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ICT R&D Newsletter in Egypt

ZEUS - an electric powertrain for mid-size city transport vehicles

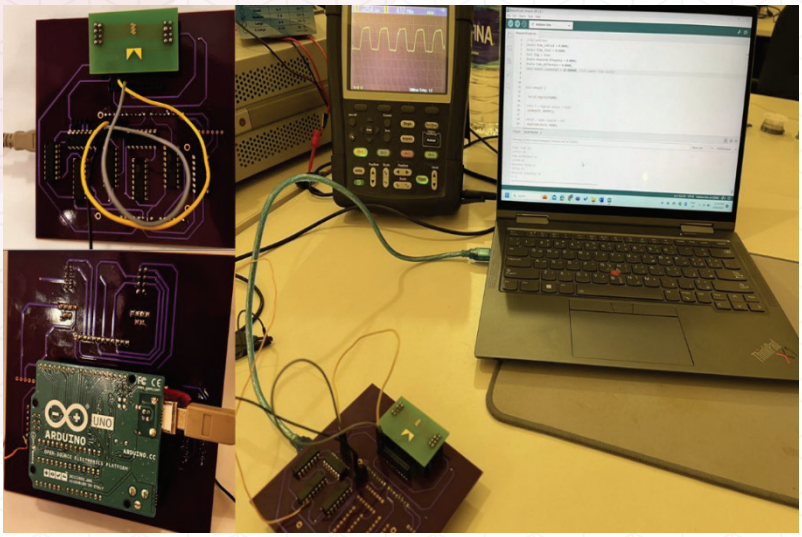
Alexandria University and Bright Skies

Researchers from Brightskies and Alexandria university developed an in-city bus battery pack and Battery Management System (BMS). With the world currently focusing on reducing the CO2 emissions and improving air quality to make our cities more sustainable, the switch to electric buses is an international initiative that EGYPT is fully supporting and working to achieve. The battery pack was developed to comply with the ECE R100 Rev2 requirements, which is the type approval standard for the European electric battery packs. The system is also highly scalable, as it is designed on modularity concepts to be able to easily adjust the system based on various customer requirements without having to do major changes in the system design. The development of the battery pack and BMS is a major milestone in the process of full domiciliation of the electric buses manufacturing industry in Egypt. The battery pack and BMS are considered as the most expensive and most complex components to develop in the EVs powertrain. The successful development of these components by a local company is a major step towards the goal of manufacturing electric buses in Egypt. The project was a collaboration between multi-domain teams consisting of software, hardware, systems, mechanical, and electrical engineers working together from the blueprints stage to conducting the product's acceptance tests. "The completion of ZEUS project is a significant achievement and it is a sign of the country's growing capabilities in the field of electric vehicles. The project is an important step forward in Egypt's journey towards a more sustainable future' says Dr. Ahmed Nagiub El Mekawy Associate professor at the faculty of Engineering, Alexandria University and the project principal investigator.

Research-Scale Benchtop Equipment for CMOS Fabrication

Zewail City of Science and Technology

Researchers from the AUC have developed an on-chip capacitance-based flow cytometer to manipulate, detect, quantify, and track the biological cells based on their capacitance, permittivity, conductivity, position, volume, and mass of the biological cells. The method Flow cytometry (FC) is used for detecting and quantifying cells' physical and chemical properties such as size, count, morphology, and DNA content. Flow cytometers play an important role in hospitals and medical institutions worldwide, where they are frequently utilized for both diagnosis and research. In routine blood tests, flow cytometry is used to detect the count of different blood cells, which is necessary to diagnose physiological deficiencies. Additionally, in cancer screening, flow cytometry is used to identify circulating tumor cells in cancer patients. The developed biochip consists of two major parts, which are the focusing system and the detection system. The focusing system is used to regulate the movement of the cells utilizing the dielectrophoresis while the detection system is used to measure and quantify the cells' properties based on measuring capacitance utilizing a ring oscillator. The proposed biochip is suitable for industrial and institutional laboratories in the field of identification and quantification of biological cells such as blood cells, CD4+ T-cells, and circulating tumor cells. PCB technology is used to implement the proposed design. The proposed microfluidic design is fabricated through EJUST labs. "The proposed sensors succeeded in differentiating between different types of samples such as air medium DMEM, carboxyl polymethyl microbeads, magnetic beads, and breast cancer, and the different concentrations of breast cancers. However, the detection limit of breast cancer was found to be 22 x 104 cells/mL' Says Dr. Yehea Ismail Chair of Electronics and Communications Department in the AUC and the project principal investigator.



The integrated system

The microfluidic chamber

Talentino - Meet Your Candidate Before Actually Meeting Them

Zewail City and Arete Consulting

Researcher from Zewial city and Arete Consulting have built an HR assistant called “Talentino’ which enrich the company’s human resources starting from the early steps in the hiring process, continuing the bond throughout the interview process, and delivering the maximum potential of the HR objectives by finding the best match candidates. The solution is built to fully automate the hiring process using the power of artificial intelligence techniques, such as machine learning, deep learning, self-supervised learning, large language models, and neural networks. Language models such as transformers are built to process textual data, generate suitable responses, and interactive systems, along with computer vision language models to analyze the candidates’ resumes and evaluate their responses and facial expressions during their interviews. “By exploring our solution, you will gain a deeper understanding of how Talentino can enhance your hiring process, reduce your time-to-hire, enable you to meet your candidate before actually meeting them, spending zero phone screens on your candidates, eliminate poor candidate experience, enhance your talent acquisition team performance and prevent biased or inefficient interviews’ says Dr. Moustafa El Shafei professor in Zewail City of Science and Technology and the project principle investigator. The main goal is to build a smart unbiased system that can speed up the hiring process and enrich the quality of accepted candidates, profiling and analyzing each candidate according to their knowledge, experience, and qualifications along with the required competencies in each character. In addition, the candidate must follow the values and the culture of the targeted organization, and fit the position’s needs. This can improve the hiring process by standardizing the recruitment process, finding the best match talents enriching the company resources, and reducing the recruiting expenses, and all of these are powered by our built-in AI models.

Development of A new Automatic External Defibrillator

Egypt-Japan University of Science and Technology

Researchers from Egypt-Japan University of Science and Technology has designed and developed a “mobile Automatic External Defibrillator’ that can accurately detect the VF in few seconds. An automatic external defibrillator (AED) is a portable device used to restore normal heart rhythm to patients in cardiac arrest by delivering an electrical shock to a patient through the chest wall. This medical emergency occurs mainly due to ventricular fibrillation. Ventricular fibrillation is a condition where there is an uncoordinated contraction of the ventricles in the heart, making them tremble rather than contract properly. The urgency of ventricular fibrillation requires that the heart must be defibrillated quickly, as a victim’s chance of surviving drops by seven to 10 percent for every minute a normal heartbeat is not restored. They have developed a new algorithm for VF detection based on the Slope of Hilbert Transformed ECG Signals. The new code has been tested and implemented on real ECG signals. The AED charge and discharge electronic circuit has been developed and manufactured. A unique AED body had been designed and manufacturing using 3D printing technique. Dr. Mohsen A. Hassan