality under various

environmental scenarios. The project successfully demonstrates a proof-of-concept for an IoT-enabled, energy-efficient smart greenhouse solution designed to enhance crop productivity, reduce manual labour, and promote sustainable agricultural practices.

(AG6) SMART LIGHTNING-BASED AUTOMATIC INSECT DETECTION AND PLANT PROTECTION SYSTEM

Team : DE220039 MUHAMMAD DANIEL BIN MOHD HAMDAN
CE230126 MUHAMMAD AZFAR BIN OTHMAN
AE220126 TAN DE HANG
CE230117 SITI BATRISYIA BINTI SHARUL HAIZAI
AE220015 MUHAMMAD HILMI BIN JOHARI

Supervisor : PROF. IR. DR. MOHAMMAD FAIZ LIEW BIN ABDULLAH

Abstract : This project presents the design and development of the Smart Lighting-Based Automatic Insect Detection and Plant Protection System, a precision agriculture solution designed to mitigate crop yield losses caused by insects and pests. Traditional pest control relies heavily on chemical pesticides, which are environmentally detrimental, or manual inspection, which is labour-intensive. A significant challenge in automating insect control is the difficulty of detecting cold-blooded insects using standard thermal motion sensors. This project utilises a hybrid sensor fusion approach controlled by an ESP32 DevKit V1. The system integrates two Passive Infrared (PIR) sensors to monitor for larger, warm-blooded living and two IR Obstacle sensors specifically calibrated to detect the physical presence of small, cold-blooded insects via infrared reflection. The ESP32 activates a specific wavelength light source to repel or trap the insects and simultaneously transmits real-time alerts to a mobile dashboard via IoT connectivity. This multi-sensor solution ensures higher detection accuracy than single-sensor systems, offering a sustainable, energy-efficient, and chemical-free alternative for modern farmers.

(AG7) PREVENTIVE MAINTENANCE FOR WATER PUMP SYSTEM THROUGH CURRENT MONITORING

Team : CE220039 MUHAMMAD FIKRI BIN YUNOS
DE220089 MUHAMMAD FAYYADH AN-NUR BIN NOOR NAJHAN
AE220050 MUHAMMAD IZZAT IMRAN BIN ZULKIFLI
DE230075 SYAZWANI RAFEAH BINTI SYUKOR
AE220024 MUHAMMAD KHAIRIN HAZIQ BIN ARMAN

Supervisor : PROF MADYA DR SHAMSUL HAIMI BIN DAHLAN

Abstract : This project focuses on preventive maintenance for a water pump system through the monitoring of electrical current. The primary objective of this study is to identify early signs of pump faults by analysing changes in current consumption during operation. In this project, current sensors are used to monitor the pump's electrical behaviour, and the collected data are analysed to identify abnormal operating conditions. The results indicate that variations in current patterns can signal potential issues, such as mechanical wear, overload, or inefficiencies in the pump system. In conclusion, current-based monitoring is an effective and low-cost approach for implementing preventive maintenance,

which can reduce unexpected failures, maintenance costs, and system downtime in industrial and domestic water pump applications.

(AG8) TILAPIA AUTOMATIC FEEDING SYSTEM

Team : DE220058 MUHAMMAD HAFFEZ BIN MOHD ZAKI
AE220037 MUHAMMAD HAFIZUDDIN BIN RAZALI
CE220131 TAN JING WEN
AE220001 HAMMAN TUKUR UMAR
CE230031 MUHAMMAD LUQMANUL HAKEEM BIN RAMLI

Supervisor : Ts. Dr. SUHAILA BINTI SARI

Abstract : This project focuses on the development of a smart tilapia feeding system that combines a 3D-printed auger screw mechanism with IoT-based control to improve the efficiency and reliability of fish feeding. All key mechanical components, including the hopper, auger screw, and motor adapter, are custom-designed and fabricated using 3D printing technology, allowing flexible design modification and cost-effective prototyping. The auger screw mechanism enables controlled and consistent feed dispensing, reducing common issues such as clogging and uneven feed release found in conventional feeding methods. The system is controlled using a microcontroller and integrated with the Blynk platform, enabling users to remotely manage feeding operations and adjust feed quantities through a mobile application. Overall, this project demonstrates how digital fabrication and smart control technologies can be applied in aquaculture to support more efficient, user-friendly, and scalable feeding solutions.

(AG9) SMART-PHONE BASED INDOOR PLANT CARE

Team : DE220065 MUHAMMAD HARITH SHAH BIN SAIFUL AMIRUDIN
DE210004 MUHAMMAD HARITH JAZMI BIN MOHD JAMIL
AE220043 MUHAMMAD NAWFAL BIN MOHD IBRAHIM
CE230055 MUHAMMAD SYAFIQ BIN MOHD SAFAR

Supervisor : ENCIK MOHD JAIS BIN CHE SOH

Abstract : Sustaining healthy indoor plants depends heavily on maintaining ideal environmental conditions, particularly soil moisture, light intensity, and temperature. Traditional plant care often involves manual observation or scheduled care, which can sometimes lead to overhydration or light deprivation, ultimately affecting plant quality. This study presents Smart Indoor Plant Care, which adopts the ESP32 microcontroller and the Blynk app to implement real-time management. The proposed project combines various sensors, specifically two soil moisture sensors that can accurately measure soil moisture, an LDR that measures light intensity, and a DHT11 that measures both ambient temperature and humidity. With its automated irrigation system, the ESP32 microcontroller controls the water pump when the soil moisture level drops below 30% to 40%, specifically targeting plants that grow in this range. The project also includes the employment of a 5V DC fan, which is essential for providing optimal air circulation and maintaining optimal humidity levels. The project is sustainable because it is inexpensive, easy to manage, and very useful for gardeners, as

plants can be monitored from smartphone devices, ultimately increasing crop productivity, reducing water waste, and resulting in optimal plant care.

(AG10) SOIL COMPRESSION AND HUMIDITY WITH PROBABILITY

Team : AE220030 MUHAMMAD HAZIQ BIN NASARUDIN
AE220008 MUHAMMAD TAUFIQ BIN HALIMI
AE220076 TEH XIN AI
DE220087 MUHAMMAD HAZWAN BIN ROSLI

Supervisor : PROF. MADYA Dr. DANIAL BIN MD NOR

Abstract : This project presents the design and development of a soil monitoring system capable of measuring soil humidity and soil compression for plant care applications. The system uses a soil moisture sensor and a force-sensitive resistor (FSR) to evaluate soil water content and soil compaction conditions. An embedded microcontroller processes the sensor data and displays soil condition information on an OLED screen. The system categorizes soil conditions into qualitative states such as dry, wet, good, soft, and hard, allowing users to easily interpret soil health. Additionally, a trend-based predictive method is implemented to provide early recommendations on when watering or soil loosening may be necessary. The proposed system is low-cost, portable, and suitable for educational use, home gardening, and small-scale agricultural monitoring.

(AG11) AUTOMATED FERTILIZER MIXER

Team : CE230138 MUHAMMAD IDHAM NISAM BIN MUSA
DE220060 MUHAMMAD IKMAL HARITH BIN HAMDANI
DE230072 MUHAMMAD ZIKRI HAZIQ BIN ROSAIDI
AE220011 NAZIHAH BINTI MD DIAH

Supervisor : PUAN ROSNAH BINTI MOHD ZIN

Abstract : Agriculture relies heavily on the proper application of fertilizer to ensure healthy crop growth and sustainable soil management. However, traditional fertilizer mixing methods are often manual, time-consuming, and prone to inconsistent nutrient concentration. This project proposes an automated fertilizer mixer utilizing Internet of Things (IoT) technology to enhance mixing accuracy and efficiency. The system integrates an ESP32 microcontroller, solenoid valves, a pesticide water mixer, a TDS sensor, and a pH sensor to automate fertilizer preparation. Real-time monitoring and control are achieved through the Blynk application, enabling users to remotely manage fertilizer concentration and water quality, thereby reducing manual labour and fertilizer wastage.

(AG12) DESIGN AND IMPLEMENTATION OF AN ESP32-BASED SMART AGRICULTURE MONITORING SYSTEM USING FAVORIOT PLATFORM

Team : DE220024 MUHAMMAD IQMAL ASYRAF BIN NASIR
CE230082 MUHAMMAD IZZAD IKHMAL BIN MOHD ZAINI
DE230056 UMMI SABIRIN BINTI AZAHAR
CE230113 NAZIM BIN AZILLAH

Supervisor : PROF. MADYA Dr. YEE SEE KHEE

Abstract : This project presents the design and development of an ESP32-based smart agriculture monitoring system specifically optimized for cocopeat-based hydroponic cultivation. Aimed at addressing challenges such as inconsistent nutrient delivery and high labour costs associated with manual monitoring, the system design automates the tracking of essential growth parameters. Core architecture utilizes an ESP32 microcontroller integrated with suitable sensors to measure pH, Total Dissolved Solids (TDS), water flow, water levels, and cocopeat moisture. By leveraging the Favoriot IoT platform, the system enables farmers to visualize real-time data and historical trends through a remote dashboard, facilitating data-driven decision-making. Preliminary results confirmed the system's reliability, successfully maintaining optimal nutrient ranges and triggering irrigation through a relay module when moisture levels drop below 60%. This affordable and scalable solution reduces human error and resource wastage, offering a sustainable path for modernizing small-scale agricultural practices.

(AG13) DURIAN MONITORING AND ENERGY-EFFICIENT SYSTEM (DUMES)

Team : CE230060 MUHAMMAD AFIQ BIN SAFAWI
AE220106 HUSSEIN OMER ABDILAHI
AE220078 EDDIE LOH BIN WEI
DE230063
MUHAMMAD FAIZ FARHAN BIN MD FARIZAL

Supervisor : PROF. Ir. Dr. FAUZIAHANIM BINTI CHE SEMAN

Abstract : The Durian Monitoring and Energy-efficient System (DUMES) is developed to improve safety, reduce fruit loss, and enhance efficiency in Durian harvesting activities. The system integrates a NodeMCU ESP32 microcontroller with a vibration sensor and dual ultrasonic sensors to accurately detect falling durians while minimizing false triggers from non-durian objects. An ESP32-CAM module is used to capture images for event verification, and a buzzer provides immediate on-site alerts. The system is powered by a solar energy module, enabling autonomous and energy-efficient operation in off-grid plantation environments. IoT integration through the Blynk dashboard allows monitoring and alert notifications via a mobile application. Performance testing reveals that the system achieves reliable detection accuracy, rapid sensor response, effective anti-double-counting performance, and stable operation, demonstrating that DUMES is a practical, cost-effective, and sustainable solution for smart durian plantation monitoring.

(AG14) SMART DRYING SYSTEM: SLIVER CHAMBER

Team : CE220067 NUR ARINA NAZIHAH BINTI MOHD NAWAWI
DE220160 NIK HAZIQ HAZIMI BIN NIK AHMAD MAIZA
AE220068 ONG YU HENG
AE220032 SITI SALWANA BINTI TUKIMAN

Supervisor : Ts. EZRI BIN MOHD

Abstract : This project developed an IoT-enabled solar drying chamber to reduce post-harvest losses for farmers in Malaysia. The system integrates a forced-convection solar collector with an ESP32-based IoT control system that automatically regulates temperature and humidity via real-time sensor feedback. Testing showed a 35–50% faster drying time compared to open sun drying, while improving product quality and hygiene. The fully solar-powered design offers a sustainable, low-cost drying solution aligned with Malaysia's green energy goals..

THEME – ENERGY EFFICIENCY

(EG1) A SMART IOT SYSTEM FOR SUSTAINABLE WATER AND ENERGY USE

Team : CE220021 MUHAMMAD NABIL HAKIM BIN MAT HISHAMUDDIN
CE230032 MUHAMMAD NORHIDAYAD BIN SALIM
AE220046 NORAMIRAH ALYA BINTI MUHAMMAD AZIZI
BE210009 HASSAN ABDIRIZAK AHMED
AE220016 NUR DAYANA BINTI ABDUL RAHMAN

Supervisor : DR. MOHAMED NAJIB BIN RIBUAN

Abstract : This project presents the design and development of a Smart Internet of Things (IoT)–based system for sustainable water and energy use through small-scale hydropower generation. The system harvests kinetic energy from household water flow using a micro-hydro turbine to generate electrical energy, which is regulated and stored in a power bank for later use. An ESP32 microcontroller is integrated to enable real-time monitoring of battery state of charge (SOC) and system performance via an IoT dashboard. To enhance energy efficiency, an automatic lighting control mechanism using a light-dependent resistor (LDR) is implemented to activate lighting only under low ambient light conditions. Additionally, remote control functionality enables users to switch off the load when the battery level falls below a predefined threshold, preventing overdischarge and extending the battery's lifespan. System testing demonstrates stable power generation, reliable battery monitoring, responsive automatic lighting control, and effective remote operation through IoT integration. The proposed system offers a cost-effective, user-friendly, and environmentally sustainable solution for smart energy management in small-scale residential applications.

(EG2) AUTONOMOUS SOLAR PANEL CLEANING ROBOT FOR PV FARM

Team : DE220116 MUHAMMAD NORIZZMIER BIN NORASMAWI
CE220009 MUHAMMAD SYAFIQ ISKANDAR BIN MOHAMAD AFIFUDDIN
AE220120 VALERIE MELANIE ANAK MARTIN JISUN
CE230054 NUR IZZATI BINTI MOHD YANI

Supervisor : PROF. MADYA Ts. Dr. MOHD NOOR BIN ABDULLAH

Abstract : Dust, debris, and environmental pollutants accumulating on solar panel surfaces can significantly reduce the efficiency of photovoltaic (PV) farms. Manual cleaning methods are labour-intensive, time-consuming, and may expose workers to safety risks. Therefore, an autonomous solution is required to improve maintenance efficiency and safety. This project presents an Autonomous Solar Panel Cleaning Robot designed for PV farm applications. The robot is equipped with a motor-driven rotating brush mechanism to remove dust and debris from panel surfaces, along with a wheeled drive system that allows stable movement across the panels. A height-adjustable motor holder ensures effective brush contact with the panel surface during operation. The system is controlled by a microcontroller-based control unit, enabling

autonomous navigation and cleaning functions. The proposed system improves cleaning efficiency, enhances energy generation, and reduces operational costs while promoting safer maintenance practices. This solution offers a practical and sustainable approach for maintaining large-scale PV farms.

(EG3) A PORTABLE AND POWER-EFFICIENT SOLAR STREET LIGHTING SYSTEM FOR SUSTAINABLE URBAN AND RURAL APPLICATIONS

Team : AE220018 MUHAMMAD THAQIF DANIAL BIN CHE MOHD
AE220056 MUHAMMAD ZUHAIR BIN SAIFULLIZAM
AE220045 NUR MAHFUZAH BINTI ABD MANAN
AE220012 MUHAMMAD HAFIZUDDIN BIN SAMSUDIN DAUD
AE220042 NUR ZAHIRAH BINTI MOHD RIDZUAN

Supervisor : Dr. MASLINA BINTI YAACOB

Abstract : This project focuses on the design and development of a portable and power-efficient solar street lighting system designed to support sustainable urban and rural applications. The system integrates renewable solar energy with embedded control systems to provide reliable and autonomous outdoor lighting without dependence on grid electricity. A 12 V solar panel is used as the primary energy source to charge a $LiFePO_4$ battery through a PWM solar charge controller, ensuring efficient energy management and safe battery operation. The stored energy is utilized to power high-efficiency LED lighting during nighttime or low-light conditions. An integrated control system equipped with a motion sensor enables automatic lighting operation and energy-saving functionality. Additionally, an Arduino-based monitoring unit manages system performance and activates a cooling mechanism when an excessive temperature is detected. The portable and compact design allows easy installation and deployment in remote areas, construction sites, and emergency locations. Overall, this project promotes sustainable engineering practices by reducing energy consumption, minimizing carbon emissions, and providing a cost-effective and environmentally friendly lighting solution for off-grid environments.

(EG4) ESP32-INTEGRATED PZEM SENSOR FOR REAL-TIME HOUSEHOLD ENERGY MONITORING UNDER NEW TNB TIME-OF-USE TARIFF

Team : CE230070 NADHIRAH BINTI MOHAMAD NAZIB
DE230067 NAYLI NAZURAH BINTI SAHRI
CE230102 VINOSH A/L SARGUNAN
DE230062 MUHAMMAD HAMBALI BIN MOHAMED
DE220144 NURUL ALIAH BINTI MOHD FAIZAL

Supervisor : TS. DR. SYED ZAHURUL ISLAM

Abstract : Rising electricity costs and the implementation of Tenaga Nasional Berhad's (TNB) Time-of-Use (ToU) tariff have increased the need for a practical method to monitor household electricity consumption. This project presents the development of an Internet of Things (IoT) based household energy monitoring system using an ESP32 microcontroller integrated with a PZEM-004T sensor. The system measures key electrical parameters such as voltage (V), current (I),

power (W), frequency (Hz), and total energy consumption (kWh) for single-phase household appliances. The measured data are displayed locally on an LCD screen and remotely through the Blynk mobile application, while LED indicators provide visual alerts for abnormal voltage or frequency conditions and indicate peak and off-peak periods under the ToU tariff scheme. By providing real-time consumption information and tariff-based notifications, the system encourages users to adjust their electricity usage patterns, particularly by shifting high-energy activities to off-peak hours. Overall, the project demonstrates the feasibility of an IoT-based energy monitoring approach to improve household energy awareness and support more efficient electricity usage in Malaysia.

(EG5) IOT-BASED SOLAR HOME ENERGY MANAGEMENT FOR SUSTAINABLE ENERGY EFFICIENCY

Team : AE220081 NG JUN RONG
AE220075 NG POH XUAN
DE220049 NURUL AQWA NABILAH BINTI MOHD FADZIL
AE220020 MUHAMMAD HARIZ DANIAL BIN OMAR
AE220031 NURUL FAEZAH BINTI JUSLI

Supervisor : Ts. Dr. MAHYUZIE BIN JENAL

Abstract : The escalating global demand for electricity, coupled with the environmental impact of fossil fuel dependency, has necessitated a paradigm shift toward sustainable residential energy solutions. Traditional home energy systems often suffer from inefficiencies due to a lack of real-time monitoring and the absence of integrated renewable energy sources. This project addresses these challenges by developing an IoT-based Solar Home Energy Management System designed to optimize power consumption and facilitate the adoption of green technology. The proposed system integrates a Solar Photovoltaic (PV) array with a smart monitoring architecture driven by the ESP32 microcontroller. The core functionality relies on the sensor module to acquire precision electrical data, specifically voltage, current, active power, and cumulative energy usage. Additionally, the system incorporates environmental monitoring to track outdoor temperature, humidity, and light intensity, correlating weather conditions with system performance. All telemetry data is transmitted via Wi-Fi to the Blynk IoT platform, providing users with a real-time dashboard for remote load control and data visualization. Experimental validation of the prototype demonstrated the system's reliability and efficiency. The solar harvesting unit successfully maintained a stable battery charging cycle with a regulated 12V output. The IoT interface demonstrated low-latency performance (under 2 seconds) in remote switching operations, while the sensor data exhibited high accuracy with a margin of error of less than 2% compared to standard multimeters. These findings confirm that the system offers a cost-effective and scalable solution for reducing household carbon footprints, empowering users with granular control over their energy expenditure.

(EG6) SOLAR WIRELESS EV CHARGING SYSTEM

Team : DE220071 NOR LILY LYIANA BINTI BAHARUDIN
CE220132 WAN NOOR IKMIL HAZIQ BIN WAN NOOR IKRAM
AE220036 MUHAMMAD HAZIQ ZIKRY BIN ZULKIFLI
DE230110 NURZAHIRAH NADIAH BINTI ZAINI

Supervisor : DR. SURIANA BINTI SALIMIN

Abstract : Electric cars (EVs) are increasingly becoming the need to have efficient and environmentally friendly charging options. Traditional plug-in chargers could be cumbersome and require grid energy that cannot be renewed. The Solar Wireless EV Charging System, discussed in this study, combines the benefits of solar energy with the convenience of wireless power transmission. Physical connections will not be required since the system utilizes inductive coupling technology to wirelessly transmit energy to the EV battery. The system, which is controlled by an Arduino Uno and ESP32, features a solar panel to reduce electricity bills while minimizing its environmental impact, while still maintaining proper control over power. The primary components are safety sensors that detect overheating, an automatic cut-off system to prevent overcharging, and real-time monitoring of charging status via IoT (Wi-Fi/Bluetooth). This initiative offers an easy-to-use, environmentally conscious, and modern charging device designed for home use.

(EG7) SMART HOME LIGHTING AUTOMATION USING IOT

Team : DE220035 NUR AIN BASYIRAH BINTI KAMARUDIN
DE230068 NUR AMIRAH HUNA BINTI AZMI
DE230121 NYLEA NATASHA BINTI MOHD NIZAM
DE230125 NUR ALEEYA NATASHA BINTI YUSRAN

Supervisor : Dr. MOHD FADZLI BIN ABD SHAIB

Abstract : The rapid development of the Internet of Things (IoT) technology has enabled the creation of smarter and more efficient home automation systems. This project introduces the design and implementation of an IoT-based Smart Home Lighting Automation System with the aim of reducing electricity waste and increasing user convenience. The system utilizes an ESP32 microcontroller with built-in Wi-Fi functionality to control household lighting via a relay module. Users can remotely control and turn lights ON or OFF using the Blynk mobile application and control at any time, anywhere using the internet. Additionally, an integrated 16x2 I2C LCD display is utilized to provide real-time local feedback on the status of each lamp and network connectivity. Functional testing is conducted to verify that the system responds correctly to user input, operates reliably, and displays the correct response from the relays, lamps, and status updates on both the mobile application and the LCD. The proposed system is low-cost, easy to implement, and works with existing lighting infrastructure, making it suitable for residential and educational applications. Overall, this project demonstrates the practicality and efficiency of IoT technology in promoting energy efficiency, convenience, and smarter living environments.

(EG8) DESIGN AND IMPLEMENTATION OF A SMART IOT-BASED STREET LIGHTING SYSTEM FOR ENHANCING ENERGY EFFICIENCY ON CAMPUS

Team : DE220046 NUR ASIAH ATHIRAH BINTI ABDUL RAHIM
AE220085 YONG HUI TING
DE230080 STEVE BDIQ ANAK JOSEPH
DE230117 PUTERI NISHA DAMIA BINTI ROSMI

Supervisor : PROF. MADYA Ir. Dr. DIRMAN HANAFI

Abstract : This project presents the design and implementation of a smart IoT-based adaptive street lighting system aimed at enhancing energy efficiency and safety on a university campus. Conventional street lighting systems often operate at fixed brightness levels, disregarding real-time environmental conditions, which results in unnecessary energy consumption and increased operational costs. To address this issue, the proposed system integrates an ESP32 microcontroller with a Light Dependent Resistor (LDR) for ambient light detection and a Passive Infrared (PIR) sensor for motion detection, enabling automatic and adaptive control of LED street lights. The lighting system operates in dim mode during low-activity nighttime conditions and switches to full brightness when motion is detected, while remaining off during sufficient daylight conditions. Internet of Things (IoT) connectivity is implemented using cloud platforms, such as Blynk, to enable real-time monitoring, data logging, and performance evaluation of energy usage. Preliminary analysis indicates that the adaptive control strategy can significantly reduce energy consumption compared to conventional constant-brightness lighting systems, while maintaining adequate illumination for campus safety. This project demonstrates a practical, low-cost, and scalable solution that supports smart campus development, energy efficiency, and sustainable infrastructure initiatives.

(EG9) ECOSMART LIVING - “OPTIMIZING HOME ENERGY WITH AI AND IOT “

Team : AE220051 NUR FARAFAQIHAH BINTI MOHD RIZAL KHAN
CE220091 NURHAZUANI FARHANA BINTI ABDILLAH
DE230119 SITI NUR ATHIRAH BINTI RUSLAN
DE230094 WAN MUHAIMIN IFWAT BIN WAN HANAFI

Supervisor : PROF. Ir. Dr. ERWAN BIN SULAIMAN

Abstract : The growing demand for energy-efficient residential solutions has driven the adoption of IoT-based smart home technologies. This project presents the design and implementation of an IoT-enabled smart home system, focusing on enhancing energy efficiency and resource management. The system integrates keyless door unlocking, temperature monitoring, intelligent lighting control, smart irrigation, and real-time energy consumption monitoring. Automated lighting and irrigation reduce unnecessary power and water usage, while environmental monitoring supports optimized energy use for thermal comfort. Real-time energy monitoring enables users to track consumption and adopt energy-saving practices. All components are connected through an IoT platform that allows real-time visualization, remote monitoring, and centralized control. System evaluation confirms reliable operation and effective energy reduction

through intelligent automation, highlighting the potential of IoT-based smart homes to enhance sustainability and residential energy management.

(EG10) HOME ENERGY DASHBOARD WITH EFFICIENCY ALERT

Team : DE220004 NURUL AIMAN NISYA BINTI BASIRAN
CE230118 NURUL AMIRAH BINTI NORIZAN
CE230016 ZAKIRA IMANA BINTI MOHD SALLEH
DE230138 WAN MUHAMMAD FARISH BIN WAN KAMARI

Supervisor : PROF. MADYA Ts. Dr. KOK BOON CHING

Abstract : This project focuses on the design and development of a Home Energy Dashboard with Efficiency Alerts for real-time monitoring and control of household electrical energy consumption. The system is developed using a PZEM-004T energy monitoring module to measure voltage, current, power, and total energy usage. An ESP8266 microcontroller processes the measured data and manages system operations. The monitored parameters are displayed on a 20×4 I2C LCD, providing continuous local visualization of energy consumption. An efficiency alert mechanism is applied by comparing real-time power values with a preset limit, triggering a warning, and allowing manual load disconnection through a relay module when excessive consumption is detected. Engineering testing confirms that the system operates reliably, providing stable and accurate measurements with minimal error. The proposed system demonstrates an effective and cost-efficient engineering solution for enhancing energy management, minimizing unnecessary power consumption, and promoting sustainable household electricity practices.

(EG11) PORTABLE SOLAR - POWER CHARGING AND IOT MONITORING SYSTEM FOR EDUCATION KITS

Team : DE220028 NURUL NAEEMA BINTI ABDUL MAJID
DE220031 NURUL SYAZANA BINTI ZAINI
AE220053 WAN MUHAMMAD SYAKIR RAMADHAN BIN WAN AZMAN
DE230128 WAN NUR FAZLIANA ALYAA BINTI ABD RAHMAN

Supervisor : Dr. MD ZARAFI BIN AHMAD

Abstract : This project presents the design and development of a Portable Solar-Powered Charging and IoT Monitoring System for Education Kits aimed at enhancing hands-on learning in renewable energy and Internet of Things (IoT) education. Many students lack practical exposure to real-world solar energy systems due to the limitations of theory-based teaching methods and the shortcomings of existing solar chargers, which primarily focus on power delivery without incorporating monitoring or educational features. The proposed system integrates a 12 V solar panel, a lithium-ion rechargeable battery, a charge controller, and a step-down converter to provide safe and stable power operation. An ESP32 microcontroller, together with INA219 voltage and current sensors and a DS18B20 temperature sensor, enables real-time monitoring of charging performance and system conditions. The monitored data and safety alerts are transmitted wirelessly to users via the Telegram mobile application using Wi-Fi communication. The system is designed to be low-cost, portable,

and safe for educational use, allowing students to observe solar charging behaviour under different environmental conditions while learning key concepts of renewable energy, battery management, and IoT-based monitoring. Overall, the project provides an interactive and practical educational platform that supports STEM learning, promotes environmental awareness, and encourages the adoption of renewable energy technologies.

(EG12) SOLAR-POWERED AUTOMATED WATER SPRAY (COOLING SYSTEM)

Team : AE220003 SUZIELA BINTI RUSLAN
AE220041 WAN MUHAMMAD HAZIQ BIN WAN MOHAMAD ZAILANI
AE220048 MUHMMAD FIRDAUS BIN JAMAL ABDUL NASIR
CE230007 NUR AINNA MARDHIAH BINTI MUSTAFA

Supervisor : Dr. MOHD AIFAA BIN MOHD ARIFF

Abstract : Residential buildings with metal (zinc) roofs often experience high indoor temperatures during hot weather, leading to discomfort and increased energy consumption, as well as higher electricity costs for maximizing the use of fans and air conditioners. This problem is particularly severe in rural areas with unreliable power supply and low-income households. This project proposes a solar-powered automated water sprinkler system that cools zinc roofs by using temperature sensors to activate the spraying when the roof temperature exceeds a set threshold. The system primarily utilizes harvested rainwater and solar energy to operate a DC water pump and a microcontroller-based control unit, thereby minimizing electricity usage and water consumption. A house model prototype with integrated monitoring displays was developed to demonstrate the system's functionality, including roof cooling performance, pump operation, and real-time temperature tracking. Experimental evaluation demonstrates that the system can effectively reduce roof surface temperatures, enhance indoor comfort, and promote sustainability by lowering energy demand and utilizing rainwater. This solution provides a cost-effective, environmentally friendly, and practical approach to addressing overheating issues in metal-roofed residential buildings, particularly in rural communities.

(EG13) SMART HYBRID SOLAR-AC LED LAMP WITH AUTOMATIC POWER SWITCHING

Team : AE220035 SITI NURDIANA BINTI ABDUL HAMID
BE210011 MOHAMED ABDULKADIR ABDI
DE230093 ANDREA KOLIAH ANAK NOHENG
DE230051 AIMAN SYAMIL BIN ROSLI

Supervisor : TS. MOHAMAD FAUZI BIN ZAKARIA

Abstract : Reliable and energy-efficient lighting systems are crucial for promoting sustainable energy use and reducing reliance on conventional electricity sources. However, conventional solar-powered LED lamps often face reliability issues during overcast weather or nighttime due to insufficient battery charging. To address this limitation, this project designs and develops a smart hybrid solar–AC LED lamp with automatic power switching. The system primarily uses solar energy, with AC power and a rechargeable battery as backup sources. The ESP32 microcontroller is responsible for continuously detecting the battery voltage through the use of a voltage and current sensor. As the battery voltage falls below a set lower threshold, the system automatically activates the relay, which changes the powering source from solar energy to an alternative source that utilizes AC power. However, the system changes to solar energy as the battery Voltage increases above the set threshold. The system also uses IoT-based Telegram notifications to monitor real-time battery status and power source changes. Simulation and experimentation were conducted to validate the system's switching capabilities at various levels of battery voltage. The experiment's outcome clearly shows that the LED light source will be able to operate uninterrupted, with smooth and auto-switching capabilities between solar and AC inputs. The proposed hybrid system is thus a reliable source of energy-efficient lighting solutions.

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