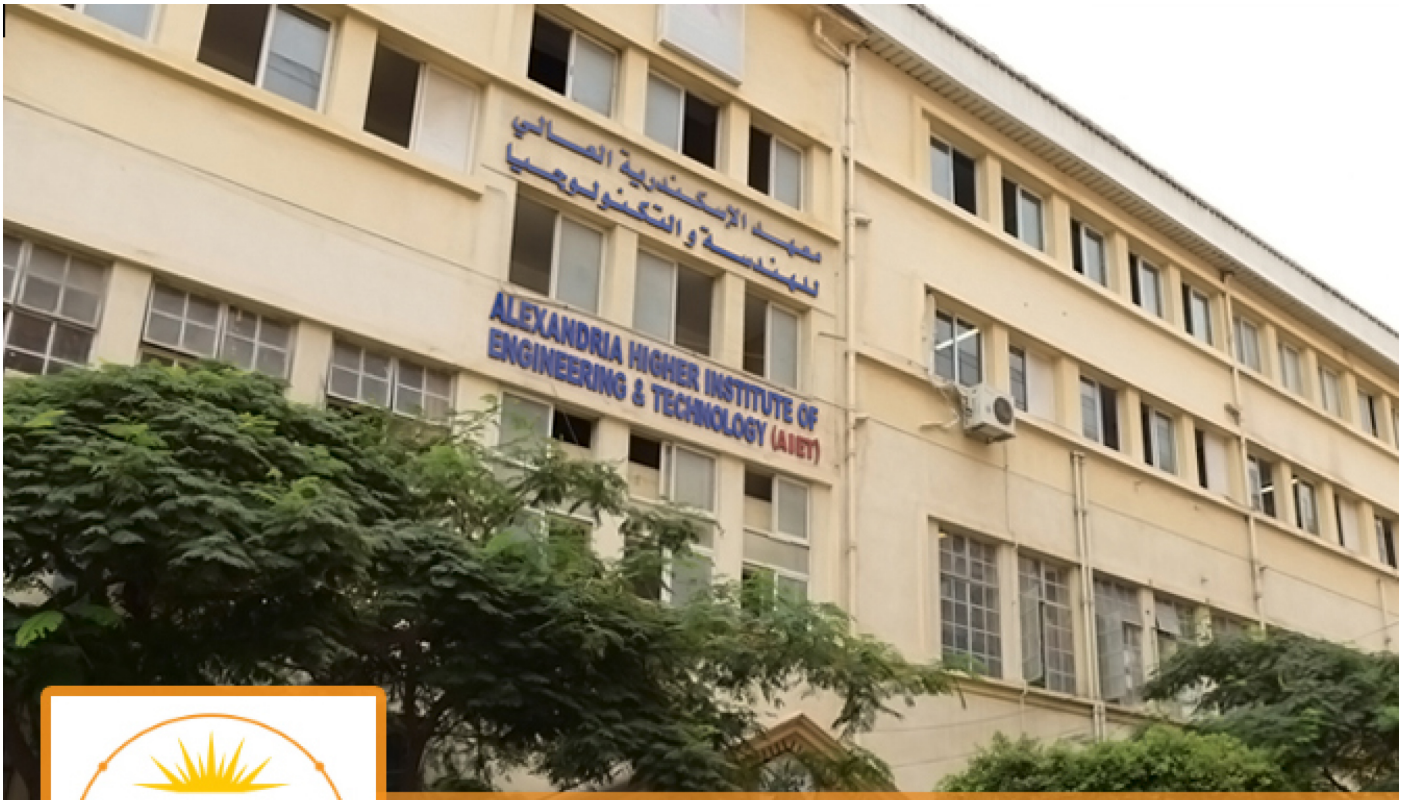

AIET
1997

Alexandria Higher Institute of
Engineering & Technology

GRADUATION

Class of 2025

Is not the end, It is the beginning.

Foreword

AIET is keen to invite prominent Professors and Experts from reputed Egyptian universities and institutions to share in and/or head Project oral Exam Committees. AIET hopes to get benefits of their experience and constructive comments on our students efforts.
The total number of graduation projects adds to projects distributed among our current four B.Sc. engineering programs as follows:

B. Sc. Eng. Program	No. of Projects	No. of Students	No. of Supervisors
Electronics and Communication Eng.(ECE)	9	80	
Computer Engineering (CE)	3	37	
Mechatronics Engineering (EME)	10	111	
Industrial Engineering (IE)	1	9	
SUM		237	

Graduation projects are diversified to cover most of the sub-specialties of a B.Sc. engineering program. Academic staff, from different Universities, other high education institutions, industries, and business; kindly contributed in supervising graduation projects parallel with the academic staff of the AIET.

This booklet gives an overview on B.Sc. graduation projects for the academic year 2024-2025.

AIET student performance is evaluated according to the grade-point average (GPA) system. Student graduates where earning 180 credit hours; among them, graduation project represents 6 credit hours which are equivalent to 3.33% of the total 180 credit hours.

Project grading is: 50% of project grade on Year Work and 50% on Final oral Exam.

AIET deeply acknowledges and appreciates the ample effort of all project supervisors to get the project up to the level which, hopefully, will win the satisfaction of project examiners.

Prof. Dr. Eng. Wageeh Ahmed El-Askary, Dean, AIET

Communication Engineering Department (ECE)

1- Design and Implementation of Platform to Detect Sea Target.
2- Design and Implementation of a pure sin wave invertor for solar system .
3- Smart Solutions For Skin Cancer
4- (FaceBot – Smart Attendance System).
5- A Proposal of Car Charger Based on Induction Coupling Implementation Controlled by a Bluetooth Application with Solar Cell Power Input.
6- Design and Implementation of Multi-Purpose System for Detection and tacking. Part (1).
7- Design and implementation of autonomous car by using wireless communication. Part (2).
8- Water Cleaning Robot Boat.
9- Automated factory by using IOT.

1- Design and Implementation of Platform to Detect Sea Target

Supervisors	Students
أ.م.د. محمد الأمير د. رشا بالخامى	محمد على حسن ماضى (إتصالات) احمد ابراهيم عبد الرازق الادهم (إتصالات) محمد خالد فخرى عبد العزيز (إتصالات) مازن مصطفى عبد الرحمن (إتصالات) طارق حمدى خميس المهدى (ميكاترونيات) حسن ماهر حسن خير الله (ميكاترونيات) عبد الله جمال محمد الغليض (ميكاترونيات) محمود محمد محمود بدوى (إتصالات) ياسر أحمد محمد عبد الحميد (ميكاترونيات)

Abstract

This project proposes the design and development of an integrated system for detecting underwater and floating targets so that appropriate action can be taken to address them. This platform system includes a set of components, such as ultrasonic sensors, a Wi-Fi camera, a GPS tracking system, and a multi-directional propulsion system to accurately identify, classify, and locate underwater targets. Through sensor integration, real-time image classification, and adaptive navigation via submersible pumps, the system enhances maritime safety while reducing human risk. The robot operates autonomously or semi-autonomously, providing direct feedback and control via wireless communication interfaces. The system supports modular upgrades. The project design utilizes renewable energy systems, including solar cells, to charge the system's batteries. The project is linked to the sustainability plan's pillars, including environmental conservation, the use of clean energy sources, and the preservation of water resources. The system also promotes innovation, environmental protection, and safety in water operations.

2- Design and Implementation of a pure sin wave invertor for solar system

Supervisors	Students
أ.م.د. محمد الأمير د. عمرو الجندى	احمد رجب دسوقى الحنبلى (إتصالات) محمد حماده محمد بسيونى (إتصالات) خالد رجب سعد النويعمى (إتصالات) مازن يسرى عبد الحميد خفاجى (إتصالات) محمد هشام فاروق هيبه (إتصالات) احمد محمد حسن الباهى (إتصالات) محمد اشرف سعد عبد الله (إتصالات) محمود عبد المنصف حسن (إتصالات) مهاب محمد مصطفى بكر (إتصالات)

Abstract

In response to the growing need for reliable and clean energy solutions, this project presents the design and implementation of a Pure Sine Wave Inverter tailored for solar energy systems. The goal is to convert a 24V DC input into a 220V AC output with a frequency of 50Hz, providing a high-quality sine waveform suitable for powering sensitive electronics like laptops and medical equipment.

The project was developed in two main phases: an initial analog design utilizing traditional signal generation techniques, and a final phase integrating the EGS002 digital control module. The EGS002 enabled precise Sinusoidal Pulse Width Modulation (SPWM) control, enhanced protection mechanisms, and superior output waveform quality. Key features of the system include thermal management, real-time monitoring via LCD, and modular, cost-effective design.

The inverter supports Egypt's Vision 2030 sustainable development goals by offering a practical solution for off-grid and renewable energy applications. With a focus on efficiency, safety, and expandability, the project demonstrates the viability of digital control in modern inverter systems, while also highlighting opportunities for future enhancement through smart technologies and advanced materials.

3- Smart Solutions For Skin Cancer

Supervisors	Students
د. مروه سماره د. أسماء عطيه د. احمد هانئ	ايه الله طارق محمود عبد اللطيف (حاسب) رنا عثمان عبد الله عثمان (حاسب) رويدا ابراهيم محمد ابراهيم (حاسب) ساره احمد مصطفى هلال (حاسب) شهد محمد عبد الرازق مصطفى (حاسب) شهاب الدين محمد جمعه (حاسب) فرحه محمد محمود نصير (إتصالات) فرح باسم محمد فاروق (إتصالات) كارين اسامه عبده اسكندر (اتصالات) كريم محمد عبد الوهاب (إتصالات) كريم محمد احمد عبد القادر (إتصالات) محمد جمعه فرج اسماعيل (إتصالات)

Abstract

Skin cancer is among the most prevalent cancers worldwide, and early detection is critical to improving survival rates. This project presents an integrated healthcare solution that combines a portable Skin Cancer Detection Device with an intelligent Aftercare System, supporting both timely diagnosis and comprehensive patient care.

The detection device features a high-resolution camera and advanced AI algorithms powered by a Raspberry Pi to analyze skin images and detect potentially cancerous lesions. Results are displayed instantly on an integrated screen, providing a fast, non-invasive diagnostic tool suitable for use in both clinical and remote settings.

The Aftercare System is designed to support patients recovering from chemotherapy or surgery—many of whom face mobility challenges and difficulties in communicating their basic needs. Leveraging computer vision, artificial intelligence, and an ESP32 microcontroller, the system interprets head gestures into actionable commands such as "food," "water," or "medicine," which are transmitted to caregivers via the Blynk IoT platform. Additionally, a wearable device continuously tracks vital signs, including heart rate and body temperature, providing real-time health updates. In the case of abnormal readings, the system immediately triggers alerts and alarms to ensure rapid caregiver intervention.

By integrating early diagnosis, continuous health monitoring, and assistive communication, MedSense enhances healthcare accessibility, improves patient outcomes, and eases the burden on caregivers. The system represents a smart, inclusive, and cost-effective solution aligned with Egypt's national vision for digital healthcare transformation.

4- (FaceBot – Smart Attendance System)

Supervisors	Students
د. نهال مبروك د. مروه سماره د. محمد عادل	عمرو مرسى السيد مرسى (إتصالات) مؤمن احمد محمد علي مدني (إتصالات) شهد اشرف محمد محمد حسن (إتصالات) عبد الرحمن محمد عامر احمد (إتصالات كيرلس عادل دانيال سعيد (إتصالات) سهيله سعيد عبد النبى عنب (إتصالات) عمر خالد محمد محمد شلبى (إتصالات)

Abstract

In modern educational institutions, managing student attendance remains a critical yet often inefficient process, especially when using manual methods prone to errors and impersonation. To address these challenges, this project introduces Face Bot – Smart Attendance System, an innovative, mobile robotic platform designed to automate student attendance in classrooms using advanced facial recognition technology. The robot is equipped with line-following infrared sensors for autonomous navigation, a high-resolution tablet for face detection and real-time confirmation, and an Arduino-based control system for handling mobility and sensor inputs. Attendance records are instantly transmitted to a secure, web-based management system connected to a MySQL database, allowing administrators and lecturers to access up-to-date attendance logs and generate reports effortlessly.

The proposed system minimizes manual workload, prevents impersonation, and enhances operational efficiency by providing immediate, transparent attendance confirmation through the robot's display. Designed with modular hardware and software components, FaceBot allows for easy upgrades such as cloud-based data analytics, voice interaction, and AI-driven student engagement analysis in future versions. Successfully tested in a simulated classroom environment, the system demonstrated excellent accuracy, reliability, and scalability, proving its potential as a valuable contribution to smart campus initiatives and digital transformation in education.

5- A Proposal of Car Charger Based on Induction Coupling Implementation Controlled by a Bluetooth Application with Solar Cell Power Input

Supervisors	Students
د. طارق عبد الشهيد د. أمنيه جودت	عبد الرحمن احمد محمد العبد (إتصالات) مؤمن احمد حسن احمد السيد (إتصالات) شهاب عوض علواني عوض (إتصالات) كريم رضا السيد بسيونى (إتصالات) كامل شريف كامل الشريف (إتصالات) محمد اشرف احمد محمد (إتصالات) محمد احمد ابراهيم عبد اللطيف (إتصالات احمد زكى بسيونى مطر (إتصالات) احمد يوسف السيد دبوره (إتصالات) محمد ظريف امين شلبى (إتصالات)

Abstract

For a clean environment that achieves for our beloved Egypt its vision of sustainable development 2030, the wireless power transfer (WPT) is a very broad though relatively new technology. Almost 80% of references are dated later than the year 2010. Hence, the scope of the project was limited to implement the inductive power transfer mode only. The question of our project was aimed to answer was simple, are we ready to use cordless electricity in our everyday lives? Last but not least our utmost aims that we set in the beginning were to apply the gained knowledge in practice, assess our professional competence and development needs and learn how to work in a professional team researching a totally new technology. we designed and implemented a proposal wireless power transfer system using the basics of magnetic resonant coupling for charging a vichels. Numerical data are presented for power transfer efficiency of both receivers. Graphs are given to show the comparison of power and efficiency with distance of both receivers.. We study wireless energy transfer systems consisting of two resonant circuits that are magnetically coupled via coils. Further, we explore the use of magnetic materials and shielding metal plates to improve the performance of the energy transfer. We find that magnetic materials can significantly increase the coupling between the two coils and reduce the induced currents and losses in the shielding metal plates. Further, we design wireless energy transfer systems capable of a peak-value power transfer over an air gap. This is achieved without exceeding the exposure limit of magnetic fields in areas where humans can be present. Higher levels of transferred power are possible if larger magnetic fields are allowed.

6- Design and Implementation of Multi-Purpose System for Detection and tacking

Supervisors	Students
د. محمد البوريدى د. علا حسين	خالد السيد محمد على النكلاوى (ميكاترونيات) محمود جلال محمود عبد الله حماد (ميكاترونيات) يوسف مصطفى عبد الونيس الفولى (ميكاترونيات) ايمن سلامه جمال رسلان كريم (ميكاترونيات) عمر ناجى احمد احمد عيسى (ميكاترونيات) حامد خالد حسن محمد مكى (ميكاترونيات) عامر على عامر عيسى (ميكاترونيات) محمد خالد احمد غباشى محمد (ميكاترونيات) عبد الله محمد مسعد عبد الرازق (ميكاترونيات) احمد مدحت محمد النبوى الحسينى (إتصالات) عدلى شحاته فرحات حجاج (إتصالات)

Abstract

This project presents the design and implementation of a multi-purpose unmanned aerial system (UAS) aiming at detection, tracking, and early threat assessment in reconnaissance missions. The developed drone serves as a front-line surveillance tool capable of operating in diverse environments to gather real-time aerial data. It is equipped with essential sensors and imaging modules to perform real-time detection and monitoring of targets or potential hazards, supporting both military and civil operations. The system is designed to provide situational awareness prior to the deployment of ground reconnaissance vehicles and military units, thereby enhancing mission planning, operational safety, and tactical advantage. The aerial platform is lightweight, cost-effective, and can be deployed rapidly, making it suitable for border monitoring, disaster response, and security applications. The successful integration of hardware and control systems demonstrates the feasibility of using autonomous drones for .early-stage field intelligence and support operations

7-Design and implementation of autonomous car by using wireless communication .

Supervisors	Students
أ.م.د. محمد الامير د. عمرو الجندى	احمد سمير سعيد احمد عبد الوهاب (ميكاترونيات) ابراهيم عبد الله ابراهيم عبد المجيد (ميكاترونيات) احمد ابراهيم عبد الرحمن ابراهيم (إتصالات) صلاح الدين ابراهيم احمد على زيد (إتصالات) أحمد سعيد السيد محمد البدرى (إتصالات) أحمد صلاح أبوالنجا حسين الصفطاوى (ميكاترونيات) أسلام أشرف شعبان محمود (ميكاترونيات) إيهاب حازم رمضان أحمد (إتصالات)

Abstract

This project presents the design and implementation of a multi-purpose unmanned aerial system (UAS) aimed at detection, tracking, and early threat assessment in reconnaissance missions. The developed drone serves as a front-line surveillance tool capable of operating in diverse environments to gather real-time aerial data. It is equipped with essential sensors and imaging modules to perform real-time detection and monitoring of targets or potential hazards, supporting both military and civil operations. The system is designed to provide situational awareness prior to the deployment of ground reconnaissance vehicles and military units, thereby enhancing mission planning, operational safety, and tactical advantage. The aerial platform is lightweight, cost-effective, and can be deployed rapidly, making it suitable for border monitoring, disaster response, and security applications. The successful integration of hardware and control systems demonstrates the feasibility of using autonomous drones for early-stage field intelligence and support operations.

8- Water Cleaning Robot Boat

Supervisors	Students
د. أميره البطوطى د. سهى جاب الله د. أحمد فؤاد	تونى ادوار بولس اسكاروس(ميكاترونيات) حسام عبد المنعم الهريدى (ميكاترونيات) عبد الله محمد جلال ابراهيم (إتصالات) احمد ايهاب احمد فؤاد زيد (إتصالات) بسمه احمد خميس عيسى (إتصالات) بيشوى جرجس اسطفانوس (ميكاترونيات هاجر سعيد سعد مرسى شتا (إتصالات) نيره يسرى عبد الحميد محمد (إتصالات) مريم محمد عبد الشافى (إتصالات) عبد العزيز احمد عبد العزيز (إتصالات) اندرو اشرف عفت ناشد (ميكاترونيات)

Abstract

SOBEK is a remotely operated water-cleaning robot, controlled through a dedicated mobile application, designed to address two major environmental challenges in aquatic ecosystems: the removal of toxic floating waste and the detection of invasive water hyacinths. Equipped with a filtered tank system, SOBEK collects waste from the water's surface and, when the tank is full, it is remotely guided back to a designated hub for disposal. A Wi-Fi-enabled camera, powered by artificial intelligence, allows the robot to efficiently identify and categorize collected waste. The same system, paired with GPS technology, is used to detect and locate water hyacinth colonies for early intervention and management.

To support water quality monitoring, SOBEK is integrated with advanced environmental sensors—including pH and turbidity sensors—which continuously transmit real-time data to the mobile app, promoting better understanding and maintenance of river health. Navigation is secured using ultrasonic sensors that allow SOBEK to avoid obstacles with precision. Access to the robot is restricted through RFID technology, ensuring authorized use only. By reducing pollution, identifying invasive species, and enabling continuous water monitoring, SOBEK contributes meaningfully to environmental sustainability and aligns with the goals of Egypt's Vision 2030, particularly in the areas of clean water management and natural resource conservation.

.9 Automated Warehouse By Using IOT.

Supervisors	Students
د. مروه سماره د. نهال مبروك د. عمرو يسن د. فاطمه احمد	احمد محمد عبد العظيم رزق (إتصالات) ادهم محمد عبد الغنى (إتصالات) محمد رضا عبد الرحمن سالم (إتصالات) احمد سعد محمد عبد السلام (إتصالات) احمد جمال محمد حسن (إتصالات) احمد شادى زكريا محمد نجيب (إتصالات) احمد عاصم احمد محمدين (إتصالات) احمد سامى رجب شلبى (ميكاترونيات) احمد عبد المنعم عبد الحكيم (ميكاترونيات) احمد فهمى اسماعيل زايد (حاسب)

Abstract

The project investigates the internet of things to control the company and factory software and hardware

Remote control of Internet of Things(iot) devices from the web app is used to publish from the local server, and be accessed it remotely from public IP

Using network address translation (NAT)

Internet basically does not recognize me. There is something called private IP. Public IP recognizes me, so what will expose me to the Internet is public IP. NAT has three types: static nat, dynamic nat, pat, which is port address translation, and the best of them to use.

Access control list is a type of security through which I can prevent a PC from communicating with an entire network.

Computer Engineering Department

(CE)

1- Design and implementation of Rescue Spider robot.

2- Design and implementation for digitalization of educational Systems and Corporates Powered by Artificial Intelligence.

3- Vita Psyche: Al-Powered Mental Health Support Platform

1- Design and implementation of Rescue Spider robot

Supervisors	Students
د. رضا الششتاوى د. محمد البوريدى	مهند محمد احمد عبد القادر عبد الفضيل (إتصالات) يوسف هشام سعيد عباس محمد (إتصالات) سيف الدين على احمد زايد حسين (إتصالات) مصطفى محمد حسين محمد (إتصالات) ندى خالد السيد يمنى محمد (حاسب) روان عربى فراج السيد فراج (حاسب) حوراء طارق كمال الدين فرج (حاسب) يوسف مجدى عبد العظيم محمود الجوهرى (حاسب) فرح مدحت مصطفى قطب شتا (حاسب) ياسمين مصطفى مسعود مصطفى درويش (حاسب) مسعد حاتم مسعد فرج سليمان (ميكاترونيات)

Abstract

The Rescue Spider Robot is an innovative robotic system designed to operate in complex and hazardous environments, offering a comprehensive solution for search and rescue missions, environmental monitoring, and security applications. The robot features a hexapod arm mechanism, enabling it to navigate uneven terrains, climb obstacles, and move through confined spaces with exceptional agility. Equipped with ultrasonic sensors, it can detect and avoid obstacles in real-time, ensuring safe and efficient navigation. For environmental monitoring, the robot integrates DHT sensors to measure temperature and humidity, along with a smoke sensor to detect hazardous gases or fire, providing critical data for situational awareness.

To enhance security, the robot incorporates an RFID system, ensuring only authorized access. Communication is facilitated through RF technology, offering extended range and reliable control even in challenging conditions. The robot is also equipped with a WiFi camera capable of human recognition and a GPS module to pinpoint the location of detected individuals, streamlining rescue operations. A dedicated Android application (APK) allows users to control the robot's movements, monitor sensor data, view live camera feeds, and receive GPS coordinates, ensuring intuitive operation and real-time decision-making.

The Rescue Spider Robot represents a significant advancement in robotic technology, combining mobility, environmental sensing, secure communication, and user-friendly control to address the demands of modern search and rescue, disaster response, and industrial inspection scenarios. Its versatility and reliability make it an indispensable tool for saving lives and enhancing safety in high-risk environments.

2- Design and implementation for digitalization of Educational Systems and Corporates Powered by Artificial Intelligence.

Supervisors	Students
د. محمد البوريدى د. رضا الششتاوى	احمد طارق عبد العزيز عباس السلماوى (حاسب) سوتيرى تامر رياض سمير عازر (حاسب) عبد الرحمن احمد فهمى ا عبد الرحمن (حاسب) كيرلس رافت لمعى ابراهيم عطيه (حاسب) محمد عادل على عبده بسيونى (حاسب) محمد مرضى فريد محمود شقره (حاسب) محمود عبد الناصر محمود عبد الرحمن (حاسب) يوسف صالح محمد رشوان عبد الحميد (حاسب) يوسف عبد الفتاح عبد الرازق حسن (حاسب) زياد محمد محمد الخولي (حاسب)

Abstract

This project explores the transformation of educational systems through digitalization, aiming to create a comprehensive mobile application platform that integrates various functions essential to university students and administrative staff. The project focuses on digitalizing a wide range of day-to-day services and functionalities for students, alongside providing an administrative portal for staff, student affairs, and other departments to efficiently interact with student requests. By streamlining these processes, the platform enhances student engagement and improves overall efficiency within the university environment. This dedicated student portal offers a seamless and modern approach to student life and university management.

Description:

- **Student Affairs:** A centralized platform to manage all aspects of student affairs, including enrollment, academic records, personal information, and the ability for students to request documents for tuition fees payment.
- **Student Grades and Attendance Tracker:** Real-time tracking and grading systems to monitor student performance and attendance controlled by the professors or management staff, ensuring timely and accurate reporting.
- **Independent Portal for Students, Professors, and Administration Staff:** Customized portals for different user groups, offering personalized access to resources, information, and communication tools.
- **Announcements and Schedules:** A dynamic scheduling system that provides real-time updates on class schedules, along with automated notifications for lectures, sections, and events or training opportunities.
- **Clinic Reservation:** An online reservation system for students and staff to book appointments at on-campus clinics, ensuring accessibility and convenience.
- **Training Tracker:** A tool to monitor and manage training programs for students, tracking progress, certifications, and the remaining training hours required.
- **Smart Student ID:** Implementation of a secure, smart ID system using QR codes and biometric verification to ensure secure access and authentication for students.
- **Lecture and Classroom Dashboard:** Implementation of a real-time dashboard to track the availability of lecture and classrooms while providing information about the lecture that is being presented and the professor's name.

3- Vita Psyche: AI-Powered Mental Health Support Platform

Supervisor	Students
د. أسماء محمد على	احمد خالد سيد محمود (إتصالات) بلال احمد محمد محمود محمد (حاسب) احمد اسامه ممدوح مرعى (حاسب) مصطفى احمد على محمد حسن (حاسب) محمد محمد عبد الفتاح رجب السيد (حاسب) اسامه اسماعيل عبد السلام دغيدى (إتصالات) رؤى محمد احمد يوسف الشاذلى (إتصالات) الاء محمد محمود محمد البنا (إتصالات) عمر محمد عبد الرؤوف محمد عباس (ميكاترونيات) عبد الفتاح خالد هلال السعيد هلال (ميكاترونيات)

Abstract

Vita Psyche is a comprehensive AI-powered mental health platform designed to address critical psychological challenges in contemporary society. With a focus on inclusivity, accessibility, and innovation, the platform aims to deliver evidence-based emotional support and early detection of mental disorders in alignment with SDG Goal 3 and Egypt Vision 2030.

Key services include psychological assessments, educational articles, FAQs, an online store for mental wellness products, and an integrated booking system for therapy sessions with certified professionals.

The platform's most distinguished features are:

- **AI-Powered Smart Therapist**: A machine learning–driven assistant capable of evaluating psychological states and delivering adaptive support.
- **"Lina" – Virtual Psychological Character**: A supportive 3D avatar that offers interactive, human-like engagement to reduce emotional isolation.
- **24/7 Mental Health Chatbot**: Private, multilingual AI conversations that provide instant support without human intervention.
- **Gamified Wellness Tools**: A series of daily mental challenges and therapeutic games designed to improve emotional resilience and motivation.
- **Music for Mindfulness**: Curated tracks that promote emotional stability and focus.

Built using advanced technologies such as Next.js, Flutter, Django, and Rasa, Vita Psyche delivers an integrated digital ecosystem that bridges the gap between users and professional mental health care. The platform not only reduces stigma but also encourages a proactive, technology-driven approach to psychological well-being.

Mechatronics Engineering Department

(EME)

1- Oil Pipe Inspection Robot.
2- Design and Implementation of Autonomous 360° Fire Fighting Robot.
3- The Leg Rehabilitation Project.
4- Automated Sorting System Based on AI
5- Anti – Theft Transportation Robot.
6- Smart multipurpose glove.
7- Water Filling System with Al-Powered Quality Control.
8- Smart Robotic arm
9- Design and Implementation Abrasive CNC Waterjet Cutting Machine of soft material
10- Water Health Monitoring Vertical Profiling Float .

1-Oil Pipe Inspection Robot

Supervisors	Students	
أ.د. وجيه العسكرى	(ميكاترونيات)	مصطفى قطب محمد محمد الغبيسى
	(ميكاترونيات)	نادين احمد السيد ابراهيم الجبالى
د. حسن الشوباشى	(ميكاترونيات)	مى هانى سعد محمد قطاره
	(ميكاترونيات)	ندى مسعد عبده جاب الله على
	(ميكاترونيات)	محمد احمد السيد السيد ابو عصر
م. أحمد الشناوى	(ميكاترونيات)	محمد ايمن عبده احمد محمود
	(ميكاترونيات)	محمد محمود ابراهيم ابو طالب
	(ميكاترونيات)	نور الدين ايهاب كمال محمد مسعود
	(حاسبات)	سهيله عصمت عبد المنعم صالح حسن
	(إتصالات)	محمد السيد عبد السلام العشرى

Abstract

. Oil Pipe Inspection Robot presents a novel; multifunctional solution aims at revolutionizing pipeline inspection and maintenance in the oil and gas industry. This autonomous system is engineered to operate within confined and hazardous pipeline environments, ensuring safe, accurate, and efficient monitoring of pipeline integrity. The robot represents a distinctive hexagonal body structure, designed for structural stability and optimal sensor placement, and is supported by a three-legged configuration with each leg oriented 120 degrees apart. This design provides superior balance and mobility inside cylindrical pipes.

A key innovation of the robot lies in its adaptive mechanical design, which allows it to dynamically expand or contract its size between 25 cm and 65 cm in diameter. This enables the robot to traverse pipelines of varying diameters without requiring structural modification, significantly improving its versatility across inspection tasks.

Equipped with a suite of AI-powered detection algorithms, the robot can autonomously identify and predict critical pipeline anomalies, such as cracks, fractures, internal leaks, and material buildup. These capabilities enable predictive maintenance and reduce the risk of catastrophic failures. A high-resolution Raspberry Pi camera and multiple embedded sensors deliver real-time visual and environmental data, including temperature, pressure, and gas concentration, all of which are displayed on a connected monitoring platform.

To ensure continuous situational awareness, the robot is integrated with a GPS module for location tracking and is managed through a dedicated mobile application that allows full directional control and live monitoring. The robot's advanced communication system supports real-time data transmission and bidirectional control, allowing operators to issue commands, receive feedback, and adjust behavior instantaneously—even from remote locations.

2- Design and Implementation of Autonomous 360° Fire Fighting Robot

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Abstract

Our proposal is for Autonomous 360° Fire Fighting Robot that can be controlled through an Android app. This innovative Fire Fighting Robot will be designed to provide greater Safety for Firemen and Quickly put out fires.

360° Fire Fighting Robot as any robotic device that can improve firefighting processes by taking over many of the firemen duties that are slow. Using robots makes many tasks safety, faster, and more effective.

The Mobile app feature will allow the user to control the Robot movement and other functions using simple Orders without fire risk.

The Autonomous Firefighting Robot project aims to Save Firemen and Human souls from Serious injuries and put out the fire as Quickly as Possible by introducing advanced robotic systems capable of performing various tasks autonomously.

The robot will be equipped with sensors and cameras to gather data and make informed decisions in real-time. This Firefighting robot will optimize resource utilization, reduce Potential risks.

It will be capable of adapting to different terrains, weather conditions, and ensuring optimal performance.

Finally, the 360° Head in Robot make control of fire Simpler as possible, and Use of more Advanced firefighting methods such as

ABCDE Fire extinguisher This will provide more safety with this method and enhance the Performance of firefighting Process.

3- The Leg Rehabilitation Project

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Abstract

This paper presents a comprehensive “The Leg Rehabilitation Project” to assist patients in regaining lower limb mobility through advanced sensor integration and multi-modal control logic. The system employs an oximeter to monitor heart rate and SpO2levels in real-time, ensuring patient safety throughout therapy sessions. Muscle activity is captured using an EMG sensor to initiate movement, while a flex sensor monitors joint bending to fine-tune motion angles. An ultrasonic sensor is incorporated to detect obstacles and prevent collisions during automated movement.

Leg and foot motion is powered by high-torque motors controlled through relay modules, providing robust and isolated switching suitable for rehabilitation loads. A thermoelectric heater module (Peltier) is integrated to deliver therapeutic heat post-exercise, enhancing muscle relaxation and recovery.

The system supports three operational modes:

1. **EMG & Flex Sensor Control** – Movement is triggered by detected muscle contractions and controlled within safe flexion limits.
2. **Application-Based Control** – Therapists or users can manually operate the system using a dedicated Android APK.
3. **Pre-Programmed Modes** – Automated routines execute repetitive therapeutic exercises with built-in safety checks.

By combining real-time physiological feedback, obstacle detection, customizable therapy modes, and integrated heat therapy, the system improves rehabilitation effectiveness, comfort, and patient adaptability—particularly for individuals with neurological or muscular impairments.

Keywords: Rehabilitation, EMG, Flex Sensor, Oximeter, Obstacle Detection, Relay Control, Peltier Heater, APK, Leg Therapy.

4- Automated Sorting System Based on AI

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Abstract

this project is aimed to develop a conveyor-based sorting system that utilizes various techniques such as image processing, load cell, IR sensor, ultrasonic sensor ,colour sensor, and RFID card authentication to efficiently sort products.

The system will be controlled by an Arduino Mega microcontroller and will have the capability to count accepted parts and send the count to a cloud service for real-time monitoring.

Features:

1. Utilization of Arduino Mega microcontroller for overall system control and integration of various sensors.

2. Image processing technique to identify and sort products based on specific characteristics.

3. Load cell integration for sorting products based on weight criteria.

4. IR sensor for sorting products based on height.

5. Colour sensor for sorting products based on colour.

6. RFID card authentication for authorized personnel access control.

7. Actuators for removing unaccepted products from the conveyor.

8. IoT capability for sending the count of accepted parts to a cloud service for monitoring.

5-Anti – Theft Transportation Robot

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Abstract

The advancement of automation technologies has opened new possibilities in secure transportation systems. This project introduces a smart Anti-Theft Transportation Robot designed to deliver items while preventing unauthorized access and enhancing security measures during transit. The system is developed using a combination of microcontrollers, sensors, and wireless modules to ensure smooth operation, environment monitoring, and theft prevention.

The core of the robot is based on an Arduino UNO and ESP32, enabling control and communication. Wireless interaction is established through the NRF24L01 transceivers and HC-05 Bluetooth module, allowing the robot to be remotely controlled via a mobile app created using MIT App Inventor. To restrict access, an RFID system (RC522) identifies authorized users and controls a solenoid lock. For navigation and object avoidance, the robot uses an ultrasonic sensor (HC-SR04). A load cell with HX711 amplifier checks for the presence and weight of the cargo, ensuring that items are not removed during transit. Environmental safety is enhanced with MQ gas sensors and a DHT11/DHT22 sensor to monitor temperature and humidity. Four geared DC motors, controlled by a ZK-5AD motor driver, provide stable movement across surfaces, while a Wi-Fi-enabled surveillance camera streams live footage to enhance remote monitoring.

This project merges hardware interfacing, IoT, and control systems into a unified robotic solution that can play a vital role in organization, warehouse automation, and secure goods transport

6- Smart multipurpose glove

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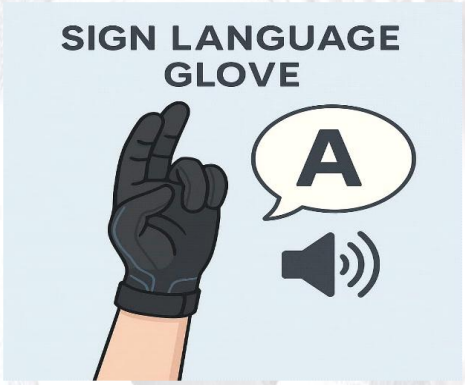
Abstract

In this mode, the glove recognizes hand gestures that represent individual alphabet letters in sign language. These gestures are translated into text in real time and displayed on both an LCD and a mobile application. The application, developed using MIT App Inventor, also provides text-to-speech functionality, allowing the translated letters to be spoken aloud. To enable two-way communication, the app includes a speech-to-text feature that converts verbal responses into on-screen text for the glove user. Additionally,

Mode 1 – Sign Language Translation:

In this mode, the glove recognizes hand gestures that represent individual alphabet letters in sign language. These gestures are translated into text in real time and displayed on both an LCD and a mobile application. The application, developed using MIT App Inventor, also provides text-to-speech functionality, allowing the translated letters to be spoken aloud. To enable two-way communication, the app includes a speech-to-text feature that converts verbal responses into on-screen text for the glove user. Additionally,



Mode 2 – Robotic Hand Control:

In this mode, the glove transmits real-time sensor data to a robotic hand, which mirrors the user's finger movements. This application demonstrates the glove's capability for remote gesture replication, which could be extended to fields such as telepresence, education, interactive demonstrations, and even certain industrial environments where human-like manipulation is required in hazardous or inaccessible areas.

7- Water Filling System with AI-Powered Quality Control

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Abstract

This project presents the design and implementation of an automated bottle classification and filling system using Arduino-based control and computer vision. The system can identify and sorting three types of bottles—water, juice, and empty—using a vision-based AI detection module. Based on classification, bottles are directed to different conveyors where they undergo a series of automated processes including filling, capping, and stamping. The system utilizes multiple microcontrollers (Arduino Uno and Nano), IR sensors for bottle presence detection, relay modules to control pneumatic pistons, and a motor-driven conveyor. A second camera is used to verify the final product quality, ensuring all required steps are completed. The proposed system enhances efficiency, reduces human intervention, and provides a reliable foundation for scalable industrial automation in the beverage packaging sector.

8-Smart Robotic arm

Supervisors	Students
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Abstract

The automation of agricultural processes is one of the most significant advancements aimed at increasing productivity and reducing dependence on manual labor. This is particularly important as the agricultural sector faces challenges such as labor shortages and rising costs. Among the innovative solutions, robotic arms have proven to be highly effective in performing transplanting and fruit harvesting tasks with precision and efficiency.

Transplanting involves moving young seedlings from a nursery to the field, a delicate process that requires high precision to prevent root damage. The robotic arm enhances this process by: Carefully picking up seedlings using sensitive sensors to determine the appropriate grip force.

Planting the seedlings in the soil at pre-determined distances to ensure uniform distribution. Controlling depth and pressure to secure the seedling in the ground and promote healthy growth.

9- Design and Implementation Abrasive CNC Waterjet Cutting Machine of soft material

Supervisors	Students	
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Abstract

Tthe project is to design and manufacture a machine capable of water cutting technology. The machine is self-powered, meaning it can carry out the cutting process automatically without the need for significant human intervention. This modern technology cutting soft and hard materials with high precision using abrasive is used to produce and cut materials with very high precision and quality in finishing the product with high efficiency. This technology relies on the power of a high-pressure water jet mixed with fine abrasive particles to cut different types of materials with high precision. Imagine a thin and powerful jet of water carrying with it small particles that act as a cutting tool, capable of penetrating both hard and soft materials. This project aims to design and implement an abrasive CNC waterjet cutting machine tailored specifically for precision cutting of soft materials. The machine utilizes high-pressure water, combined with abrasive particles, to create a powerful jet capable of cutting soft materials such as rubber, plastic, and composites without causing structural deformation or damage. The CNC system enables precise control over the cutting path, allowing for the execution of complex designs with high

accuracy. Key machine parameters, including water pressure, flow rate, and abrasive particle feed, are programmable and adjustable based on material type and thickness. This flexibility ensures customized cutting that meets specific material requirements, enhancing both quality and operational efficiency. The automated nature of the CNC waterjet cutting machine reduces the need for manual intervention, allowing for continuous operation, which improves productivity and reduces operational costs. This machine is particularly By delivering high-quality cuts and preserving material integrity, this system provides a reliable and cost-effective solution for advanced industrial applications.

10- Water Health Monitoring Vertical Profiling Float

Supervisors	Students
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	محمد عاطف محمد فكرى ماهر (إتصالات)

Abstract

The project is a buoy that takes readings of various parameters through multiple sensors connected to the device, in open and closed bodies of water such as:

- **Seas**
- **Rivers**
- **Lakes**
- **Oceans**

In turn collected data and information is processed and sent to the recipient. The recipient, in turn, analyzes the data and benefits from it, in order to preserve the safety of water, and to monitor the effects and changes that may affect water.

This comes in light of Egypt's vision 2030 in environmental sustainability and sustainable development

Industrial Engineering Department

(IE)

1- Design and implementation of an automated integrated production line for liquid filling system based on PLC and HMI

1- Design and implementation of an automated integrated production line for liquid filling system based on PLC **and HMI**

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Abstract

This project presents the development of a fully automated water bottling system using the Siemens S7-1200 PLC. The system handles key stages of the bottling process—detection, filling, capping, and labeling—with minimal human intervention. It integrates components like a motorized conveyor, IR sensors, solenoid valves, pneumatic pistons, DC motors, and an HMI panel for real-time control. The PLC is programmed based on sensor feedback to ensure precise coordination. The modular mechanical and electrical design supports scalability and easy maintenance, while pneumatic systems and safety interlocks enhance accuracy and reliability. The system reduces manual tasks, boosting productivity and safety. It also supports Egypt's Vision 2030 by promoting industrial innovation and sustainable development and offers potential for future upgrades like IoT and remote monitoring.

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