جامعة:	الأكاديمية العربية للعلوم و التكنولوجيا و النقل البحري	كلية:	الهندسة والتكنولوجيا		
البرنامج:	هندسة القوي الكهربية و التحكم	النظام الدراسى:	الفصلين الدراسيين		
كود:	EE 503		الساعات المعتمدة	✓	
التخصص العام:	هندسة القوي الكهربية و التحكم Electrical and Control Engineering	التخصص الدقيق:	هندسة القوي الكهربية و التحكم Electrical and Control Engineering		
عنوان المشروع:	نظم ادارة المبانى بإستخدام تكنولوجيا انترنت الأشياء Building Management System and IOT				
المشرفون:	Prof. Mostafa Abdelgeliel				

فكرة المشروع: (Abstract)

The increasing demand of energy requires that all systems in particular a building must be smart in order to be operated at a high efficiency and robust performance. Since the consumption of energy in a building represents a huge percentage of the total energy consumption in our world especially in large cities, using a Building Management System (BMS) and employing IOT technology are essential in order to make the building smarter and energy efficient. The BMS covers different building aspects such as lighting, energy consumption, HVAC, security, and IT. The new trends of BMS are based on IOT technology. So, the purpose of this project is to understand, analyse, design and control BMS based on IOT technology for an educational building.

أهم النتائج:(Conclusion)

An IoT platform has been designed and integrated with the existing components related to BMS of a building in the faculty of engineering, Alexandria campus, AAST. The integrated components with the designed IoT system include: - 1) Air Handling Unit (AHU) which is controlled using Schneider PC server; and 2) 50 kw PV plant over the building's roof.

In addition to the existing control system, new controllers were added for lighting, firefighting, security, and ventilation systems.

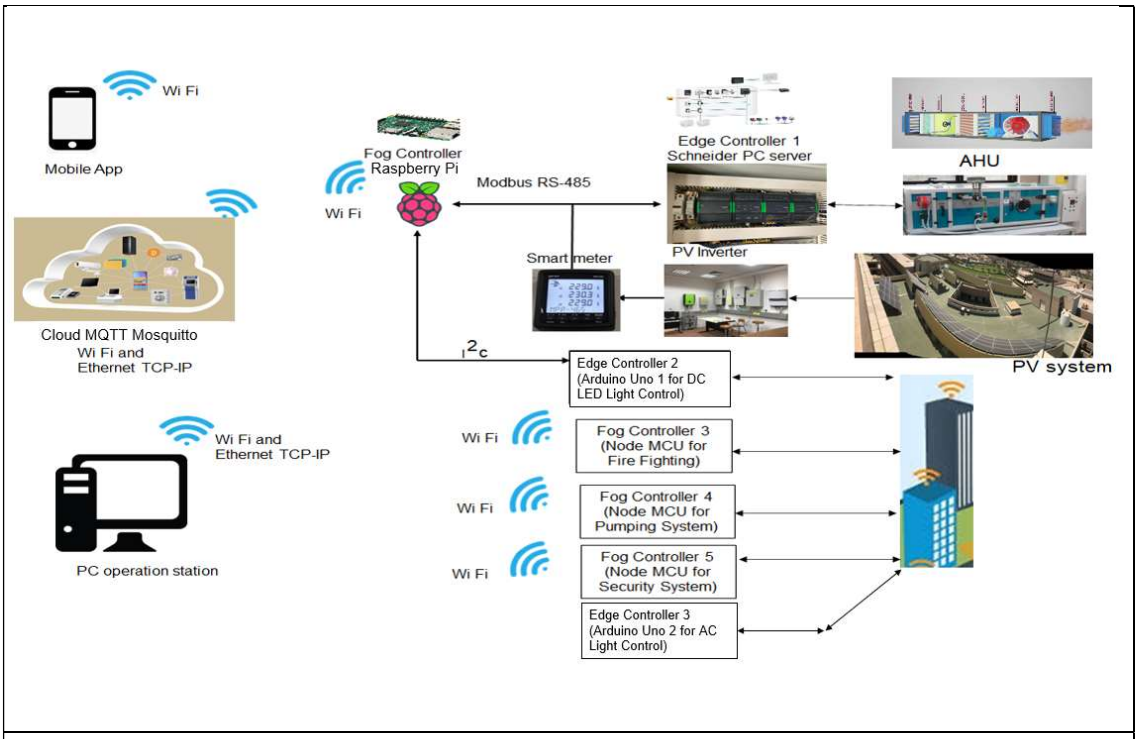


Fig.1 Block Diagram of Developed IoT system

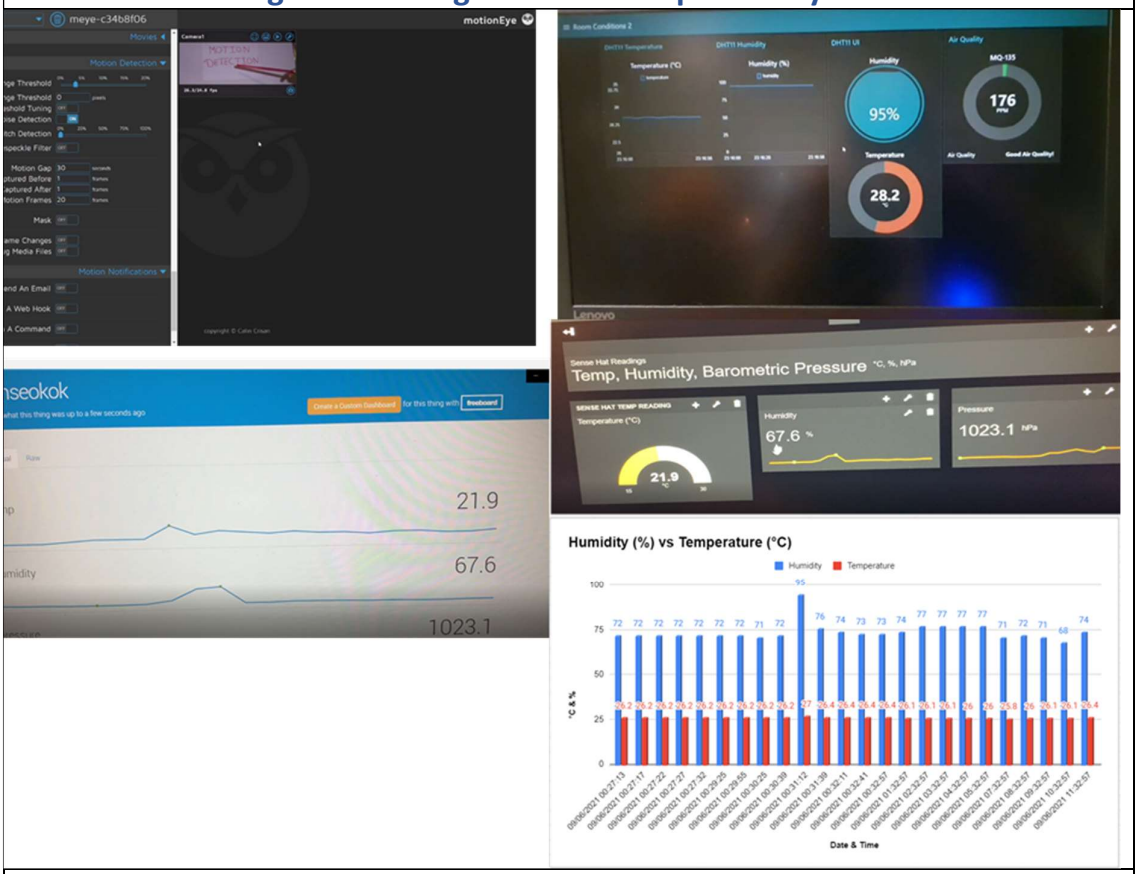


Fig.2 IoT Mobile Application for BMS system Part (I)

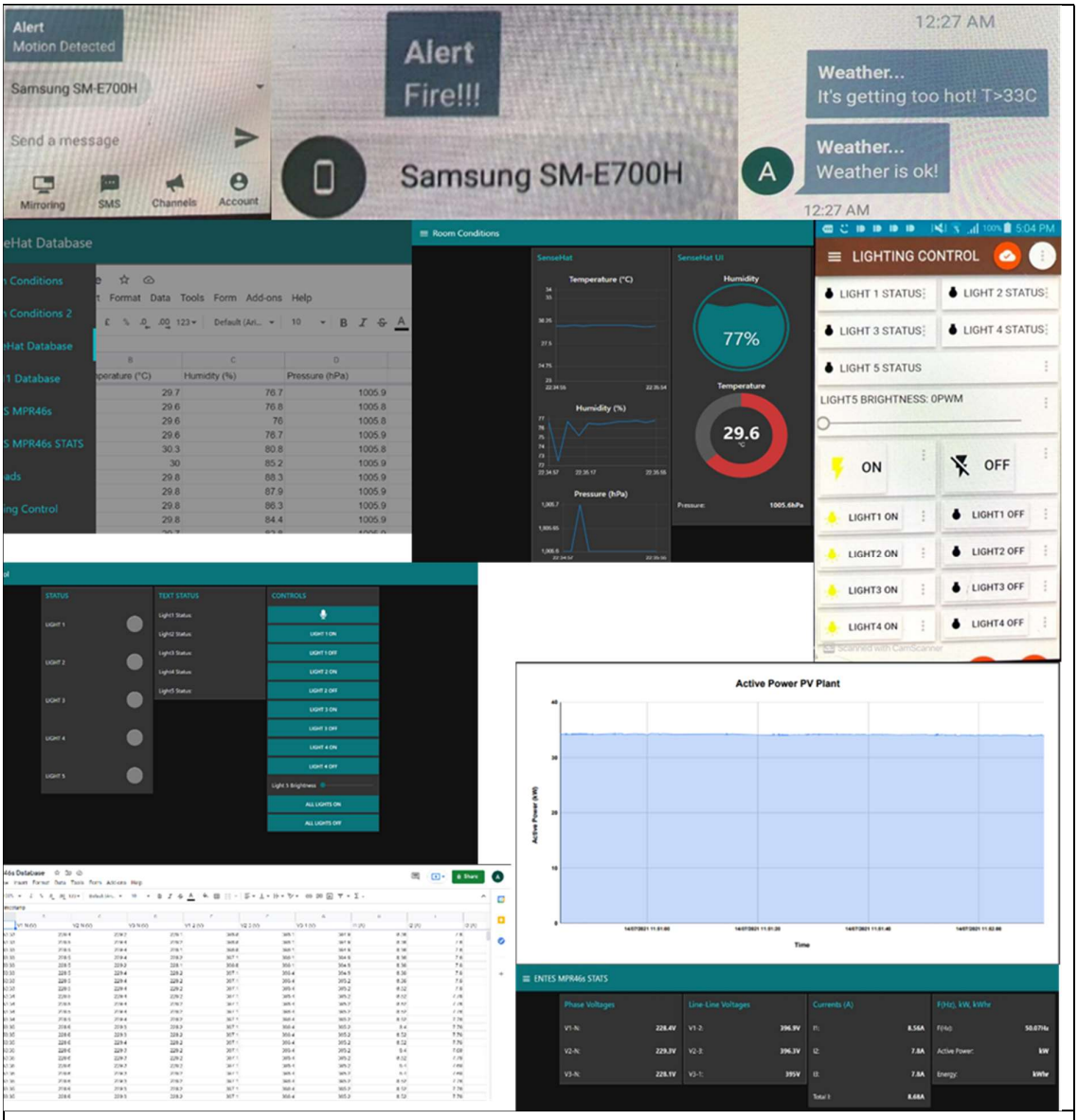


Fig.3 IoT Mobile Application for BMS system Part (II)

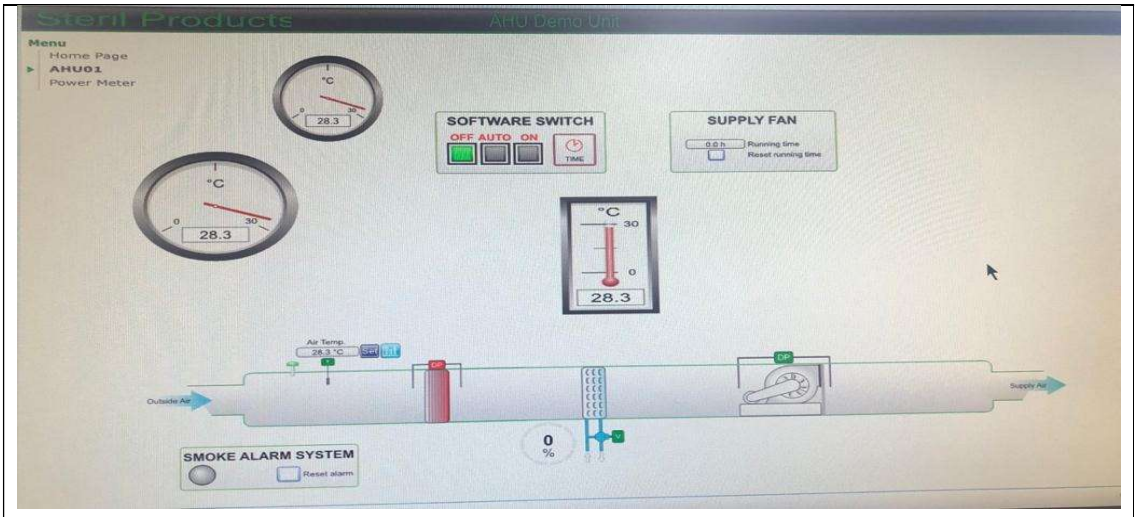


Fig.4 AHU control system and GUI

نقاط التميز والتفرد للمشروع إن وجد

- **A complete IoT system has been designed, implemented, and integrated with industrial building management equipment, ABB inverter for PV plant and Schneider server for AHU.**
- **Work can be extended to integrate other BMS components.**

جامعة:	الأكاديمية العربية للعلوم و التكنولوجيا و النقل البحري	كلية:	الهندسة		
البرنامج:	الهندسة الكهربية و التحكم	النظام الدراسى:	فصليين		
كود:	EE 503		الساعات المعتمدة	✓	
التخصص العام:	الهندسة الكهربية و التحكم Electrical and Control Engineering	التخصص الدقيق:	هندسة القوي الكهربية و التحكم Electrical and Control Engineering		
عنوان المشروع:	أنظمة الري الآلية و الذكية للصوب الزراعية القائمة على الطاقة الكهروضوئية PV Based Pumping Irrigations And Smart Automated Greenhouse				
المشرفون:	Prof. Hamdy Ahmed Ashour				

فكرة المشروع: (Abstract)

With the increased dependence on renewable energy in various aspects including agriculture, Egypt government now are putting great efforts and establishing infrastructure to harness the unused energy from the sun based on PV system. Also automation with the implementation of IoTs technology has been introduced for smart irrigation operation. This project displays the different configurations of PV-based pumping irrigation systems and the novel architecture of agrivoltaic greenhouses. After studying system requirements, a prototype experimental unit is implemented and tested and while being controlled via a digital PLC and DAC interface modules. The results are finally validated on a SCADA system using LabVIEW software and hardware based Kit.

أهم النتائج:(Conclusion)

1- Implementing a prototype experimental se combining PV-based pumping and agrivoltaic greenhouse unit.
2- Identifying the system components and estimating their ratings considering the national code of standards.
3- Pricing of system components and reaching out for their corresponding local suppliers.
4- Applying the control algorithms on a digital controller such as smart relays and PLC units.
5- Practicing on relevant monitoring software such as LabView and design a SCADA system to monitor the process.
6- Utilization of communication strategy based on Node-RED using the Modbus industrial protocol proto-type as an IoT facilities.

Fig.1 A photograph of the Implemented Setup

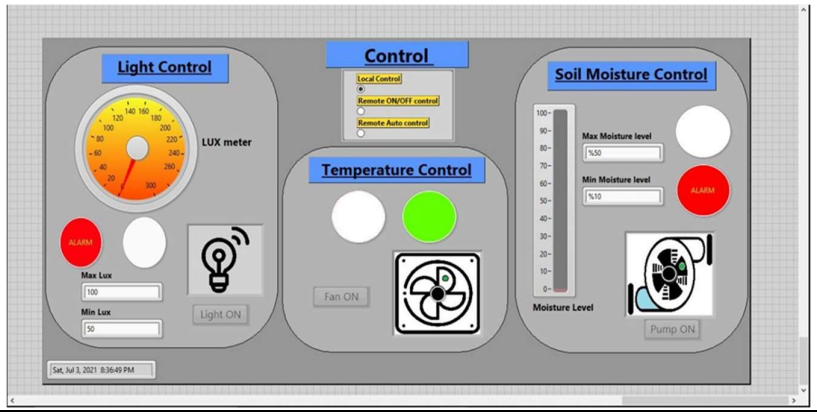


Fig.2 LabView GUI for SCADA System

نقاط التميز والتفرد للمشروع إن وجد

- **Experimental set up can be used as a demonstrated unit for students.**
- **Work can be extended for actual commercial sizing and implementation**

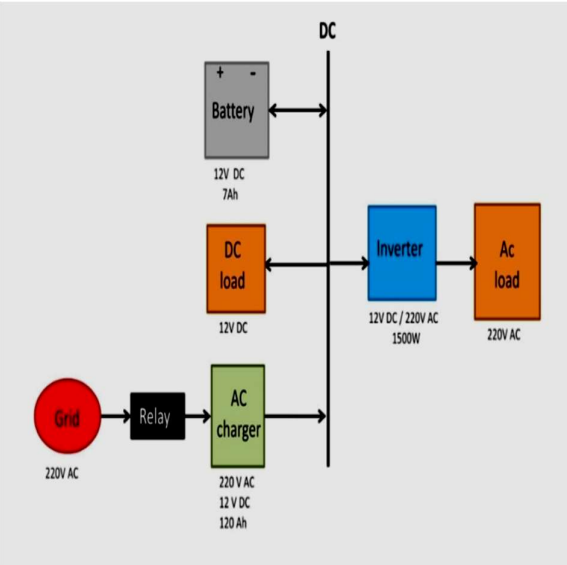
جامعة:	الأكاديمية العربية للعلوم و التكنولوجيا و النقل البحري	كلية:	الهندسة		
البرنامج:	الهندسة الكهربية و التحكم	النظام الدراسى:	فصليين		
كود:	EE 503		الساعات المعتمدة	✓	
التخصص العام:	الهندسة الكهربية و التحكم	التخصص الدقيق:	هندسة القوي الكهربية و التحكم		
	Electrical and Control Engineering		Electrical and Control Engineering		
عنوان المشروع:	تقييم طبولوجيا النظام القائم على الخلايا الكهروضوية لتطبيقات الشبكات الذكية **Evaluation of PV-based System Topologies for Smart Grid Applications**				
المشرفون:	**Prof. Hamdy Ashour and Dr, Osama Hebala**				

فكرة المشروع: (Abstract)

Solar photovoltaic (PV) energy has witnessed significant growth as a part of Egyptian smart renewable energy strategies to enhance overall grid efficiency and reliability. The interest in the micro-grid concept and smart-grid technology is needed for future integration of renewable energy sources. The main objective of this project is developing a simple low-cost energy management algorithm for smart-home application. The proposed energy management algorithm is developed for a hybrid DC-AC Microgrid that allow multiple operating modes including standalone PV operation (Off-Grid with battery) as well On-grid operation (with PV/Battery and/or without PV/battery). The effectiveness of the proposed system was verified in MATLAB Simulation and experimentally.

أهم النتائج:(Conclusion)

7- Implementing a prototype experimental set combining PV cell, controller, charger, inverter, dc and ac loads
8- Identifying the system components and estimating their ratings considering the national code of standards.
9- Pricing of system components and reaching out for their corresponding local suppliers.
10- Practicing different tests for different modes of operation



System configuration and a photograph of the Implemented Setup
نقاط التميز والتفرد للمشروع إن وجد
• **Experimental set up can be used as a demonstrated unit for students.** • **Work can be extended for actual commercial sizing and implementation**

جامعة:	الأكاديمية العربية للعلوم و التكنولوجيا و النقل البحري	كلية:	الهندسة		
البرنامج:	الهندسة الكهربية و التحكم	النظام الدراسى:	الفصلين الدراسيين		
كود:	EE 503		الساعات المعتمدة	✓	
التخصص العام:	الهندسة الكهربية و التحكم Electrical and Control Engineering	التخصص الدقيق:	هندسة القوي الكهربية و التحكم Electrical and Control Engineering		
عنوان المشروع:	دراسة كفاءة الطاقة لمبنى صناعي Energy Efficiency Study for an Industrial Building				
المشرفون:	Prof. Mostafa Saad Hamad Dr.Sherif Emam				

فكرة المشروع: (Abstract)

Nowadays the world aims to find and create solutions for the increasing in the energy demand. Energy efficiency and Building Energy management systems (BEMS) have a key role for achieving the optimal economic solution for industrial buildings. Building Energy Management System has gained popularity because of increasing interest in building energy conservation and savings. The construction and design of energy efficient buildings often include Photovoltaic systems as a renewable energy source instead of conventional electricity (Grid). Moreover, Energy management systems should meet Industrial Internet of things (IIOT) requirements of energy equipment such as smart meters and a cloud to monitor and collect all the data of the whole building to ease the controlling process and reduce percentage of fault. The objective of this project is to discuss how the building efficiency could be improved in a specific Enterprise in Egypt by three main techniques as follow; by installing photovoltaic system, installing power factor correction panel, and creating a cloud to link all the production lines of the enterprise by using Industrial Internet of things (IIOT) and communication. Furthermore, a detailed survey for each technique and means of communication will be introduced in this project.

أهم النتائج:(Conclusion)

To sum up, Energy Management systems have crucial role for increasing energy efficiency for all industrial manufacturing markets. Moreover, IIoT is a major part of BEMS as it will play a key role in transforming the industrial world by opening a new era of economic and competitive growth in the Industrial Revolution known as "Industry 4.0". Thus, IIoT helped organizations to achieve better benefits in industrial buildings by increasing productivity, reducing costs and developing new services and products.

By collecting energy consumption data from shop floor, (e.g., at production line, machine, processes level etc.) and by monitoring these data in real time at any place (Using mobile phones) this will provide decision makers a higher reliability and eventually integrating energy data in production management allows energy efficiency to be improved.

This Project has introduced different solutions for Building Energy management system (BEMS) for an industrial building in Egypt such as; PV system, Power factor correction and presented an industrial communication strategy based on Node-RED using the Modbus industrial protocol proto-type.

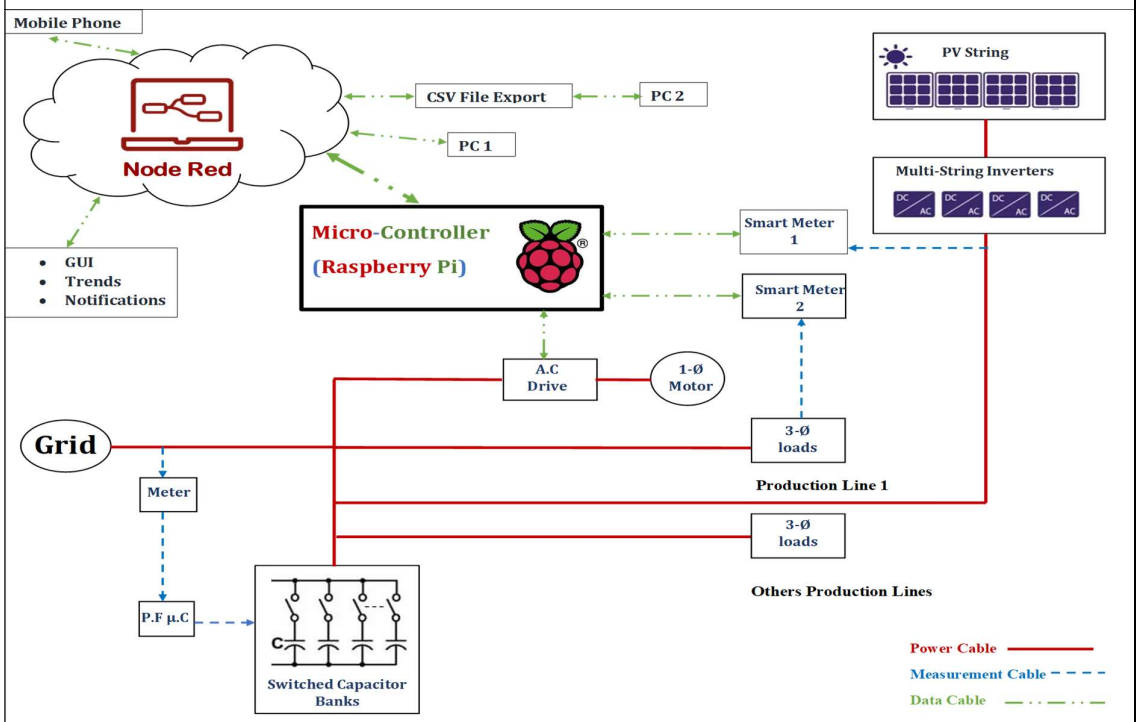


Fig.1 Block Diagram of the implemented system

Fig.2 Results

نقاط التميز والتفرد للمشروع إن وجد

- **Experimental set up can be used as an experiment for students.**
- **Work can be extended for postgrad studies in tge field of smart grid**