



itida
IT INDUSTRY DEVELOPMENT AGENCY

itac
program

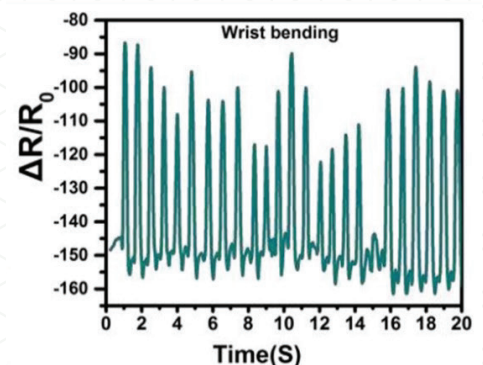
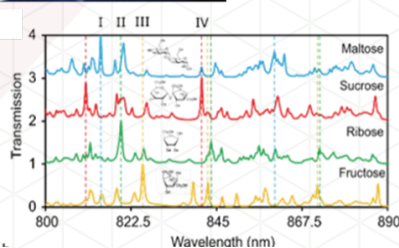
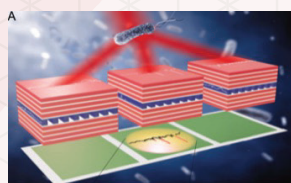


ICT R&D Newsletter in Egypt

Low-Cost Multifunctional wearables for Human Health Monitoring

Cairo University and Evo Smart Ltd

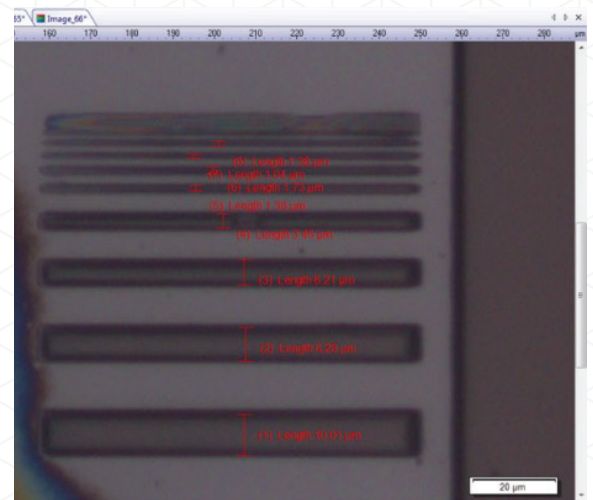
Researchers from Cairo University and EvoSmart Ltd are developing a low-cost, flexible, and wearable sensors based on silk nanocomposites with multifunctional and unique sensing properties for human health physiological signals. Wearable sensors are emerging as a new technology to detect crucial physiological and biochemical markers. Modern wearable healthcare devices such as watches and fitness bands have been able to detect vital human signals including heart rate, respiration rate, and human body temperature. These devices are usually rigid, inflexible and can be bulky. "We are developing novel flexible and stretchable electrode based on silk hydrogels blended with reduced graphene oxide (rGO) and molybdenum disulfide (MoS₂) nanosheets to provide the sensitivity, flexibility and long-term performance for these devices" said Dr Ahmed Khalil, founder and CTO of EvoSmart. "We are extending the scope of these monitoring devices beyond the conventional electrostatic signals by integrating chip-scale optical analyzer to monitor perform sweat analysis in real time". Highlighted Dr Amr Saleh, Associate professor at the faculty of Engineering, Cairo University and the project PI. "This technology promises to deliver a new generation of comprehensible wearable devices that could be adopted and utilized even by athletes pursuing the most intense activities." added Dr Amr Saleh.



Research-Scale Benchtop Equipment for CMOS Fabrication

Zewail City of Science and Technology

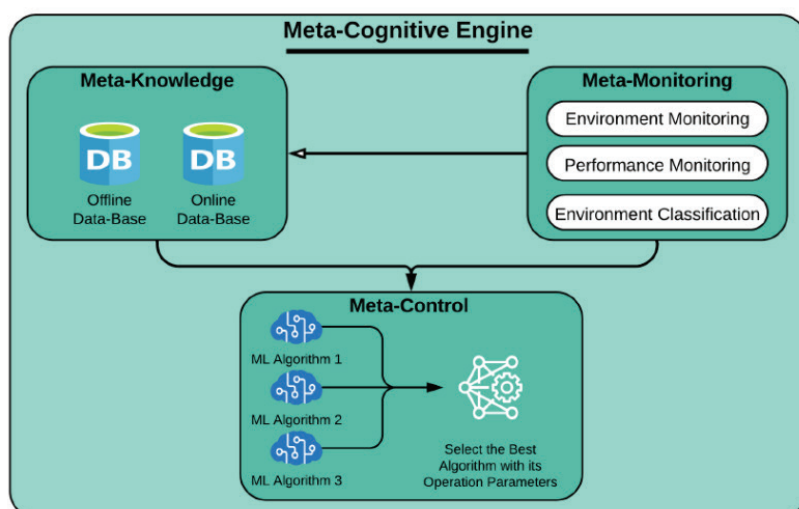
Researchers from Zewail city demonstrated and adapted several cleanroom equipment for use in the basic submicron CMOS processing. We have demonstrated a working benchtop 5x reduction UV Projection Lithography system with laser alignment, and have demonstrated sub-micron resist features. "All commercially available bench-top equipment are proximity/contact aligners, with 1:1 printing ratio, which do not fit to CMOS. Projection reduction lithography systems are only made for mass production, not for benchtop research scale, and cost millions of dollars. We have also designed and built a Rapid Thermal Processing (RTP) concept system for shallow junction formation, thin gate oxide formation, annealing, and source-drain silicidation." says Dr. Amr Bayoumi project principal investigator with the assistance of Dr. Ahmed Abd-Rabou. The team have developed a low-cost flow for fabrication of submicron CMOS transistor, suitable for educational labs. They have conducted full finite element simulations for equipment design, implemented digital control algorithms and conducted equipment assembly.



Fully integrated weather station chips for smart phones and tablets

Ain Shams University & MEMS Vision LLC

Researchers from Nile university have designed an intelligent network optimization module capable of optimizing the performance of the 4G LTE and the WiFi networks when they are both using the same frequency bands. The ever-increasing demand on communication services, especially wireless connectivity, has made the spectrum scarcity problem more prominent. "The wireless spectrum, or the frequency bands used for communication services, is a limited resource that all wireless networks must share. Therefore, it is crucial to develop innovative tools for efficient spectrum management" says Dr. Amr El-Sherif – Currently professor at Egypt University of Informatics, and the project principal investigator. To increase its available spectrum resources, the LTE network can use the 5 GHz unlicensed spectrum band which is already used by some WiFi access points. This project tackles the LTE/WiFi coexistence and spectrum management problems by developing a machine learning-based meta-cognitive engine that controls the LTE network's access to the 5 GHz frequency band. The meta-cognitive engine developed can be deployed at the LTE base station, and operates by collecting information about the state of the LTE and WiFi networks to infer their spectrum requirements and then optimizes the LTE operating parameters to maximize the throughput of both networks. While the project has focused on the specific problem of LTE/WiFi coexistence, the developed solution can be considered as a steppingstone towards the development of other intelligent network management tools and fully self-organizing networks.



An AI-Based Helpline and a Holistic Mental Health Platform for Arabic Speakers

Faculty of Computers and AI, Cairo University and NajahNow

Researchers from Faculty of Computers and AI, Cairo University and NajahNow presented the latest initiative: an AI-driven helpline and comprehensive mental health platform designed specifically for Arabic speakers. This groundbreaking project directly addresses the critical need for accessible mental health resources within the Arabic-speaking community, where cultural taboos often deter individuals from seeking help. "Utilizing state-of-the-art AI technology, our platform employs an advanced model trained on a vast dataset of Arabic mental health data collected specifically for this purpose. This ensures accurate classification of users' mental health concerns into categories such as depression, OCD, anxiety, and suicidal tendencies, while also identifying other potential issues" says Dr. Mohammad El Ramly – Assistant Professor at Cairo University, and the project principal investigator. Furthermore, users have the convenience of scheduling medical consultations with doctors online or in-person, in addition to accessing a plethora of informative articles, tips, and supportive recommendations. The primary achievement lies in delivering comprehensive, stigma-free mental health support, empowering Arabic speakers to seek assistance and guidance confidently and effortlessly.

