Mechatronics Engineering Program

برنامج هندسة الميكاترونيكس

Graduation Projects

Mechatronics Engineering Program

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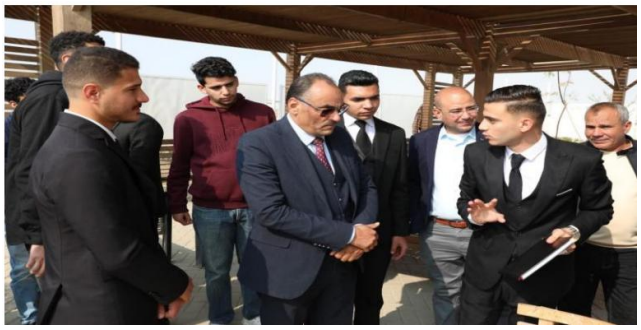

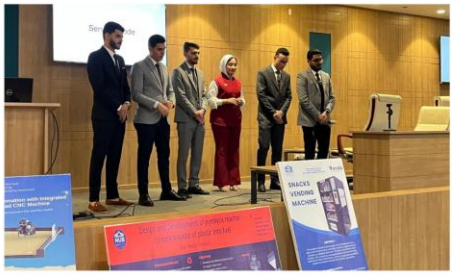

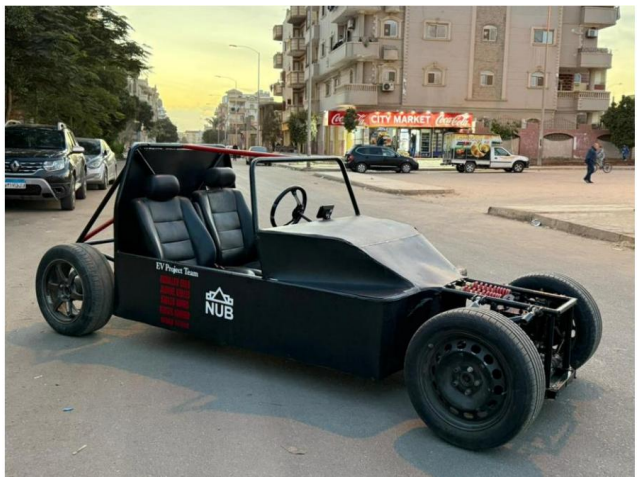

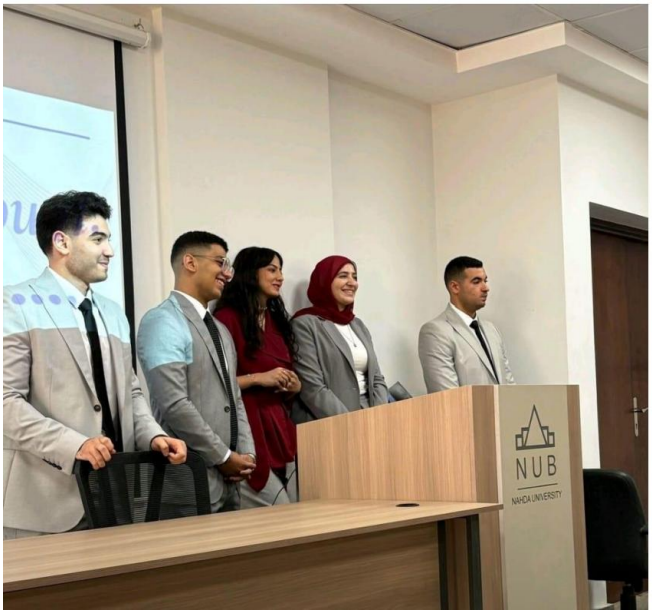

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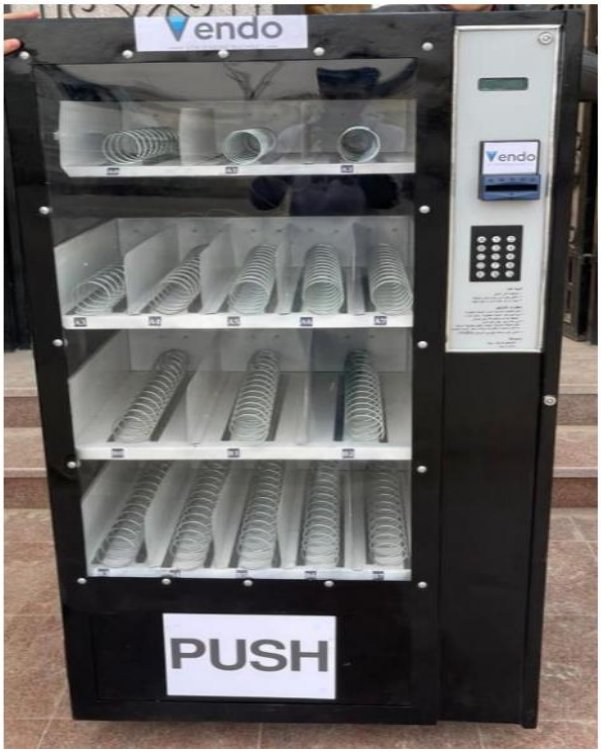

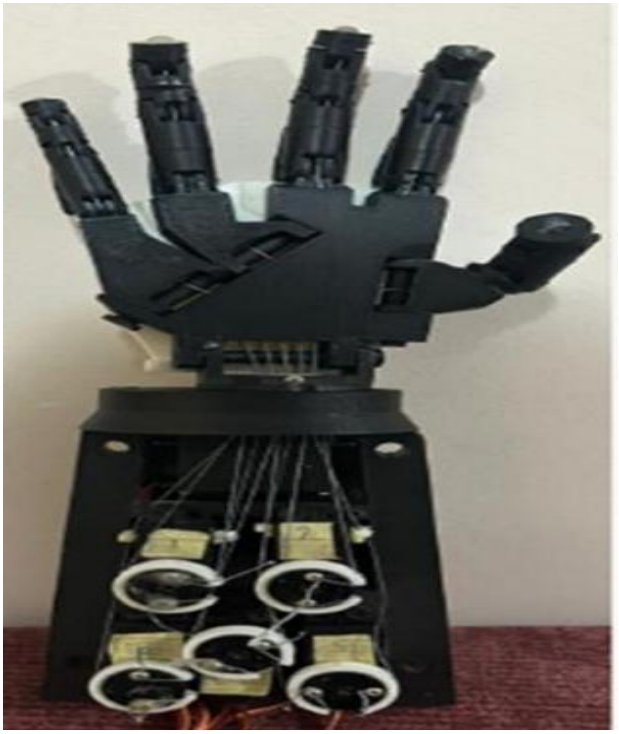

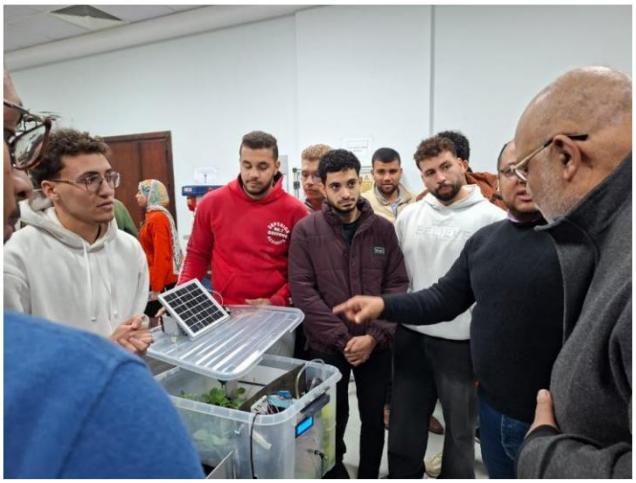

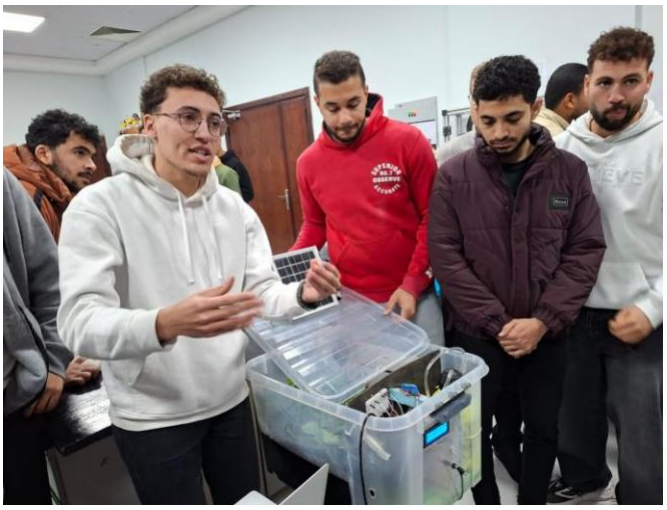

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برنامج هندسة الميكاترونيكس

AUTONOMOUS INSPECTION ROBOT

Project HELIOS

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Dr. Mohamed Koraiem M
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Dr. Eman Shams

Academic Year: 2025 - 2026

Mechatronics Engineering Program

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Abstract

This project presents the design, research, and preliminary development of Project HELIOS, a general-purpose autonomous inspection robot intended for industrial and infrastructure inspection tasks. The system is motivated by the need to reduce human exposure to hazardous industrial environments and to improve the consistency and frequency of condition-monitoring data. The proposed robot is designed as a mobile platform capable of autonomous indoor navigation, real-time sensing, structural fault detection, and diagnostic reporting to a remote operator station. The system architecture integrates a Raspberry Pi 4 as the main computing unit, an ESP32 for low-level control, a 2D LiDAR for SLAM, an IMU for orientation tracking, wheel encoders for odometry, and a camera module for visual inspection. The software architecture is based on ROS2 to support modular navigation, mapping, sensor integration, and inter-process communication. The report also covers the mechanical design, electrical system, sensing payload, navigation approach, safety concept, communication strategy, bill of materials, risk assessment, and implementation roadmap. The current work is clearly positioned as a GP1 design phase that establishes a technical foundation for later prototype construction and validation.

Keywords:

Autonomous Inspection Robot, ROS2, SLAM, LiDAR, Sensor Fusion, Embedded Systems, Industrial Inspection.

Project Scope

The project scope, as derived from the source report, can be summarized as follows:

- Define functional and non-functional requirements for an autonomous industrial inspection robot.
- Design a modular system architecture covering mechanical, electrical, sensing, navigation, safety, communication, and software layers.
- Specify a four-wheel skid-steer mobile platform supported by kinematic, torque, traction, gradeability, and power-budget analysis.
- Select inspection and navigation sensors including LiDAR, IMU, wheel encoders, camera, thermal sensing, and gas sensing modules.
- Plan ROS2-based localization, SLAM, sensor fusion, autonomous navigation, telemetry, simulation, integration, and risk management.

- Exclude full hardware construction, field validation, sensor calibration, and industrial deployment from the current GP1 phase.

Deliverable nature

The report is mainly a design-phase document supported by analysis and implementation planning.

Overview

HELIOS is structured as a design-phase mechatronic platform for repeated inspection routines in indoor industrial environments. Its intended operation follows the perception-cognition-action cycle: the robot senses the environment through LiDAR, IMU, encoders and inspection payloads; processes localization, mapping and navigation tasks through ROS2; and executes motion through a skid-steer drivetrain controlled by embedded electronics. The project emphasizes accessibility by using commercially available components, while also documenting the limitations of a design-only phase. The main engineering value of the project lies in the disciplined integration of mechanical design, power electronics, embedded control, perception, autonomous navigation, safety logic, telemetry, and implementation planning. The report does not claim measured hardware performance; instead, it presents a complete and internally consistent design ready for the next phase of prototype construction, subsystem validation, calibration, and field testing.

Main engineering areas:

Mobile robotics	ROS2 navigation
Industrial inspection sensing	Safety and telemetry

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Faculty of Engineering
Nahda University in Beni-Suef – NUB
Mechatronics Engineering Department

Design and Implementation of an IoT-Based Smart Farm Bot for Automated Irrigation and Crop Monitoring

Smart Farm Bot

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Academic Year: 2025 - 2026

Abstract

This project presents the design and implementation of an IoT-based Smart Farm Bot for automated irrigation and crop monitoring. The project addresses the inefficiency of traditional non-targeted irrigation and manual monitoring, which can cause water waste and inconsistent crop yield. The proposed system uses a 3-degree-of-freedom robotic platform with a circular center-pivot architecture suitable for small-to-medium cultivation plots. It combines Raspberry Pi 4 processing for AI-based weed and crop classification using YOLOv8, Arduino Mega control for deterministic motion, and ESP32 connectivity for cloud telemetry through MQTT. The system also uses environmental and soil-moisture sensing to support targeted micro-irrigation. According to the report, the platform achieved 0.8 mm positioning accuracy, 91% mean average precision in crop/weed identification, and an 80% reduction in water consumption compared with traditional flood irrigation. The project is presented as a sustainable, scalable, and cost-conscious precision agriculture solution, with future extensions including renewable energy integration and multi-agent coordination.

Keywords:

Smart Farm Bot, Precision Agriculture, IoT, Automated Irrigation, YOLOv8, MQTT, Embedded Systems.

Project Scope

The project scope, as derived from the source report, can be summarized as follows:

- Design and prototype a 3-DOF circular center-pivot agricultural robot for a controlled precision-farming workspace.
- Implement closed-loop micro-irrigation based on soil-moisture thresholds and volumetric dosing.
- Integrate environmental sensing for soil moisture, ambient temperature, and relative humidity.

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- Use Arduino Mega for motion control, Raspberry Pi 4 for computer vision, and ESP32 for MQTT-based IoT telemetry.
- Train and deploy a YOLOv8 model for detecting Mentha spicata crop targets and native weeds under daylight conditions.
- Limit the current scope to prototype-scale laboratory and small-field validation, excluding industrial scaling, swarm operation, multispectral disease diagnosis, and large-scale farm deployment.

Deliverable nature

The deliverable combines system design, implementation components, integration planning, and validation indicators within the project boundaries.

Overview

The Smart Farm Bot integrates mechanical positioning, embedded control, AI vision, sensing, irrigation, and cloud communication into one precision-agriculture platform. The robot moves in polar coordinates using a circular center-pivot layout, enabling repeatable positioning over a localized growing area. Sensor measurements guide irrigation decisions, while the vision module identifies crops and weeds to support targeted treatment. The embedded architecture separates timing-critical motion from AI and IoT tasks, improving modularity and maintainability. The project is comparatively mature because it reports experimental indicators for positioning, recognition, water saving, and cost reduction. Its main contribution is the practical integration of affordable mechatronics and AI into a small-scale precision-farming system that can be extended later through solar power, disease detection, and multi-robot farming networks.

Main engineering areas:

Agricultural robotics	AI crop/weed vision
IoT telemetry	Automated micro-irrigation

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Faculty of Engineering
Nahda University in Beni-Suef – NUB
Mechatronics Engineering Department

Autonomous Electric Vehicle For Xploration Transit

Sustainable Electric Terrain Mobility System

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Dr. Mohamed Adel
Dr. Eman Shams

Academic Year: 2025 - 2026

Abstract

This project develops a Sustainable Electric Terrain Mobility System in the form of an autonomous electric buggy and campus robot taxi. It integrates mechanical design, electrical traction, embedded control, perception, and safety systems to support autonomous self-parking in both parallel and perpendicular parking scenarios. The vehicle baseline is a lightweight but rigid tubular steel space-frame chassis with a target mass of 350 to 450 kg, independent front double-wishbone suspension, rear shock absorbers, and 205/55 R16 terrain tires. A rear-wheel-drive configuration powered by a CY Gold brushless DC motor and a centralized 48 V lithium iron phosphate battery pack is selected for efficiency, reliability, and compatibility with regenerative braking. The autonomous layer includes drive-by-wire steering using an EPS motor, BTS7960 H-bridge, PID position control at 200 Hz, and AS5600 absolute magnetic encoder feedback. Braking is automated using a 200 N linear actuator acting on the hydraulic master-cylinder linkage. A Raspberry Pi 4 running Linux and ROS handles perception, parking-slot detection, and trajectory generation using LiDAR, ultrasonic sensors, and an IMU, while a Teensy 4.1 executes deterministic low-level control and safety interlocks.

Keywords:

Autonomous Electric Vehicle, Self-Parking, Drive-by-Wire, ROS, LiDAR, Teensy, Electric Mobility.

Project Scope

The project scope, as derived from the source report, can be summarized as follows:

- Convert an electric terrain buggy into a layered cyber-physical vehicle capable of autonomous self-parking.
- Design the mechanical vehicle baseline, including chassis, suspension, tires, steering, braking, and component mounting constraints.
- Integrate a 48 V electric power architecture with BLDC propulsion, LiFePO4 battery pack, and battery management.

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- Implement drive-by-wire steering and braking using embedded real-time control, encoder feedback, H-bridge actuation, and watchdog mechanisms.
- Use LiDAR, ultrasonic sensing, and IMU measurements for parking-slot perception, near-field obstacle detection, and pose estimation.
- Focus on design, architecture, and validation planning for low-speed campus/off-road applications rather than unrestricted public-road autonomy.

Deliverable nature

The deliverable combines system design, implementation components, integration planning, and validation indicators within the project boundaries.

Overview

The autonomous electric vehicle project treats the buggy as a complete mechatronic system rather than a simple vehicle fitted with sensors. The architecture separates high-level autonomy on the Raspberry Pi from deterministic actuation and safety on the Teensy microcontroller. The Raspberry Pi interprets LiDAR and other perception data, reasons about parking-slot geometry, and generates steering, propulsion, and braking commands. The Teensy validates commands, closes the steering loop, supervises braking, and transitions to safe states if communication or sensor conditions become unsafe. The project is strong in system integration because it connects real vehicle mechanics, electric traction, embedded control, and autonomous driving concepts. Its next essential stage is physical implementation, calibration, and measured validation of steering accuracy, braking response, parking performance, and safety interlock reliability.

Main engineering areas:

Electric mobility	Drive-by-wire control
Autonomous parking	Safety-critical embedded control

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Faculty of Engineering
Nahda University in Beni-Suef – NUB
Mechatronics Engineering Department

Smart Facial Recognition Access Control and Electronic Gate Automation System

Dual-Authentication Smart Access Control Gate

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Dr. Mohamed Koraiem M
Dr. Mohamed Adel
Dr. Eman Shams

Academic Year: June 2026

Abstract

This project presents a smart facial-recognition access-control and electronic gate automation system built around a dual-authentication security concept. The system addresses weaknesses in traditional single-factor access control, such as RFID card theft, cloning, and unauthorized sharing. The proposed mechatronic gate combines an automated physical barrier, facial recognition, RFID verification, motion-triggered activation, local embedded processing, display feedback, and electromechanical actuation. A Raspberry Pi 4B serves as the main embedded processing node and runs a Python-based software pipeline with OpenCV, face-recognition libraries, GPIO control, SPI communication for the MFRC522 RFID reader, and I2C communication for LCD feedback. An infrared or PIR motion sensor wakes the system from standby, the camera verifies the user face against a local authorized database, and RFID provides a secondary token-based confirmation. If both checks succeed, the relay energizes the actuator to unlock the gate for a calibrated passage interval; otherwise the system triggers an alert and returns to standby. The report also covers mechanical gate design, actuation, software logic, authentication performance, and latency analysis.

Keywords:

Facial Recognition, Access Control, RFID, Raspberry Pi, Edge AI, Electronic Gate, Mechatronic Security.

Project Scope

The project scope, as derived from the source report, can be summarized as follows:

- Design and construct a mechatronic access-control gate with dual biometric and token-based authentication.
- Model the gate structure and internal locking/actuation mechanisms, including solenoid or electromagnetic actuation and emergency drop-arm concepts.
- Implement Raspberry Pi-based hardware interfacing for camera input, RFID reading, motion detection, LCD feedback, relay control, and actuator triggering.

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- Deploy face detection and recognition on edge hardware using OpenCV, Dlib/face_recognition, and 128-dimensional embedding comparison.
- Apply standby/wake automation logic to reduce idle power consumption and activate the AI pipeline only when a person is detected.
- Evaluate authentication behavior, false acceptance/rejection considerations, RFID detection, and total latency from user detection to gate unlocking.

Deliverable nature

The deliverable combines system design, implementation components, integration planning, and validation indicators within the project boundaries.

Overview

The access-control system operates as a sequential security cell. In standby, the controller monitors the motion sensor while power-hungry devices remain idle. When a person approaches, the optical subsystem and LCD activate; the camera captures frames; the software detects and encodes a face; and the embedding is compared with the authorized local database. If facial verification succeeds, the user scans an RFID card, and the UID is checked as a second authorization layer. Successful dual authentication energizes a relay to unlock the gate for a defined interval before returning to standby. The project is strong because it combines mechanical gate design, edge AI, RFID security, embedded firmware, and actuation logic. Important future improvements would include encrypted credential storage, stronger liveness detection, broader lighting tests, audit logging, networked administration, and fail-safe behavior verification.

Main engineering areas:

Edge AI security	RFID authentication
Gate actuation	Embedded hardware interfacing

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Faculty of Engineering
Nahda University in Beni-Suef – NUB
Mechatronics Engineering Department

Automated Juice Bottling Production Line

PLC and HMI Controlled Filling, Capping and Labeling Line

Project team:

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Academic Year: 2025/2026

Abstract

This graduation project presents the design and software development of a fully automated juice bottling production line. The line performs three coordinated stages: filling, capping, and labeling. A conveyor belt acts as the core transport mechanism, moving bottles between the automated workstations in a synchronized sequence. A Delta DVP-20SS2 PLC processes sensor inputs, controls actuators, and manages the timing logic for each stage. An HMI interface enables real-time monitoring and adjustment of important parameters such as filling time, process status, and user commands. The filling unit is designed to dispense juice from a 40-liter tank into 300 ml bottles, after which bottles move to capping and labeling stations. The current

phase focuses mainly on PLC programming, HMI screen design, component selection, system simulation, and cost estimation. Hardware implementation is planned for a later phase. The report demonstrates how simulation and PLC-based automation can improve productivity, repeatability, and precision in beverage production lines while giving students practical experience in industrial control.

Keywords:

PLC, HMI, Automated Bottling, Filling, Capping, Labeling, Factory I/O, Industrial Automation.

Project Scope

The project scope, as derived from the source report, can be summarized as follows:

- Design the sequential automation logic for a juice bottling line with filling, capping, and labeling stages.
- Use a Delta PLC to read sensors, control actuators, and coordinate timed process transitions.
- Develop HMI screens for monitoring line status, selecting parameters, and interacting with the control system.
- Model the conveyor and station interactions using simulation tools before hardware implementation.
- Use TrySim, Factory I/O, and SolidWorks to validate control logic, visualize the line, and reduce errors before construction.
- Restrict this project phase to software, simulation, design, component selection, and cost estimation, with full physical implementation planned as future work.

Deliverable nature

The current deliverable is primarily software design, PLC/HMI programming, simulation, and future hardware planning.

Overview

The automated juice bottling project is centered on industrial process sequencing. Bottles are transported by a conveyor through filling, capping, and labeling operations. Sensors provide the PLC with position and process-state information, and the PLC activates motors, valves, capping mechanisms, and labeling actions

according to ladder logic. The HMI provides the operator with visibility and parameter control. The report is especially useful as an educational industrial-automation project because it shows how PLC logic, HMI design, SCADA concepts, and simulation platforms can be combined before physical assembly. The project reports meaningful progress in control and simulation, but it remains incomplete at the hardware level. Its future work should include real assembly, sensor calibration, filling-volume accuracy testing, timing optimization, fault handling, rejection systems, barcode/quality control, and IoT data logging.

Main engineering areas:

PLC logic	HMI/SCADA concepts
Conveyor sequencing	Factory simulation

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Faculty of Engineering
Nahda University in Beni-Suef – NUB
Mechatronics Engineering Department

PET Plastic Recycling System for 3D Printer Filament Production

Low-Cost Mechatronic Recycling and Filament Production System

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Mechatronics Engineering Program

برنامج هندسة الميكاترونيكس

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Academic Year: 2026/2027

Abstract

This project presents the design and implementation concept of a low-cost mechatronic system for recycling PET plastic bottles into 3D printer filament. The project responds to two linked needs: reducing PET plastic waste and producing affordable filament for FDM 3D printing. The proposed system processes bottles through several stages: shredding, drying, extrusion, cooling, pulling, and filament winding. A twin-shaft shredder reduces bottles into small flakes, while a drying stage removes moisture to improve extrusion quality. The extrusion subsystem uses a single-screw extruder made of SS304 with a 25 mm screw diameter and multiple ceramic heater bands to produce controlled melting of PET material. The target output is 1.75 mm filament suitable for common 3D printers. A PLC-based control system is proposed to regulate temperature, motors, process sequence, and operational safety. The project emphasizes local manufacturing, available components, cost effectiveness, and sustainability by converting waste plastic into useful additive-manufacturing material.

Keywords:

PET Recycling, 3D Printer Filament, Extrusion, PLC Control, Sustainability, Mechatronic Manufacturing.

Project Scope

The project scope, as derived from the source report, can be summarized as follows:

- Design an integrated PET recycling line that converts bottles into standardized 1.75 mm 3D-printing filament.
- Develop a twin-shaft shredder capable of reducing PET bottles into uniform flakes suitable for extrusion.
- Include drying, single-screw extrusion, active cooling, pulling, and tension-controlled spooling subsystems.
- Use PLC-based automation for temperature regulation, motor sequencing, safety interlocks, and process monitoring.

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- Target educational and laboratory-scale operation using locally available, cost-conscious materials and components.
- Reserve full experimental optimization, laser diameter feedback, advanced HMI/IoT monitoring, and multi-material processing for future versions.

Deliverable nature:

The deliverable is a design and implementation-oriented system proposal that still requires full fabrication and experimental characterization.

Overview

The PET recycling project links environmental sustainability with additive manufacturing. The proposed line transforms post-consumer PET bottles into filament through an integrated sequence of mechanical size reduction, moisture removal, thermal extrusion, dimensional stabilization, pulling, and winding. The mechanical design centers on a high-torque twin-shaft shredder and an extruder with a controlled heating profile. The control architecture is expected to supervise motors, heaters, and safety states through PLC logic, while future versions may add real-time filament-diameter feedback and closed-loop pulling-speed control. The project is well aligned with mechatronics because it combines mechanical design, thermal dynamics, motor control, sensor feedback, automation, and manufacturing sustainability. Its next critical stage is fabrication, calibrated testing, tensile/ovality characterization, print trials, and comparison with commercial filament quality.

Main engineering areas:

Plastic recycling	Extrusion and cooling
PLC automation	Sustainable manufacturing

رئيس القسم

أ.م.د. امير على كامل

اسم المشروع: طرف صناعى متطور

وصف المشروع:

قام طلاب الفرقة الرابعة من قسم هندسه الميكاترونيكس بعمل مشروع تخرج عن طرف صناعي تساعد الذراع الاصطناعية الكهربية العضلية هي نوع من الأجهزة الطبية المتقدمة المصممة لتحل محل الذراع المبتورة أو المفقودة يستخدم هذا النوع من الأطراف الاصطناعية أجهزة استشعار توضع على الجلد لكشف الإشارات الكهربائية التي تولدها العضلات عندما يحرك المستخدم يده، والتي تترجم بعد ذلك إلى حركات للذراع الاصطناعي تتمتع الأذرع الاصطناعية الكهربية العضلية بالعديد من المزايا مقارنة بالأذرع الاصطناعية التقليدية، بما في ذلك البراعة الأكبر، وتحسين التحكم، والمظهر الطبيعي أكثر.

وقام بالمشروع كلا من:

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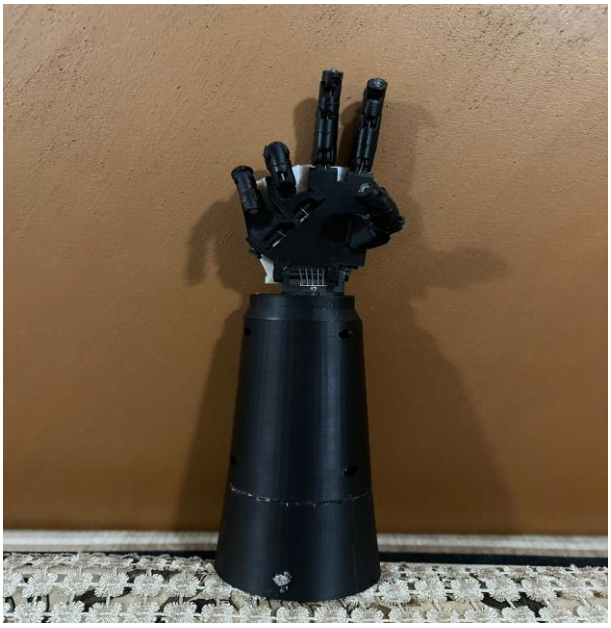
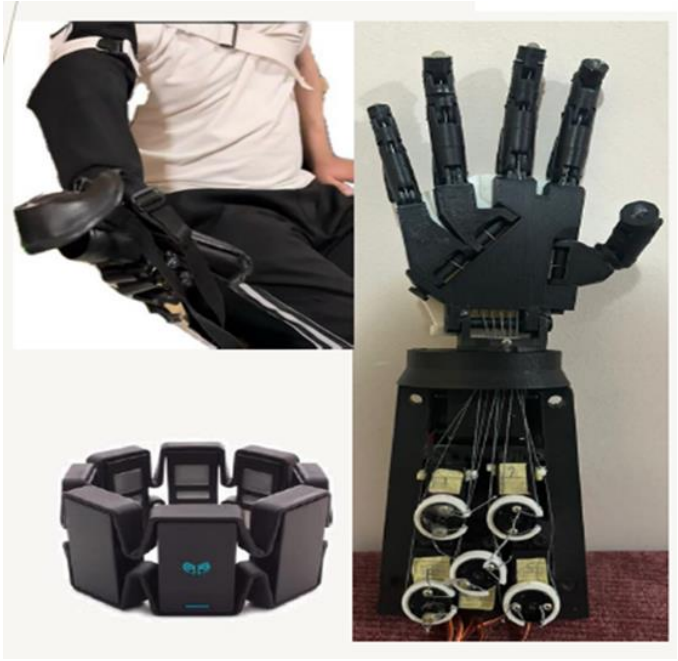
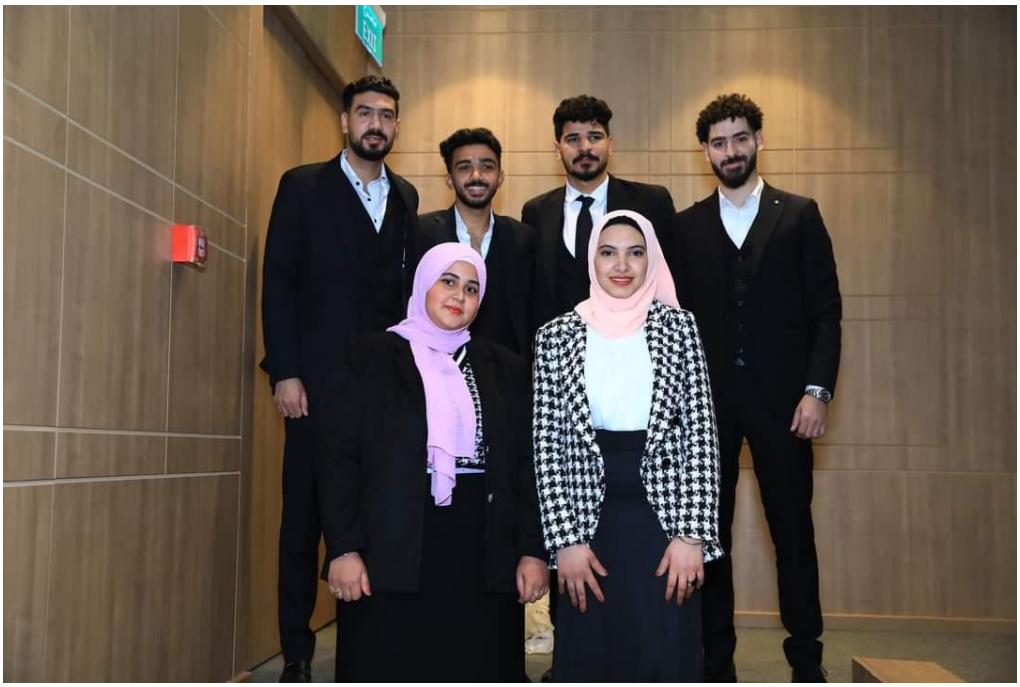




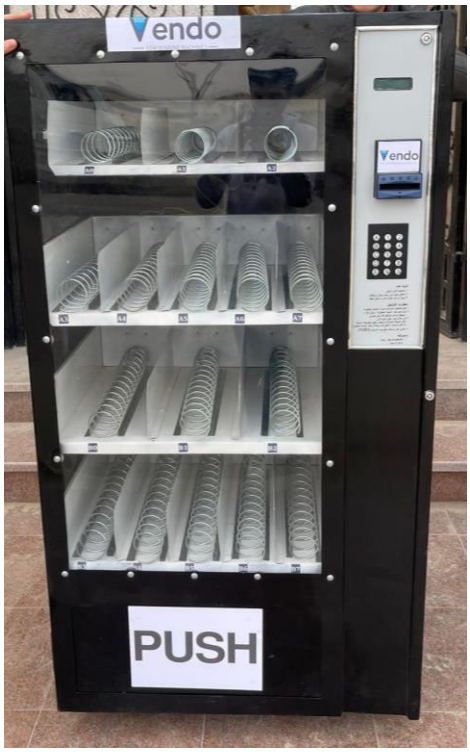


اسم المشروع: Snacks Vending Machine with Payment System

وصف المشروع:

قام طلاب الفرقة الرابعة من قسم هندسه الميكاترونيكس بعمل مشروع تخرج عن Snacks Vending Machine with Payment System حيث انه يركز علي طرق الدفع و الشراء الغير تقليديه حيث شهدت المعاملات التجارية تطورًا كبيرًا عبر العصور، حيث انتقلت من نظام المقايضة التقليدي إلى أنظمة الدفع الرقمية الحديثة. مع تقدم التكنولوجيا، أصبحت الحاجة إلى حلول بيع آلية متطورة أكثر أهمية لتلبية متطلبات المستهلكين وتوفير تجربة شراء سلسة. يعكس هذا التقرير تصميم وتطوير آلة بيع آلية مبتكرة تلبي احتياجات السوق المعاصر.

يشمل تصميم وتطوير آلة بيع آلية مخصصة بالكامل، تهدف إلى تقديم حل بيع تجزئة آلي يتميز بالكفاءة وسهولة الاستخدام. تم تصميم هذه الآلة بهيكل منظم، وتوزيع محسن للمحركات، ونظام كهربائي متكامل لضمان التشغيل السلس والموثوق.



المزايا الأساسية لآلة البيع:

- توزيع محسن للمحركات لضمان كفاءة في تقديم المنتجات.
- تصميم متين وفعال من حيث التكلفة لتلبية متطلبات السوق.
- واجهة استخدام سهلة لضمان تجربة سلسة للمستخدمين.
- إمكانية الترقية المستقبلية، مثل الاتصال بإنترنت الأشياء وخيارات الدفع غير النقدية.

من خلال دمج هذه الميزات، تسهم آلة البيع في تعزيز الوصول والأداء، مما يوفر حلاً حديثًا وفعالًا لمجال البيع الآلي.

في النهاية تُعد آلات البيع الحديثة نموذجًا للتطور التكنولوجي في البيع بالتجزئة، حيث تجمع بين الهندسة الميكانيكية والتكنولوجيا الرقمية لتوفير حلول مبتكرة وفعالة.

وقام بالمشروع كلا من:

1. عبد الرحمن أحمد ياسين عبد الغني
2. عمرو عصام أحمد كوراني
3. فاطمة أحمد إبراهيم رغد
4. محمد حسن محمد أنور
5. محمد محمود سيد سيف
6. محمد شريف سيد علي بدوي

تحت اشراف:

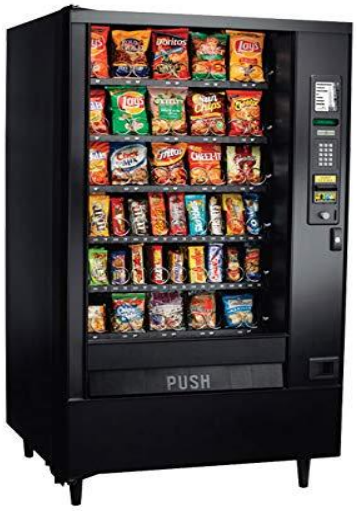
أ.د. جمال دسوقي

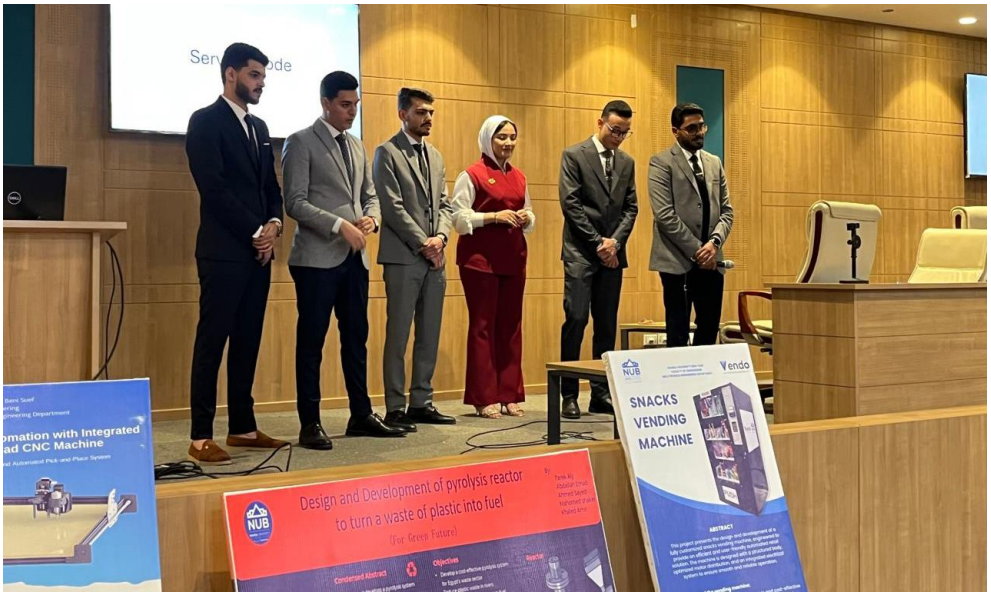
د. عمرو ربيع

د . أمير علي

د . محمد كريم

د. حمدي سلطان





اسم المشروع: Electrical Buggy Car

وصف المشروع:

قام طلاب الفرقة الرابعة من قسم هندسه الميكاترونيكس بعمل مشروع تخرج باسم Electrical Buggy Car ويهدف مشروع العربة الكهربائية إلى تصميم مركبة صديقة للبيئة مخصصة للطرق الوعرة، تعتمد على التكامل بين الأنظمة الميكانيكية والكهربائية وأنظمة التحكم كبديل مستدام للمركبات التقليدية، تتميز بهيكل خفيف ومتين، ونظام دفع خلفي، ومنظومة إدارة بطاريات متطورة مع فرامل استرجاعية لتعزيز الكفاءة وقد خضع النموذج لاختبارات أداء ودراسة جدوى أثبتت إمكانية تطويره ودعمه لتقنيات التنقل الكهربائي المستدام.

مميزات مشروع العربة الكهربائية:

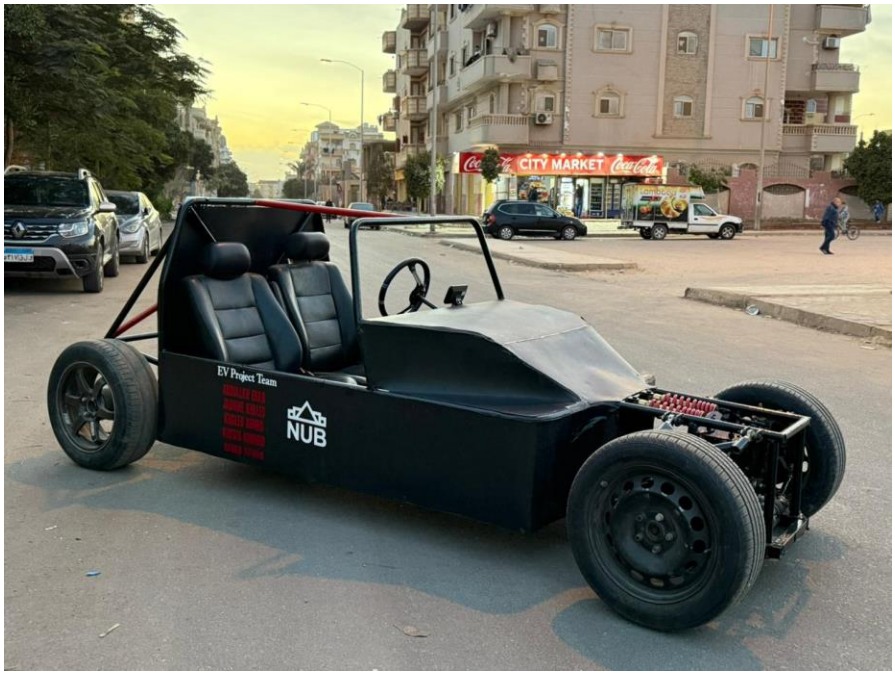
- صديقة للبيئة وخالية من الانبعاثات.
- كفاءة عالية في استهلاك الطاقة.
- تصميم متين وخفيف الوزن مناسب للطرق الوعرة.
- مزودة بنظام إدارة بطاريات وفرامل استرجاعية لزيادة الكفاءة.
- منخفضة تكاليف التشغيل وقابلة للتطوير مستقبلاً.

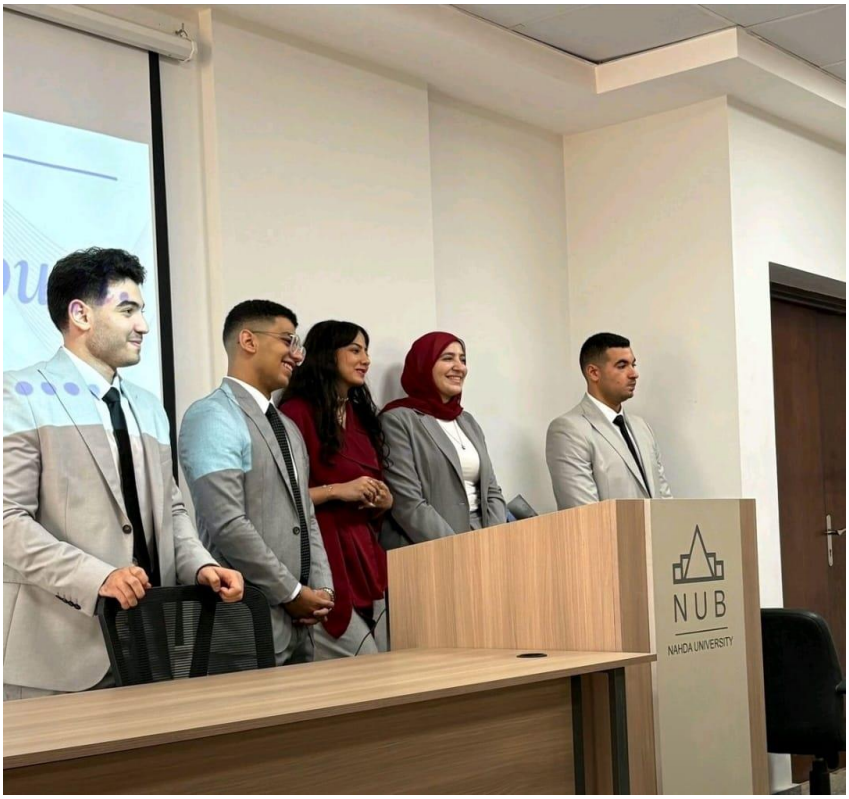
وقام بالمشروع كلا من:

1. عبدالله ايهاب فوزي
2. جاسمين خالد حسين
3. خالد أحمد فتحي
4. مصطفي محمود حسين
5. رحاب أيمن عبدالله

تحت اشراف:

أ.م. د. أمير علي
أ. د. أحمد عبد الحميد
أ. د . أحمد راشد
أ.م. د. حمدي سلطان
د . محمد كريم
د. إيمان شمس
د. محمد عادل


CITY MARKET
EV Project Team
NUB

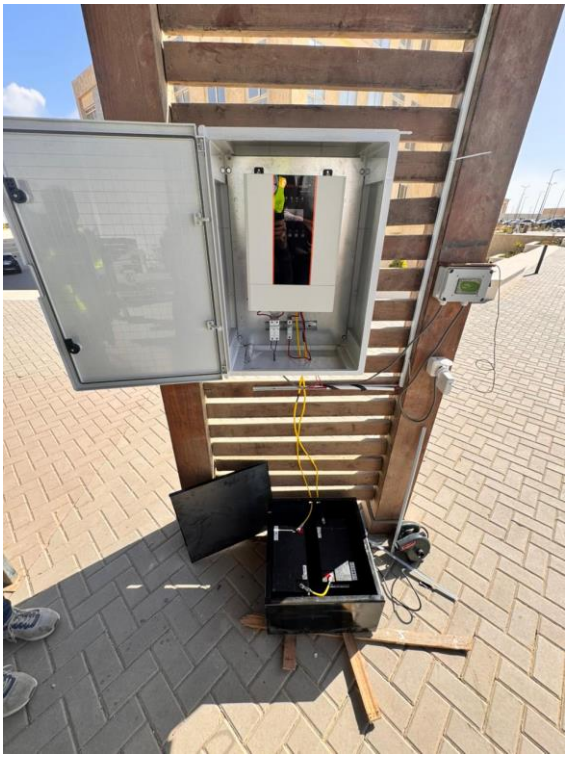

NUB
NAHDA UNIVERSITY

اسم المشروع: Solar-Powered Electric Vehicle Charging Station

وصف المشروع:

يهدف المشروع إلى تصميم قام طلاب الفرقة الرابعة من قسم هندسه الميكاترونيكس بعمل مشروع تخرج باسم Solar-Powered Electric Vehicle Charging Station ويتحدث عن شحن السيارات الكهربائية صديقة للبيئة وعالية الكفاءة للاستخدام في الطرق الوعرة، كبديل مستدام للمركبات التقليدية المعتمدة على الوقود.

يهدف المشروع إلى تصميم وتنفيذ محطة شحن سيارات كهربائية تعمل بالطاقة الشمسية، استجابةً للطلب المتزايد على بنية تحتية مستدامة لشحن المركبات الكهربائية. يعتمد النظام على تكامل الألواح الشمسية، ومنظم الشحن، ووحدة تخزين البطاريات، ومحول التيار، وشاحن سيارات كهربائية، وفق منهجية هندسة الميكاترونيكس لضمان الكفاءة والأمان.



أثبتت نتائج المحاكاة والاختبارات العملية قدرة النظام على شحن المركبات باستخدام الطاقة الشمسية فقط، مع تحقيق فوائد بيئية واقتصادية مثل تقليل الانبعاثات وخفض تكاليف التشغيل. ويمثل المشروع خطوة أساسية نحو تطوير بنية تحتية ذكية ومستدامة لشحن المركبات الكهربائية مستقبلاً.

مميزات مشروع محطة الشحن بالطاقة الشمسية:

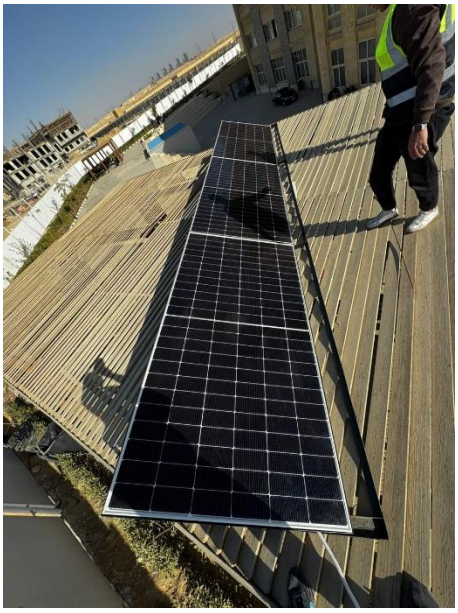
- يعتمد بالكامل على طاقة متجددة ونظيفة (الطاقة الشمسية).
- يقلل الاعتماد على الشبكة الكهربائية والوقود الأحفوري.
- يخفض الانبعاثات الكربونية وتكاليف التشغيل.
- قابل للتوسع والتطوير وربطه بالشبكات الذكية مستقبلًا.
- يعزز البنية التحتية المستدامة للمركبات الكهربائية.

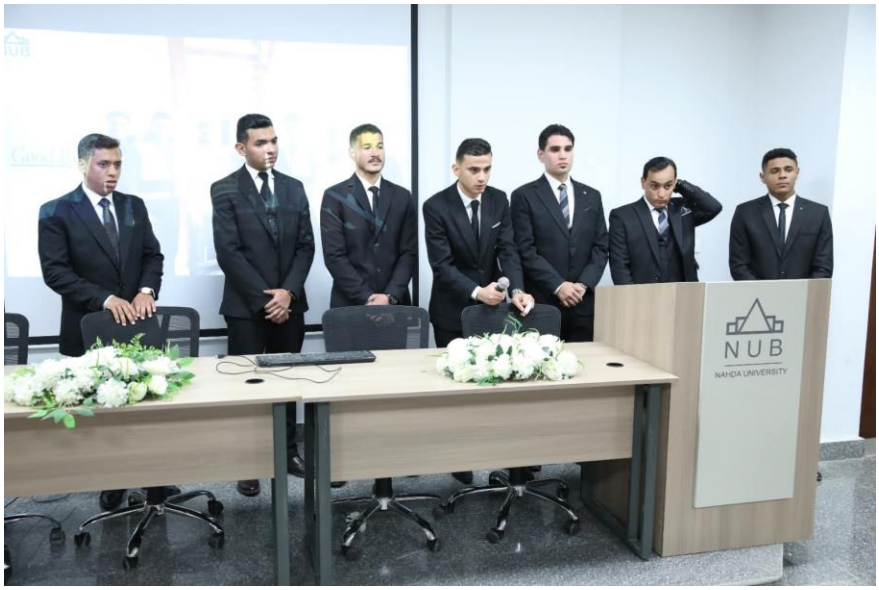
وقام بالمشروع كلا من:

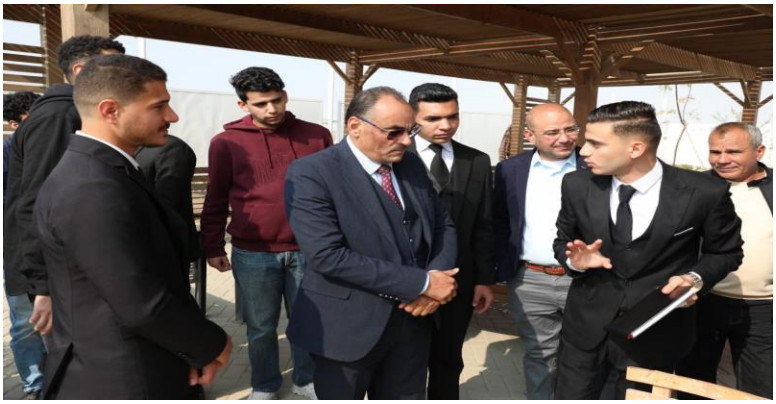
1. محمد حمدي
2. محمد ماجد
3. محمد علي عبدالعال
4. شهاب عصام
5. حمزة عمرو ابراهيم
6. عبدالله عادل

تحت اشراف:

أ.م. د. أمير علي
أ. د. أحمد عبد الحميد
أ. د . أحمد راشد
أ.م. د. حمدي سلطان
د . محمد كريم
د. إيمان شمس
د. محمد عادل



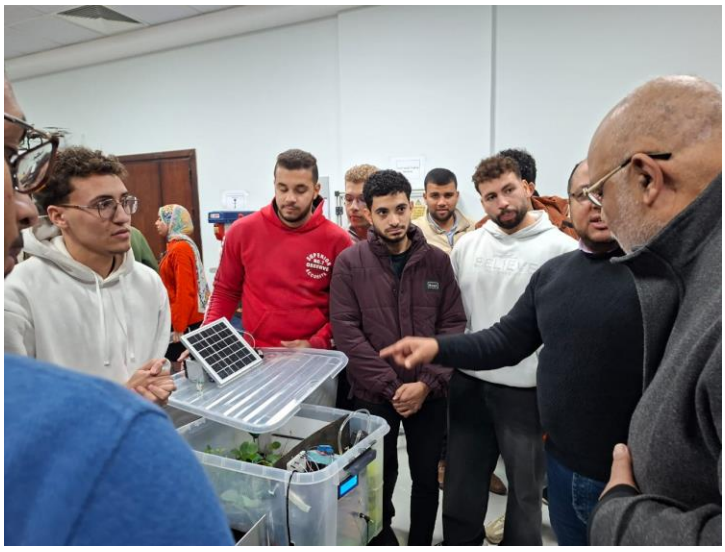


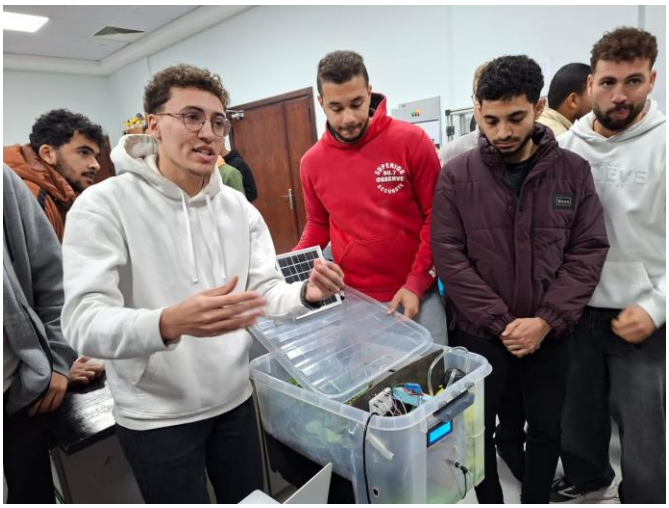


اسم المشروع: نظام دفيئة ذكي لتحسين نمو النباتات

وصف المشروع:

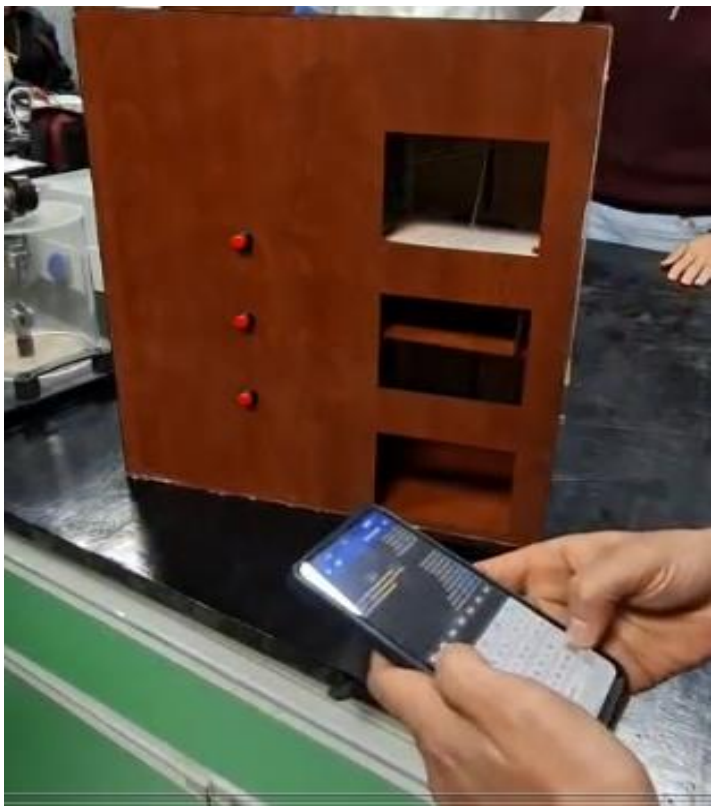
قام طلاب الفرقة الثالثه من قسم هندسه الميكاترونيكس بتفيذ مشروع نظام دفيئة ذكي قائم علي تقنيات إنترنت الأشياء (IOT) ويهدف هذا المشروع بصورة أساسية إلى تصميم وتنفيذ نظام دفيئة آلي يتيح المراقبة والتحكم الذكي في المعايير البيئية الحيوية، بما يسهم في تحسين نمو نبات الباذنجان (Solanum melongena) وفي ظل التحديات المتزايدة التي تواجه القطاع الزراعي، والمتمثلة في تقلبات المناخ، ونقص الأيدي العاملة، والطلب المتزايد على رفع إنتاجية المحاصيل، برزت الأتمتة كحل عملي وقابل للتطوير لتحقيق الكفاءة والاستدامة. ويسعى هذا المشروع إلى معالجة هذه التحديات من خلال دمج تقنيات إنترنت الأشياء مع الممارسات الزراعية التقليدية.





اسم المشروع: مصعد ذكي

وصف المشروع:



قام طلاب الفرقة الثالثه من قسم هندسه الميكاترونيكس بتنفيذ مصعد ذكي معتمد علي تقنيات إنترنت الأشياء (IOT) ويهدف هذا المشروع إلى تصميم وتنفيذ نموذج مصعد ذكي لثلاثة طوابق يعتمد على دمج أنظمة التحكم التقليدية مع تقنيات إنترنت الأشياء (IoT)، وذلك بهدف تحسين كفاءة التشغيل، ودقة التوقف عند الطوابق، ورفع مستوى الأمان، بالإضافة إلي توفير تجربة استخدام سهلة من خلال إمكانيات التحكم اليدوي أو اللاسلكي عبر الهاتف الذكي.

منسق البرنامج

أ.م/ أمير علي كامل