يشــهد العـالم فى الآونـة الأخيرة تطوراً هـائلاً وملحوظاً فى كل منـاحي العلم والمعرفة على وجه العموم وفي مجال أبحاث وصـناعة الإلكترونيات وتكنولوجيا الاتصـالات والمعلومات والطاقة والفضـاء بوجه خاص. فالواقع الجديد للبحث العلمي يسـتدعي من الجامعات والمعاهد والمراكز والجهات البحثية تبني رؤى واستراتيجيات علمية مستقبلية لمواكبة ذلك التطور السريع، لتستطيع من خلالها الدولة تحقيق طموحها المسـتقبلي في بناء مجتمع المعرفة وتحقيق نجاحات متميزة في مختلف المجالات بتلك المؤسسـات، مما يكون له أكبر الأثر في المساهمة في تنمية الاقتصـاد القومي.

وانطلاقا من إدراك معهد بحوث الإلكترونيات بأهميته ودوره الاسـتراتيجي في رسـم خارطة طريق مسـتقبلية لتحقيق الريادة المحلية والدولية والتميز العلمي في مجال الإلكترونيات وتكنولوجيا الاتصالات والمعلومات والطاقة والفضاء، بالشـكل الذي يجعل مصـر في طليعة الجهات البحثية في ذات المجال. حيث يقوم المعهد بالاسـتثمار في العقل البشـري واقتصـاديات المعرفة، الي جانب تبني شـراكات علمية وبحثية على المستوي المحلي والدولي يحقق من خلالها تلك الرؤى والتطلعات المستقبلية في إطار رؤية مصر ٢٠٣٠؛ بهدف تشجيع الابتكار وريادة الأعمال وتحقيق التنمية المستدامة.

هذا وأود أن أؤكد بأننا نؤمن بأن المعامل المركزية والمتخصصة والبحثية بالمعهد تعتبر أحد محاور التقدم العلمي والتميز فى المجالات التي يتبناها المعهد، وأن التشغيل الاقتصادي لها هو أحد المبادرات الأساسية التي تسـاهم في تنفيذ المسـار الأول من خطة المعهد الاسـتراتيجية وذلك بهدف تهيئة بيئة محفزة وداعمة للتميز والابتكار في البحث العلمي، بما يؤسـس لتنمية مجتمعية شـاملة وإنتاج معرفة جديدة تحقق ريادة دولية، إلى جانب المسـاهمة في تقديم خدمات تقنية لمدينة العلوم والتكنولوجيا لأبحاث وصـناعة الإلكترونيات التابعة للمعهد؛ لخدمة رواد الأعمال والحاضـنات التكنولوجية والشـركات الناشـئة، حيث تسـاهم المدينة في وضـع مصـر على خريطة المنافسـة العالمية في جودة تقديم خدمات أبحاث وصناعة الإلكترونيات والاتصـالات والتقنيات الرقمية، لتصـبح صـرحًا عملاقًا ينقل هذه الصـناعة نقلة حضـارية متطورة وتسـاهم في جعل مصـر في مصـاف الدول الكبرى في مجال أبحاث وصـناعة الإلكترونيات وتطبيقاتها.

ودعمًا من الدولة المصـرية للعلم والبحث العلمي حظى المعهد بدعم كبير لتطوير معامله وتجهيزها بأحدث الأجهزة العلمية لمواكبة التطور العلمي والعالمي، وخطط الدولة لتوطين منتجات محلية الصـنع في مجالات تخصـص المعهد، كما أن هذه المعامل مدعمة بخبرات علماء المعهد من أسـاتذة وباحثين ومهندسين وفنيين متخصصين؛ ويسعي المعهد جاهدإ لتعظيم العائد من تلك المعامل من خلال مشروعات مشـتركة أو برامج تدريبية أو شـراكات مع الجامعات والمعاهد البحثية والمصـانع والشـركات ورواد الأعمال الموهوبين، من خلال حاضـنات ترعاها وزارة التعليم العالي والبحث العلمي ومختلف الجهات ويدعمها المعهد بخبراته العلمية والإدارية.

ولا يسعني إلا أن اتقدم بخالص الشكر لكل صاحب جهد في هذه المنظومة الهامة، وأؤكد على دعمنا الكامل لكافة المجهودات المبذولة من أجل الارتقاء بالمعهد وبمصرنا الحبيبة، متمنية أن تتواصل جهودنا المشتركة حتى نصل بقطاع الإلكترونيات والاتصالات والمعلومات والطاقة والفضاء في مصر إلى أفضل مستوى.

سنواصل التطوير للمعامل المركزية والمتخصصة والبحثية بالمعهد؛ لتلبية احتياجات المجتمع فى الفترة الحالية والمستقبلية ولخدمة أغراض الدولة، لما لذلك من عظيم الأثر على جودة المنتج الوارد للسوق المصري وتأمين لواجهة المنتج المحلي بالأسواق العالمية، وسيستمر معهد بحوث الإلكترونيات ترس فعال في منظومة التطوير في الجمهورية الجديدة.

السيدة الأستاذ الدكتور/ شيرين عبدالقادر محرم

أكتوبر ٢٠٢٣

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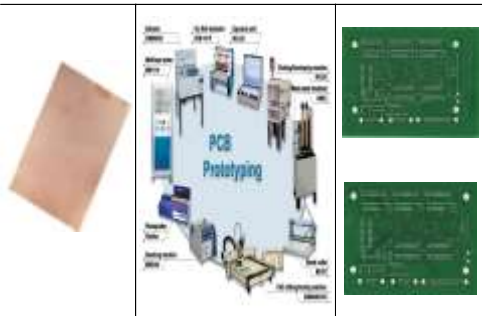
المعامل المركزية والمتخصصة والبحثية بمعهد بحوث الإلكترونيات

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أولاً: المـعامل المركزية

١- المعمل المركزي لتصنيع لوحات الدوائر المطبوعة (نموذج أولي)

خط متكامل لتصنيع الدوائر الإلكترونية المطبوعة وجه واحد ووجهين بدقة عالية تصل إلى 150 µm لكل من عرض المسارات والمسافات البينية بينهم. وتصنيع Printed Circuit Board (PCB) متعددة الطبقات تصل الي ٦ طبقات.

Function	Device Photo	Device Name
Manufacturing Single side boards, double side boards, and multilayer PCB up to 6 layers with a green mask		**PCB prototype integrated Lab.**
Drilling and Milling for FR4 PCB boards **CCD/ATC is a high quality Computer Controlled Drilling machine with Automatic Tool Change (ATC=automatic tool change)** **RPM: 5.000 - 63.000**		**CNC machine** **CCD/ATC**

Function	Device Photo	Device Name
Ne-Cut for cutting of PCBs (0-3 mm), Aluminium (0-2mm), steel (0-1 mm).		Ne-Cut
For cleaning the PCB boards from greases and dirt.		Brushing Model: RBM 300
Conveyorized PCB Dryer. Adjustable transport speed ensures perfect drying of holes and surfaces after all wet process sequences.		Hot Air Drayer Model: Air 2000

Function	Device Photo	Device Name
- **A universally applicable electroplating machine for the deposition of metals.** - **The production of plated-through-hole printed circuit boards for prototype and small batch production.** - **The HitecPlate 3040 is designed for direct metallization and have baths for process steps cleaning, rinsing, pre-dipping, activating, rinsing, intensifying, rinsing, copper deposition.**		**Through Hole Plationg/ Desmear** **Model: HitecPlate 3040**
The DL 500 is a double-sided conveyorized spray developing/etching machine with an integrated rinsing zone.		**Developing / Etching Model: DL500**

Function	Device Photo	Device Name
Splashing / Stripping - **To Remove the dry films after developing the process**		**Stripping Splash-XL**
An inspection system is used to compare - **The manufactured PCB boards with the original Gerber manufacturing file in terms of both track width and clearance.** - **The stencil sheets used in SMT soldering process with the original Gerber manufacturing file.**		**Photo Plotter Model: Filmstar-Plus-XL**

Function	Device Photo	Device Name
The RLM is a dry film laminator, with adjustable temp., pressure control, and laminating speed. Useful for photoresist and solder mask dry films.		Dry Film Laminators (Photo resist / Solder mask) Model RLM 419P
The universal oven for temperature control. Used in - Preheating the PCB boards. - Curing the dry film solder mask (Green mask).		Oven (Memmert) : Model UF110

Function	Device Photo	Device Name
The EXP 3040 LED is a high speed double sided exposure, and used for high resolution production of printed circuit boards.		**Exposure** **Model: EXP 3040**
Multi-Layer press for pressing the multilayer PCB.		**Multi-Layer Press Model: RMP 3545**

Function	Device Photo	Device Name
An inspection system is used to compare: - The manufactured PCB boards with the original Gerber manufacturing file in terms of both track width and clearance. - The stencil sheets used in SMT soldering process with the original Gerber manufacturing file.		ScanCAD

٢ـالمعمل المركزي لقياس معدل الامتصاص النوعي

يقوم المعمل بقياس معدّل طاقة الأشعة الكهرومغناطيسية الممتصة من طرف الجسم.

Function	Device Photo	Device Name
Providing the intended power output.		Power source (20 dBm max)- Model(SE UMS 160 CA SPEAG Switzerland)
It is an RF wave signal generator that can turn into a reliable and full-featured GNSS signal source. It has advanced simulation capabilities to generate realistic, complex, yet repeatable GNSS scenarios that can be run under controlled conditions.		Vector Signal generator- Model (SMBV100B)
It is used to measure the human SAR represented in the left part of the head.		cSAR3D V2-L-Model(SD C00 L01 AC SPEAG Switzerland)
It is used to measure the human SAR in the middle part of the body.		cSAR3D flat-Model(SD C00 F01 AC SPEAG Switzerland)

- It is used to measure the human SAR represented in the right part of the head.		**cSAR3D V2-R-Model(SD C00 R01 AC SPEAG Switzerland)**
- It is used in broadband radio communication testing through a global test platform for RF integration and protocol development. - It is available as an R&S®CMW500 Protocol Connection and Test Box. - It includes a fully integrated data solution that allows comprehensive IP quality and throughput measurements.		**Wideband Radio Communication tester-Model(CMW500)**
- The shield box can be used for frequencies up to 6GHz. - It is used to optimize the antenna structure to enable excellent radio connections between the DUT and the test. - The extremely wide band helical antenna enables a wide variety of applications.		**RF shield box external gas SPR – Model(CMW-Z10)**

Function	Device Photo	Device Name
Pick and place object Training, positioning, painting, and welding.		IRB4600
ABB's YuMi is the first truly collaborative dual-arm robot designed for production environments where humans and robots work together.		ABB YuMi IBR 14000
A compact, flexible, fast and functional small industrial robot.		IRB 1200

Function	Device Photo	Device Name
Allows the processing of multiposition SMT components for rework and component insertion.		**RSA PL 550 A Precision Placement System**

٥ ـ **المعمل المركزي لتصنيع وقياس دوائر الموجات المليمترية:**

معمل متخصص في تصنيع دوائر الموجات الكهرومغناطيسية بدقة عالية تصل إلي 50µm وقياسها في المدي الترددي 10MHz حتي 110GHz.

Function	Device Photo	Device Name
Measuring MM-waves signals up to 110 GHz		**N5222B 4 Port 10 MHz to 110 GHz PNA network up to 1.5 analyzer**
Probing Solution for MMW, THz, and Load Pull Applications		**EPS150MMW Manual Probing Station**

Function	Device Photo	Device Name
Fabricating the electronic circuits designs and PCBs in the radio frequency range (RF).		**LPKF proto laser U4 PCB system**
Vector Network Analyzer 10 MHz – 110 GHz		**PNA-5244B with Extenders N5293AX01**
Manual Probing Station		**EPS150MMW**

تحليل وقياس المواد في صورها المختلفة (مسحوق، أفلام رقيقة) للتعرف على خصائص المادة المختلفة من تحديد الشكل البلورى للمادة، قياس شكل وحجم المادة.

Function	Device Photo	Device Name
- **Analysis of material phases in powder form** - **Analysis of material in thin films** - **Analysis of nanomaterials using X-ray with small-angle scattering (SAXS)** - **Determination of particle size and thin film thickness** - **Battery performance assessment using X-rays**		**XRD (SmartLab)**

معمل لتصميم وتطوير وتصنيع لبطاريات ايون الليثيوم ذات القياس العياري ١٨٦٥٠مم باستخدام تقنية النانو.

Function	Device Photo	Device Name
- **The equipment uses the motor to drive the stirring rod, and the stirring rod mixing the slurry in the tank.** - **This equipment is used in various kinds of lithium battery slurry and other kinds of mixed materials.**		**Vacuum Mixing**
- **This filter device is a special filter designed mainly used for laboratory samples. The whole machine is flexible and convenient to use**		**Slurry filter device**
- **This machine is mainly used For Lithium battery cylinder cell case grooving.**		**Grooving Machine**
- **It is a sealed container that is designed to allow one to manipulate objects where a separate atmosphere is desired.** - **It allows manipulation of substances that must be contained within a very high purity inert atmosphere.**		**Glove Box**

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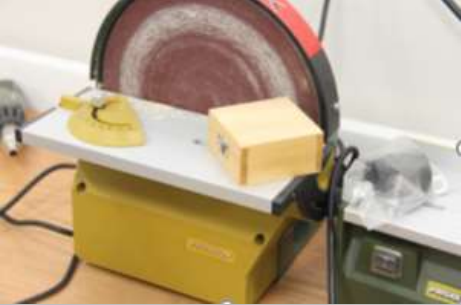|		
- This machine is specially designed and manufactured for battery electrode slitting. - The split width of the pole plate is determined by the upper and lower knife die.		**Slitting Machine**
- The ultrasonic spot welding machine is to convert the high frequency electric energy into vibration energy through transducer and effect on the workpiece. It produces high-frequency friction between the work-pieces surface until the surface heating and welding together.		**ULTRASONIC welding Spot Machine**
- This machine is mainly used for laboratory battery materials, small amounts of precious metals such as gold and silver materials, and Cu or Al nonferrous metal materials electric calendaring.		**Rolling Machine**

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- **It is mainly used in the sample production of laboratory battery material research and development for the scientific research sealing of cylindrical batteries and cylindrical capacitors, and can also be used for small batch trial production in factories.**		**Sealing Machine Or Pressing Machine**
- **The vacuum oven is mainly used For scientific research units, Such as laboratories, industrial mining enterprises, and universities and for the production field for materials drying and heat treatment under the vacuum state.**		**Vacuum Oven**

Function	Device Photo	Device Name
- **Three-dimensional design and output work for the shape of the product and mechanical design**		**Pro MacBook inch15-laptop**
- **A library containing a collection of design philosophy books and evaluation of ideas and products.** - **In addition to encyclopedias on raw materials, manufacturing methods and packaging**		**Library**
- **High-precision three-dimensional printing machine**		**Form 3D printer**
Machine for three-dimensional printing		**Raise 3D**

Machine for manual foam operation		Hot wire cutter THERMOCUT
High-precision operation system for grinding`, drilling and caving at speed -200 to 4000 rpm variable speed pre-selection of Resolution at altitude (accuracy of 0.05 mm). Digital speed indicator .		Proxxon Miller 4-axis
CNC Systems Precision with high repetition accuracy. Double cylindrical mounted. Recycle spherical spindles on all 3 axes and 3 powerful step motors. big travel distances: Z approximately 200 mm , Y-axis 100mm X-axis approximately 290mm, axle.		Proxxon Miller CNC 4-axis
Precision grinding machine for " laboratory technicians, opticians, jewelers, electricians/creators models		MICRO miller

For the operation of steel, copper, aluminum and plastic. For face and flipping, straight rotation And cut the thread. With a wide range of system accessories, you can also grind and drill		**Proxxon Precision lathe**
The axle is driven by two powerful gradient motors and recycled ball spindles.		**Proxxon Precision CNC lathe**
Manufacturing of cups, saucers, vases and columns for the dollhouse. In typical trains, One has to make light masts, windows and cabinets. Puppet limbs and hundreds of classic miniature rotation tasks can be easily performed.		**MICRO woodturning lathe**
Cut into steel, non-ferrous metals, wood, plastic. With reference guide.		**MICRO bandsaw**

Long edges of sand (sandpaper), end sections, radius, meter, fine flat surfaces at right angles.		**Disc sander**
For clean and safe cutting along non-ferrous metals, plastics and wood.		**Cut off/mitre saw**
For precise work: drilling holes		**Bench drill press**
Precision device for parallel drilling, cutting and screwing.		**Drilling device**
Sharpening drill bits with a diameter of 3 to 13 mm, with standard angle of 118 degrees		**Drill sharpener**

Precision instrument for precision mechanics and modeling: pressure inward, press-out, installation, Printing, edges, bending wires and plates. Embossing, beads and crimps from easy-to-form materials		**MICRO-Press**
For 50mm discs and brushes. With electronic speed control from 8 to 24 m / s.		**Grinding and polishing machine**
For processing the surfaces of precious and non-precious metals as well as plastics. For standard brushes and inserts up to 4 inches or 102 mm.		**Polishing machine**
460 mm arm! Ultra-light magnesium saw arms reduce weight mass that is almost stirred. 40% compared to die-cast aluminum for smooth operation and clean cutting.		**2-speed scroll saw**
For soft thickening, vibration-free for hard and soft woods.		**Thicknesser**

Description	Image	Name
To engrave letters, numbers and individual shapes.		**Engraving device**
To work with an open flame or with a catalyst unit with transformers. Welding, hot cutting and burning wood and shrink sleeves.		**MICROFLAM gas soldering set**
For drilling, grinding, polishing, polishing, cleaning, carving and drilling.		**Precision drill/ grinder**
For carpenters, modelers, artistic wood sculptors. With cast aluminum gear head.		**Motor-driven carving device**
For grinding and finishing steel, non-ferrous metals and stainless steel surfaces.		**Cylinder sander**
The sanding belt towards the left allows sanding at right angles. Precise adjustment of rollers It prevents the belt from rolling sideways.		**Belt Sander**

For grinding surfaces in very narrow spaces. With hook and loop fastening for quick abrasive change.		**Delta sander**
Ideal for narrow curves in wood (up to 12 mm), computer cards up to 5 mm, and metal From various non-ferrous Super-Cut pitches up to 3 mm. Complete with 4 saw blades For wood, plastic, metal		**Super jig saw**
For shape finishing, mortising, soft polishing (flat surfaces). Also to remove metal holes and remove paint and soft finishing.		**Belt sander**
Steel mill, non-ferrous metals, glass, ceramics, wood, plastic. To cut Wood, machined with coarse cutting, grinding and carving.		**angle grinder**
for ideal surfaces even in confined spaces: for finishing empty surfaces, cleaning, rust removal, For the "finishing touches" after polishing.		**Angle Polisher**

For cutting wood, plastic, fiberglass reinforced plastic, paper, cardboard and foil and similar materials. With a cutting width of 0.5 mm.		**MICRO-Cutter**
For work on surfaces in cavities, holes and small corners. Linear stroke (non-rotary)		**Pensander**
Used in welding, desolation, copper welding, heating workpieces, canning.		**MICROFLAME burner**
For shrinking sleeves, forming and welding plastics, welding and desolding electronic components.		**MICRO heat gun**
Fast and reliable gluing of metal, wood and plastic (including plexiglass), Glass, ceramics, stoneware, cardboard, leather, polystyrene foam, textiles.		**MICROMOT glue gun**

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Carbon dioxide lasers are adapted to cut non-metallic materials, such as textiles. Laser cutting achieves crystal clear edges. can create cardboard prototyping or MDF		trotec laser cutter
Laser engraving is a process of selective removal of the layers of materials, thereby creating visible markers on the operating surface.		Yueming laser fiber
The flexible column device is used for many functions including milling, edging , and carving and engraving, inlay stones and polishing almost any material.		Foredom Flex shaft rotary tool
Paint machine used for painting non-metallic surfaces		Iwata AIRBRUSHES & SPRAY GUNS
Machine used in painting metal surfaces		Electrostatic painting machine

Glass spraying machine		Sand blast
A machine used to clean the internal parts of artifacts		Ultrasonic cleaner
Microscope Laser Precision Welding Machine		Laser spot welding
Laser welding machine		Laser welding
Welding Machine		Tig welding
Welding machine by water atom separation		HHO welding

Camera for photographing products and models		**Canon Camera**
Lighting Equipment		**Light equipment**
Audio recorder		**Zoom sound recorder**

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ثانياً: المعامل المتخصصة

Function	Device image	Device name
Employing a rotating magnetic field to cause a stir bar (also called "flea") immersed in a liquid to spin very quickly, thus stirring it.		Heat sensor Magnetic stirrer
The Emax is an entirely new type of ball mill for high energy milling. The unique combination of high friction and impact results in extremely fine particles within the shortest amount of time.		High Energy ball milling
The use of microwave irradiation is an efficient tool for nanocrystal synthesis. It can be used to increase the temperature of the sample up to 300oC and the pressure up to 30 Par according to the required specifications and time of operation.		Monowave300 (Microwave Reactor)
PECVD is a chemical vapor deposition process used to deposit thin films from a gas state (vapor) to a solid state on a substrate. Chemical reactions are involved in the process, which occur after creation of plasma of the reacting gases.		Plasma Enhanced Chemical Vapor Deposition (PECVD)
Used in thin film gross on different substrate.		Magnetron sputtering system

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In this ball milling, the powder mixture is subjected to high-energy collision from solid balls.		3 Grinding Ball Milling
It is a sealed container that is designed to allow one to manipulate objects where a separate atmosphere is desired. It allows manipulation of substances that must be contained within a very high purity inert atmosphere.		4 Gloves system
Muffle furnaces are most often utilized as a compact means of creating extremely high-temperature heat treatment		Muffle Furnace
It is used to dry or heat materials. A vacuum oven uses a vacuum pump to lower the atmospheric pressure inside the chamber. To avoid oxidation, an inert gas (e.g. nitrogen) can be fed into the chamber.		Vacuum Oven with Gas Flow-meter
It is an equipment that puts an object in rotation around a fixed axis (spins it in a circle), applying a potentially strong force perpendicular to the axis of spin (outward) for separating and filtrating different particles with different densities		Centrifuging System

Used in sonochemistry synthesis of nanosize compounds. Typical application includes homogenization, nanomaterials like metal oxides, nanoclays or carbon nanotubes which tend to be agglomerated when mixed into a liquid.		UP400-S Ultrasonic Power Sonicator
Spin coating is used for many applications where relatively flat substrates or objects are coated with thin layers of material.		Spin Coater
It is a device for measuring wavelengths of light over a wide range of the electromagnetic spectrum. It is widely used for spectroscopic analysis of sample materials. The incident light from the light source can be transmitted, absorbed or reflected through the sample.		Spectrometer
Provide Essential Functionality and Solid Performance. Every lab needs a balance that combines essential weighing functions with ease of use to deliver accurate, reliable results day after day		Mettler Toledo - ME-TE Analytical Balance
It can be used to polish different substrate materials.		Polishing machine

It has a unique driving system to produce a smooth coating on all types of materials. Used for researchers on ceramic tape castings for Li-Ion battery and Supercapacitor electrode coating		**Automatic thick film Coater**
The resulting discs can be used as electrode/separator discs of the split test cell and coin cell for battery and supercapacitors		**Heavy Duty Disc Cutter**
A compact pressure adjustable electric crimper for CR2016, CR2025, and CR2032 coin cells.		**Digital Pressure Controlled Electric Crimper**
300x Microscope with digital camera and aiding software It uses focused light and lenses to magnify a specimen.		**Microscopy**

Used to print different circuit pattern with different solution mixtures and fine precision dots, lines, and curves.		**Micro-plotter**
Used in drilling or engraving in different substrate materials.		**CNC Machine**
used to measure and characterize the electrochemical analysis of different applications such as sensors, supercapacitors and batteries.		**Potentiostat VSp300**
It is a type of local ventilation device that is designed to limit exposure to hazardous. It protects researchers by Containing vapors, dusts, gases, and fumes generated within the hood, and removing them as air flows into the hood and then out via the laboratory exhaust system.		**Fume hood**

Function	Device image	Device name
Screen system with different mesh screens 5 and 30 Microns. Can be used to filter fine materials based on the powder size.		Screen system

٢ـالمعمل المتخصص للحوسبة السحابية

Function	Device image	Device name
The HPC (CPUs only) subsystem consists of 11 powerful servers that supports the following features: 1- Parallel Processing - Total of 22 cutting-edge CPUs with total number of 528 cores ensuring exceptional computational performance. - Supports industry-standard HPC software libraries and compilers (OpenMP, MPI), coupled with custom optimizations, to maximize CPU performance across all cores. - The network infrastructure is equipped with high-speed interconnects		HPC (CPUs)

up to 100GbE , enabling efficient communication between the nodes of the cluster.

- Slurm job scheduling and resource management systems is utilized to allocate resources efficiently, minimizing wait times for users.

2- Jupyter

- JupyterHub is a powerful platform that provides an environment where users, such as students, researchers, and data scientists, can access HPC system resources and work on their projects without having to worry about the complexities of installation and maintenance tasks.
- Current provided jupyter kernals:
  - R on Kubernetes
  - Python+Spark on Kubernetes
  - Bash via SLURM
  - Python on Kubernetes
  - Python 3.7 via SLURM
  - Bash on Kubernetes

3- Containers

- Containers enable software engineers

to program in a consistent environment. - **Containers allow them to write applications once and run them everywhere in the cluster.** **MATLAB**		
The HPC (CPUs & GPUs) subsystem consists of 5 powerful servers that supports the following features: **1- Parallel Processing** - **Total of 5 NVIDIA GPU nodes, providing an aggregate 12800 NVIDIA Tensor Cores for maximum computational power.** - **Total of 10 CPUs with total number of 200 cores.** - **NVIDIA GPU clusters with their CUDA cores are applied across various domains, including scientific research, AI and machine learning, healthcare (medical imaging), autonomous vehicles, and finance, for accelerated parallel processing tasks depending on popular frameworks like TensorFlow, PyTorch..etc.**		**HPC (CPUs + GPUs)**

- Users can deploy Hybrid application using CPUs and GPUS with highly available packages and libraries in the HPC system.

2- Jupyter

- JupyterHub is a powerful platform that provides an environment where users, such as students, researchers, and data scientists, can access HPC system resources and work on their projects without having to worry about the complexities of installation and maintenance tasks.
- Current provided jupyter kernals:
- R on Kubernetes
- Python+Spark on Kubernetes
- Bash via SLURM
- Python on Kubernetes
- Python 3.7 via SLURM
- Bash on Kubernetes

3- Containers

- Containers enable software engineers to program in a consistent environment.
- Containers allow them to write applications once

and run them everywhere in the cluster.		
4- MATLAB		
- **Proxmox Virtualization Environment:** - **Complete, open-source platform for enterprise virtualization.** - **Two virtualization technologies are supported: KVM hypervisor & Linux Container (LXC).** - **Easy management with web-based user interface & CLI.** - **High-Availability (HA) Cluster Manager.** - **Live/Online Migration.** - **Integration of Proxmox Backup Server** - **Built-in services: firewall, backup/restore, storage replication, etc.** - **Open-source license.**		**Proxmox Virtual Environment**
Storage System: - **Store all HPC data.** - **Scale-out network attached storage (NAS) solution.**		**Storage System**

Backup System: - **Provide all Backup capabilities for the whole HPC system.**		**Backup System**
Centralized System of VMware: - **VMware is a leading provider of visualization and Cloud computing.** **Provide a powerful VMs with multi vCPU and vGPUs, and this maintains more flexibility in provisioning more virtualized resources.**		**Centralized System of VMware**
Centralized System of Ansys: - **ANSYS is a leading provider of engineering simulation software and services, offering a wide range of tools and solutions to help engineers and organizations simulate, analyze, and optimize their products and systems across various industries.** - **Provide electromagnetic simulation tools for analyzing electromagnetic fields, antenna**		**Centralized System of Ansys**

design, electromagnetic interference (EMI), and electromagnetic compatibility (EMC). These tools are essential in industries like electronics, telecommunications , and automotive.	45	

ثالثاً: المعامل البحثية

Microelectronics Department

Integrated Circuits lab

Device Tests	Device image	Device name
It is able to sample, store, and display higher-frequency signals. One million waveforms per second update rate MegaZoom IV smart memory technology.		Digital storage oscilloscope Agilent model DSOX3014A
Thickness and refractive index can be measured in less than a second.		Thin film surface profiler model F20EXR with contact probe CP-1-1.3.
Attach Micro-chips to a pack through wire bonding Ultrasound-cold wire welding		Wire bonder tpt wire bonder hb10.
Supports Remote Programming and has a Real Time Wave Display		Programmer DC power supply model spd3303x

Measuring of both low and high impedance ranges for components and materials.		**E4980A Agilent LCR Meter**
RF Vector Signal Generator offers mid-range performance and up to 200 MHz modulation bandwidth - This instrument complement other leading mid-range RF test solutions from Tektronix, such as the USB-based RSA306 Spectrum Analyzer and MDO4000B and MDO3000 Mixed Domain Oscilloscopes		**Analog Signal Generator 6 GHz (TSG4104A: E1)**
Enables viewing an entire system behavior - analog, digital, and RF, time-synchronized to understand its true behavior, Frequency range of the Mixed Domain Oscilloscope up to 6 GHz.		**Mixed Domain Oscilloscope (Tektronix MDO4104C-SA6**
Accelerate research, reliability and failure analysis studies of semiconductor devices, materials and process development with the 4200A-SCS. The highest performance parameter analyzer, it delivers synchronizing current-voltage (I-V), capacitance-voltage (C-V) and ultra-fast pulsed I-V measurements.		**Keithley 4200A-SCS Parameter Analyzer**

Microelectronics Systems Lab

Device Tests	Device image	Device name
Create a hardware circuit design that generates specific outputs. Enables designers to investigate and experiment with features of Virtex-5 LX FPGAs.		Xilinx ML501 Evaluation Platform
Measure timing relationships using 4 GHz (250 ps) timing zoom.		Logic Analyzer for Tracking Real-time System Operation (Agilent 16800)
Measure DC/AC voltage, DC/AC current, 2- and 4-wire resistance, diode, continuity, frequency, and period		Digital Multimeter, 6½ Digit (Keysight 34401A
Self Test and Software Calibration.		PPS-3635 Single Output Programmable Linear D.C. Power Supply

Computers and Systems Department

Biomedical Engineering and Systems Lab

Device Tests	Device image	Device name
-Calibration services. Able to test four basic defibrillator performance characteristics: discharge energy, synchronized-mode operation, automated external defibrillation, and ECG monitoring.		Defibrillator Analyzer (Uni Pulse)
- Calibration services. Conduct the full range of flow, pressure, volume and interval tests on practically any fluid delivery system including single-rate, dual rate, and patient-controlled analgesia (PCA) devices.		Infusion Analyzer Infutest 2000E
Test, verify and calibrate ventilators. It measures bi-directionally flow, various pressures, temperature, humidity and O2 concentrations. The unique measuring modes for adult, pediatric and high frequency ventilators The oxygen sensor as well as all pressure and flow sensors and the Multi Gas Analyzer TM OR-703 can be calibrated from submenu. The offset calibration for pressure and flow can also be started by pressing the Zero! Button.		Flow Analyzer (PF-300)

Infrared cameras have a variety of biomedical applications, including: - **Thermography:** Infrared cameras can be used to capture images of heat patterns on the body's surface, which can provide information about blood flow, inflammation, and other physiological processes. This technology is commonly used in the diagnosis and monitoring of conditions such as breast cancer, arthritis, and sports injuries. - **Non-contact temperature measurement:** Infrared cameras can be used to measure body temperature without contact, which is particularly useful in situations where close contact might spread disease. This technology is commonly used in airports, hospitals, and other public places to screen for fever and other signs of illness. - **Surgical guidance:** Infrared cameras can be used to guide surgical procedures by providing real-time images of blood flow and other physiological processes. This technology is particularly useful in minimally invasive procedures, where surgeons need to rely on		**Thermal infrared camera**

imaging to guide their instruments. - **Wound assessment: Infrared cameras can be used to assess the healing of wounds by measuring changes in temperature and blood flow. This technology is particularly useful in the treatment of chronic wounds, such as diabetic foot ulcers.** **Overall, infrared cameras have a wide range of biomedical applications and are an important tool in the diagnosis, monitoring, and treatment of many conditions.**	52	

Digital Signal Processing Lab

Function	Device image	Device name
Professional-grade VR headset for Virtual Reality application with specifications: - **High Resolution Dual AMOLED 3.5" diagonal Screens 1440 x 1600 pixels per eye (2880 x 1600 pixels combined).** - **SteamVR Base Stations support Large-Scale Tracked Areas up to 5m x 5m.** - **Hi-Res Certified headphones.**		Vive Pro VR system full Kit.
Immersive enterprise Mixed reality Headset with specifications: Lightwear : 50° Field of View, 1280 x 960 pixel RGB per Eye Lightpack: 8GB RAM 128GB SSD Tracking: 6DoF (position and orientation), Touchpad.		**Magic Leap One Mixed reality headset.**
Key features: - **Four scan settings capture data in 7, 13, 30, or 75 seconds at 680,000 points per second** - **Rich High-Dynamic Range (HDR) imagery with 5 bracket HDR** - **Small and light, measuring 155x80mm and weighing just 850g with batteries** - **ive times faster than the BLK360 G1, taking**		Leica BLK360 Imaging Laser Scanner

20 seconds for a full-dome scan with photospheres - **Visual Inertial System (VIS) automatically pre-registers scans in the field** - **High-speed data transfer via USB-C and Wi-Fi.**		
A camera for shooting imagese 360, recording 3D video, and panoramic images 8K with specs: - **360 photos:** Maximum at 7680x3840 (8K) (real-time stitching OR post-processing stitching) - **360 videos** Maximum at 3840x1920@30fps (4K) (real-time stitching/live-streaming) Maximum at 7680x3840@30fps (8K) (post-processing stitching) - **360 3D photos** Maximum at 7680x7680 (8K) (real-time stitching OR post-processing stitching) - **360 3D videos** Maximum at 3840x3840@24fps (4K) (real-time stitching/live-streaming) Maximum at 6400x6400@30fps (6K) (post-processing stitching) Lenses 6 x F2.4 fisheye lenses		**Camera Insta360 Pro**
360 virtual reality glasses, Super AMOLED screen.		**Samsung Gear VR oculus**

Include Steam software API (application programming interface) to show virtual reality app. Through Vive Pro VR system full Kit		**MSI Laptop GS63VR STEALTH PRO (7th Gen) (GEFORCE GTX 1060)**
Included software for processing panorama and 360 pictures		**Lenovo Legion laptop**
portable, handheld 3D scanner		**Go-Scan handheld 3D scanner**
Acquiring analog and or digital signal from any input device or sensor and processing it. DSK, TMS320C6416T.		**Texas Instruments DSP board**

Photovoltaic Cells Department

Technology of Photovoltaic Cells and Energy Storage Lab

Function	Device image	Device name
Used to make thin-film of dual, triple and quadruple semi-conductor materials to manufacture second and third-generation solar cells.		VTC-100 Vacuum Spin Coater for Film Coating
Used to cut round tablets from thin metal sheets/foils less than or equal to 0.3mm (e.g. copper and aluminum) or separator film (< 30mm). The resulting tablets can be used as electrode tablets for coin cell of batteries and super capacitors.		Heavy Duty Disc Cutter
This machine can be used in the coating of chemical materials to manufacture battery electrodes and super capacitors.		Automatic Film Coater

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وزارة التعليم العالي والبحث العلمي
MINISTRY OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH

معهد بحوث الإلكترونيات
Electronics Research Institute

The device compresses and presses the coin batteries for obtaining a test and measurable cell.		**Digital Pressure Controlled Electric Crimper**
Used to grind and mix a small batch of chemicals and compounds automatically to manufacture battery electrodes and super capacitors.		**Desktop Grinder w/ 5" Agate Mortar**
Carrying out full in door electrical tests for the PV panels through simulating the sun		**Sun simulator**

Photovoltaic Systems and Applications Lab

Function	Device image	Device name
Used to measure the power quality of the electrical network and its impact on energy bills. It is also used to measure efficiency of the PV power inverter		Power quality analyzer
Used for laboratory simulation of modern technologies for smart electrical networks/grids that use renewable energies.		Smart Grid Lab
Used for control systems development and simulating power systems		Hil in the loop
Used with MATLAB software for control development, testing, and data acquisition in academic and industry labs		Micro lab box
Used with MATLAB software for control development, testing, and data acquisition in academic and industry labs		dSPACE 1104

Used to supply, simulate, and operate the electronic circuits.		Multi-function power supply
Used to measure the global solar radiation		Pyranometer
Used to measure the direct solar radiation		Pyrheliometer
Used for outdoor testing and measuring the characteristic curves of PV panels		IV Curve Tracer

A controllable AC programmable source used to study the various electrical faults that are difficult to study practically on the electrical network.		**Programmable AC Source**
Programmable electronic AC/DC load used in experimental setup and practical experimentation		**AC/DC programable load**
Used to measure the power quality of the electrical equipment.		**Digital Power Meter**

Microstrip Circuits Department

RF Wireless Mobile Systems Lab

Function	Device image	Device name
S-parameter Vector Network Analyzer, 10MHz to 67GHz Measurements		Rohde & Schwarz ZVA67
S-parameter Vector Network Analyzer, 50MHz to 13.5 GHz Measurements		KEYSIGHT 8719ES
Portable S-parameter Vector Network Analyzer, 50 MHz to 26GHz Measurements		Agilent Technology N9918A (portable VNA)
Time domain measurements spectrum		Real-time digital phosphor oscilloscopes Tektronix

Flux meter measures total flux, flux density, magnetic field strength Manual magnetic testing, Automated magnetic testing, Magnetizing, Material analysis, AC magnetic fields		Lake Shore Model 480 Flux meter
Broadband signal generator covers audio, HF, VHF, UHF, RF and microwave frequencies from 0.1 Hz to 70 GHz		MG3697C - Anritsu Signal Generator
- Utility designation - Concrete inspection - Mining and geology - Environmental assessment - Archaeology - Forensics		SIR 4000 Rugged, High-Performance GPR Controller
Fast & Precise Measurement System for Dielectric Characterization of Materials		Dielectric Assessment Kit (DAK)
Measuring - Radiation pattern in any polarization (linear or circular) - Gain - Directivity - Beam width - Cross-polar discrimination - Side lobe levels - 1D, 2D, 3D radiation patterns - Antenna efficiency		Anechoic chamber Antenna radiation characteristics

Specifications	Image	Name
Sine, Square, Triangle, Pulse and Ramp Output Variable Duty Cycle and DC Offset Coarse and Fine Tuning Linear and log sweep		10 MHz Sweep Function Generator Model 4017A
Power meter with - Frequency range of 9 kHz to 110 GHz (sensor dependent) - Wide dynamic range of -70 to +44 dBm (sensor dependent)		N1914A EPM Series Dual-Channel Power Meter
Generating RF signal with frequency range of 250 kHz to 6400 MHz, output-power range of -75 to +10 dBm		Synthesized Signal Generator SSG-6400HS
Radar investigations of different objects and media, measurement of complex permittivity; GPR investigation; Live object detection (including search behind the walls, under ruins)		Digital Sampling Converter GZ10

Microwave Engineering Department

Microwave Engineering Lab

Function	Device Image	Device Name
Analyze vector signal in the frequency range (10 Hz to 44 GHz)		Vector Signal Analyzer N9010A 10 Hz to 44 GHz
Generate Vector signals in the frequency range (100 kHz to 44 GHz)		Vector Signal Generator E8267D 100 kHz to 44 GHz
4.6 Gsa/s arbitrary waveform generation with the capability of 2 GHz IQ modulation bandwidth		81180B 4.6 GSa/s Arbitrary Waveform Generator 2 GHz IQ modulation bandwidth
Analyzing vector network in frequency range (10 MHz – 6.5 GHz)		Vector Network Analyzer N9918A 10 MHz – 6.5 GHz
Oscilloscope for time domain measurements (2.5 GHz)		High-Performance Oscilloscope Lecroy Model Wavepro 725Zi, 2.5 GHz oscilloscope for time domain measurements

Analyzing the spectrum of electrical signals in the frequency range (9 kHz – 13.5 GHz)		Spectrum Analyzer Anritsu Model MS2830A, 9 kHz-13.5 GHz
Measuring the power of microwave signals in the frequency range (10 MHz – 26.5 GHz)		Power Meter 4231A 10 MHz –26.5 GHz
Measuring the radiation hazard of electromagnetic waves in the frequency range (10 MHz – 8 GHz)		Radiation Hazard Meter EXTECH480846 10 MHz – 8 GHz
Anechoic EM Test Chamber		Anechoic EM Test Chamber
Measurement of low-frequency electric / magnetic fields		Trifield Meter Less EMF Inc. 30 Hz – 500 Hz Electric

Photonics and Optical Communications Lab

Function	Device Image	Device Name
Tunable Laser Source with wavelength range (1520-1630 nm)		**Tunable Laser Source dBm Optics (4200-680-MP) Wavelength Range (1520-1630 nm)**
Laser sources at constant wavelengths (635, 675, 780, 1310 nm)		**SIFCXXXX, ThorLabs 635 ,675 ,780 ,1310 nm**
Analyzing the spectrum of optical signals in the wavelength range (600 – 1700 nm)		**Optical Spectrum Analyzer Advantest: Q8384 600 – 1700 nm**
Analyzing optical dispersion and loss – Analyzing chromatic dispersion in optical fiber networks		**Modular Network Tester Agilent N3900A Optical Dispersion and Loss Analyzer Chromatic dispersion Analyzer**
Analyzing optical polarization in the wavelength range (1300 – 1700 nm)		**Optical Polarization Analyzer ThorLabs: PAX5710IR3 1300 – 1700 nm**

Tunable laser filter in the wavelength range (1530 – 1610 nm) with bandwidth range (0.1 – 13 nm)		**Tunable LASER Filter AlnairLabs: CVF- 200CL 1530-1610 nm BW : 0.1-13 nm**
Measuring the power of optical signals in the wavelength range (400 – 1800 nm)		**Optical Power Meter ThorLabs 400 – 1800 nm**
Analyzing the spectrum of optical signals in the wavelength range (350 - 1100 nm)		**THORLABS Optical Spectrum Analyzer OSA201C 350-1100 nm**

Power Electronics and Energy Conversion Department

Power Electronics Applications lab

Function	Device image	Device name
Measuring and analyzing the electrical power of all devices feeding electrical loads such as (Inverters, Rectifires, Convereters). And also measure the torque and speed of electric motors. (Subject to availability of special equipment)		Hioki 3390
Measurement and analysis of the electrical power of AC power supply sources only for factories.		Hioki PW3196
Measurement and analysis of electrical power of AC power supply sources (single phase) Single-Fas Power Quality Club Meter		Fluke 345
200MHz, 4-Ch, 2 GS/s Digital Storage Oscilloscope		Tektronix TPS2024B

Vibration Research		**VR9500**
dSPACE Microlab Box - (2 GHz dual-core real-time processor and user-programmable FPGA - **More than 100 channels of high-performance I/O with easy access via integrated connector panel** - **Dedicated electric motor control features and interfaces for Ethernet and CAN bus)**		**Real Time Control Prototype Platform**
(RT-LAB /Rapid Control Prototyping (RCP) and Hardware-in-the-Loop (HIL)) - **High-performance Real-time.** - **High-speed Connectivity.** - **Open and Optimized for Power Electronics**		**OPAL 4510**
(HIL Controller and Data Acquisition Interface) Compact, Portable and Large Number of Robust I/O Channels. It is also designed to be used with a real-time simulator (such as OP-4510) to provide supplementary signal conditioning.		**OPAL-8660**

Energy Conversion Applications Lab

Function	Device image	Device name
Portable Oscilloscope 200MHz, 4-Channel, 2.5 GS/s ScopeMeter Built-in Digital Multimeter		**Fluke 190-204/AM**
Digital Phosphor Oscilloscope 100MHz, 4-Ch		**Tektronix TDS3014C**
True-RMS AC Clamp Meter, 600V/1000A with Frequency		**Hioki 3286-20**
Lux tester		**Hioki 3423**
Measuring Non-Contact Infrared Thermometer, Long Focus, Precise-Field Type		**Hioki FT3701-20**

Industrial Control and Automation Lab

Function	Device image	Device name
Practical Applications using PLC **Motor Operation using Two Pushbuttons** **Forward-Reverse Direction of Motor** **Start-Stop of Motor using only one Pushbutton** **Flicker lamps** **Operation and control of two conveyers** **Drilling Machine Project** **Automatic Escalators Project** **Production Line Project** **Mixer Project** **Automatic Garage Door** **Sequence of operation of three motors**		**S-7 1200 PLC Programming Kits Elevator Simulator**
Practical Applications using PLC **Construction site traffic light** **Star-delta starting** **Dahl Ander circuit** **Start control** **Monitoring installation** **Tank filling system** **Flood gate control** **Transfer platform** **Buffer storage tank** **Filling level controlled system** **Mixing system and much more** **7-segment displays All experiments and programs are carried out in lab facilities as shown below**		**S-7 1500 PLC Programming Kits With experiments masks**

العنوان:	شارع البحث العلمى من جوزيف تيتو، النزهة الجديدة، القاهرة، مصر
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الفاكس:	٠٢٢٦٢٥٢٧٠١ ٠٢٢٦٢٥٢٧٠٢
الرقم البريدىى:	١١٨٤٣