K.S.RANGASAMY
COLLEGE OF TECHNOLOGY
AUTONOMOUS | TIRUCHENGODE

30 Years of
Educational Excellence
in Engineering

CENTRE FOR

RESEARCH & DEVELOPMENT

AICTE IDEALab

A++ GRADE

RESEARCH FACILITIES...

UV - VISIBLE SPECTRO PHOTO METER (UV-VIS)

Make: Aligent Tech **Model:** 8454 G

Specifications:

- Liquid samples only analyzed. For solid sample (powders, crystals) analysis, samples must be sonicated with suitable solvent to get uniform dispersion.
- Tungsten and Deuterium lamps are used as light sources.
- Analysis can be performed from 180 nm to 780 nm ranges in electromagnetic spectrum.
- Final spectra data is depicted as graph between Wavelength and absorbance of nanomaterial.

Purpose

Optical absorption of Nanomaterials

FLUORESCENCE SPECTRO PHOTO METER (PL)

Make: Aligent Tech **Model:** 8454 G

Purpose

Photonic Exicitation and Luminiscense

Specifications:

- Liquid and thin film samples can be analyzed. Powder samples should be dispersed with suitable solvent.
- He-Cd laser (325 nm) and xenon lamps used as light sources.
- Excitation spectra (Photoexcitation) can be performed from 190 nm to 800 nm.
- Emission spectra (Luminescence) can be measured from 190 nm to 1000 nm.
- Final PL result gives the intensity of emitted photons as function of stimulated wavelength (nm)

ATOMIC FORCE MICROSCOPY (AFM)

Make: Innova **Model:** SPM System

Specifications:

- Thin films, Coated materials and fabricated fibers can be analyzed. Powder sample should be pelletized.
- Sample size should be 10 mm x 10 mm.
- Surface morphology, Roughness and Topographical images can be measured.
- Highest resolution optics deliver better data and accurate probe positioning
- Full range of SPM modes provides powerful research flexibility

Purpose

Surface 3D Characterization

NANO INDENTATION

Make: Hysitron **Model:** TI-700

Specifications:

- Nanoindentation testing, is a variety of indentation hardness tests applied to small volumes
- It enables quantitative mapping of nano-mechanical properties
- Elastic modulus and hardness can be determined by Nanoindentation

Purpose

Optical absorption of Nanomaterials

FOURIER TRANSFORM INFRARED SPECTROSCOPY (FTIR)

Make: Perkin Elemer **Model:** Spectrum 100 Kbr System

Purpose

Functional Group Identification

Specifications:

FTIR:

- Powder samples can be analyzed through pelletizing with KBr
- Tungsten-halogen lamps are used as light sources
- Spectral Ranges: Wavenumbers 400 - 4000 cm-1, Transmittance range is 100 %

ATR-FTIR:

- Solid samples (Thin films, crystals, Fabricated materials) can be analyzed
- Spectral Ranges: Wavenumbers 600 - 4000 cm-1, Reflectance range is 100 %

MICRO VICKERS HARDNESS TESTER

Make: Shimadzu **Model:** HMV G2IST

Specifications:

- Solid samples (Thin films, Coated plates, Fabricated fiber) can be analyzed
- Minimum sample size is 10 mm x 10 mm
- Maximum 2 Kg (19.61 N) can be applied to sample surface
- Optical microscope images can be captured with intended marks

Purpose

Micro / Macro - Mechanical Properties

ELECTROCHEMICAL WORKSTATION (AUTOLAB)

Make: Metrohm **Model:** TI-700

Specifications:

- Two cell and Three cell setup used for analysis
- Powder samples can be either coated or pelletized
- Ag/AgCl - Reference electrode, Pt - Counter electrode, Sample - Working electrode
- Acid, Neutral and alkaline solutions can be used as electrolyte
- Impedance, Corrosion and Charge-Discharge properties can be measured

Purpose

Optical absorption of Nanomaterials

CONTACT ANGLE

Make: Data Physics **Model:** DCAT IIEC

Specifications:

- Contact angle meters allow direct measurements of surface tension, interfacial tension and contact angles
- It quantities the wetability and surface tension of a solid surface by a liquid
- To measure the relative amounts of adhesive (liquid-to-solid) and cohesive (liquid-to-liquid) forces acting on a liquid
- Learning the operation mechanism of contact angle

Purpose

Indication of the wettability Nature

SPIN COATING

Make: Sawatec **Model:** SM 180BT

Specifications:

- Uniformly dispersed or homogeneous solutions with proper viscous condition needed.
- Flat and clean plates (Glass plates or Metallic substrates)
- Substrate size 10 mm x 100 mm
- RPM - 100 to 6000 rpm
- Time - 30 to 300 secs

Purpose

Coating Process

BALL MILL

Make: Retsch **Model:** PM100

Specifications:

- One grinding station with 500 mL Zirconia jar and Balls.
- Samples: Powders / solids with size < 10 mm
- Grinding speed: 100 to 650 rpm
- Adjustable Operating conditions: Speed, Rest time, total running time
- Result: Fine nanoparticles with less than 100 nm size

Purpose

Synthesis Process

ENERGY DISPERSIVE X-RAY ANALYSIS

Make: Shimadzu **Model:** EDA720

Purpose

Elemental Analysis

Specifications:

- Solid, powder and liquid samples can be measured in air and vacuum.
- Measurement of Chemical elements from Na (Sodium) to Uranium (U)
- Liquid nitrogen is used as a cooler for the X-ray source and Detector
- Qualitative and Quantitative measurements are performed separately
- Large sample holder with automatic open and close doors
- The result concludes with the total number of elements present and % of elements present

PARTICLE SIZE ANALYSER

Make: Sympatech **Model:** Nanophox

Specifications:

- Sample type: Liquid, Powder can be liquified with suita solvent using sonicator.
- Particle sizes ranges from 1 to 500 nm can be measured.
- Commonly used solvents: Distilled Water, Ethanol and Acetone
- Size measurement repeated for five time by default.
- He-Cd laser used as source.
- Result depicts with average size distribution

Purpose

Particle Size Measurement

THERMO GRAVIMETRIC-DIFFERENTIAL THERMAL ANALYZER (TG-DTA) / DIFFERENTIAL SCANNING CALORIMETRY (DSC)

Make: Linseis **Model: STA PT 1600**

Specifications:

- Powder and solid samples can be analyzed.
- Measurement temperature extends up to 1600-degree Celsius.
- Measurement includes Exo and Endo thermic reactions.
- Highly sensitive balance and Platinum crucible used for analysis.
- Quick response detector used for DSC and DTA measurements.
- Results contains temperature dependent TG, DTA and DSC reports.

Purpose

Thermal Analysis

DC - SPUTTRING UNIT

Make: Vacutech **Model:** 12' Magnetron

Specifications:

- A metal precursor is only used
- Maximum 300W power can be applied
- Heating arrangement maximum up to 400°C with substrate rotation facility
- The base substrate may be a glass plate, ITO, FTO and metal plates
- High vacuum line, Pneumatic ON/OFF valves. Auto throttle valve with pressure-controlled system
- Vacuum better than 10-5Torr. based Diffusion pump back by Rotary Vacuum pump, Penning Pirani vacuum gauges
- Commonly used for solar cell fabrications

Purpose

Coating Process

PILOT MODEL SPRAY PYROLYZER

Make: SM Scientech **Model:** Pilot plant

Specifications:

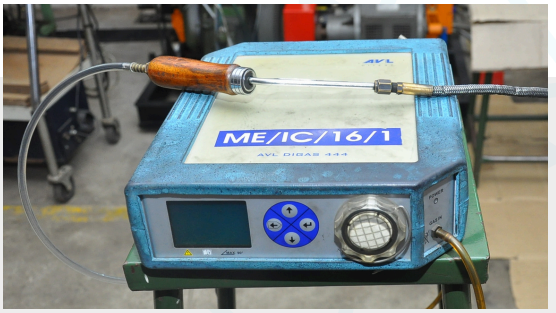
- Precursor should be solution type
- Precursor: 3 – 6 litre of precursor solution can feed per hour
- Heating range: 200 – 800 °C
- Maximum 0.5 Kg - 1.5 Kg nanoparticles can be prepared
- Nanoparticles with 2 - 20 nm can be produced.
- Part of the equipment can be removed for cleaning purposes.

Purpose

Synthesis Process

DIGAS GAS ANALYZER

Make: AVL **Model:** 444



Specifications:

- Measure the composition and concentration of gases in a given sample
- Application - For Diesel, Petrol, CNG and Gas
- Analysis Time - 2 min
- Resolution Ratio - 0.001 FSN or 0.01 mg/m^3
- Detection Limit - 0.002 FSN or 0.02 mg/m3
- Measurement range - 0-10 FSN

Purpose

To improve safety, quality, and efficiency, and to monitor the process and emissions

CDAQ 9178 (DAQ CHASSIS 8 SLOT USB

Make: National Instruments **Model:** 781156-01

Specifications:

- 8-slot USB Compact DAQ chassis
- Compact DAQ I/O modules
- USB (Universal Serial Bus)
- Compact and rack-mountable design

Purpose

Providing a platform for modular data acquisition and control.

NI ELVIS –II + PROTOTYPE HARDWARE

Make: National Instruments **Model:** 780381-01

Specifications:

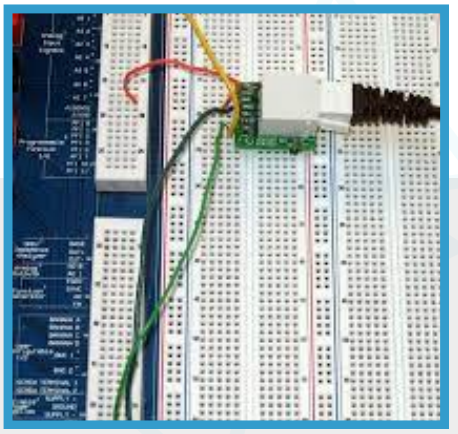
- DMM Fuse
- DMM Connectors
- Oscilloscope Connectors
- Function Generator Output/Digital Trigger Input Connector
- Prototyping Board Mounting Screw Holes
- 7 Prototyping Board Connection
- Prototyping Board

Purpose

The ELVIS platform combines various instruments and features to support a wide range of educational activities related to electronics, controls, and instrumentation.

VERNIER BIO INSTRUMENTATION SENSOR

Make: National Instruments **Model:** 1087



Specifications:

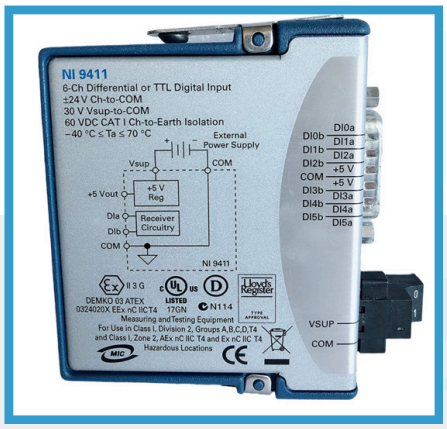
- Analog Proto board connector(s)
- Blood Pressure Sensor
- Hand Dynamometer
- Hand grip Heart Rate Monitor
- EKG Sensor

Purpose

Vernier bio instrumentation sensors is to collect accurate and precise biological data.

NI 9411 6 CHANNEL

Make: National Instruments **Model:**781156-01



Purpose

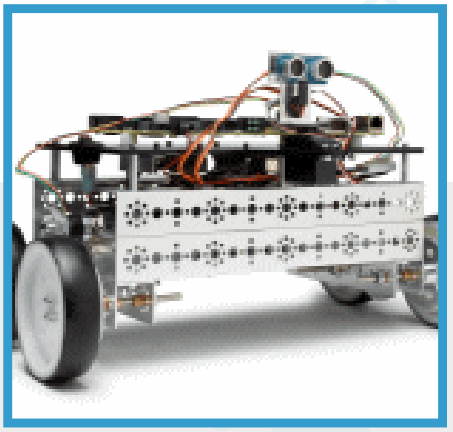
The NI-9411 provides connections for 6 digital input channels

Specifications:

- Channels: 6 digital input channels.
- Digital input channels are compatible with TTL, 3.3 V, 5 V, and 24 V logic levels.
- Compatible with various National Instruments data acquisition systems and platforms.

LABVIEW ROBOTICS SBRIO STARTER

Make: National Instruments **Model:** 9632



Specifications:

- Single-Board RIO (sbRIO) controller, which integrates an FPGA, real-time processor, and I/O modules.
- Power supply unit and necessary cables for powering

Purpose

The NI LabVIEW Robotics Starter Kit includes a robot that runs LabVIEW Robotics software on NI reconfigurable I/O (RIO) hardware to prototype and deploy autonomous applications.

THERMAL IMAGE CAMERA

Make:Flir **Model: T420**

Specifications:

- Thermal Image Camera with 1200 Deg Celsius
- Fault Identification in Insulation, High Voltage AC transmission, HVDC
- Power Quality Health Data in Real Time
- Estimation of Energy Loss cost specially caused by poor power quality

Purpose

Thermal Image Analysis

3D SCANNER

Purpose

Creating 3D CAD model of an object

Make: SHINING 3D **Model: EinScan Pro Plus 2X**

Specifications:

- Scan Accuracy: up to 0.05 mm
- Volumetric Accuracy: 0.3 mm/m
- Scan Speed:20frames/s; 1,100,000 pt/s
- Point Distance: 0.2 mm-3 mm
- Single Scan Range: 208 x 136 mm
- Depth of Field: ±100 mm Working
- Distance: 510 mm
- Align Mode: Markers Alignment

3D PRINTER

Make: CreatBot **Model: D 600 Pro**

Specifications:

- PrintTechnology:Fused Deposition Modeling (FDM)
- Build Volume:600x 600 x 600 mm
- Number of Nozzle:02
- Max. NozzleTemperature: 420°C
- Max. Bed Temperature: 100°C
- Max. Printing speed: 120 mm/s
- Filament Diameter: 1.75 mm

Purpose

Printing solid3D CAD model

VERTICAL MILLING CENTRE

Make: Jyothi **Model:** PX40

Specifications:

- Produce intricate cuts on hard materials and create quality products in less consumption of time with high rate using a preprogrammed code
- Table Travel: X=750mm,Y=400mm,Z=500mm
- Working Table Size: X=800 mm, Y=500mm
- Number of Tools: 50
- Maximum Spindle Speed: 5000 rpm
- Tool Holder: BT40

Purpose

To create holes in flat parts

PIN ON DISC WEAR TESTER

Make: DUCOM **Model:** TR-20LE

Specifications:

- Investigate and evaluate the frictional and wear properties of materials and lubricants under controlled and reproducible conditions
- Load Range - Up to 200 N
- Disc Speed - 200 to 2000 rpm
- Thickness - up to 8 mm
- Frictional Force - 0 to 200 N
- Wear Range - 0 to 1200 µm
- Wear Track Diameter - 50 to 100 mm
- Wear Disc Diameter - up to 165 mm

Purpose

To investigate the friction and wear behavior of material pairings

SMOKE METER

Make: AVL **Model:** 437

Specifications:

- Assess the level of smoke emissions from vehicle exhausts and ensure compliance with emissions regulations
- Measurement principle - Filter paper blackening
- Measured value output - FSN (filter smoke number),mg/m³ (soot concentration)
- Measurement range - 0 to 10 FSN
- Detection limit - 0.002 FSN or 0.02 mg/m³

Purpose

To detect and measure the amount of light blocked in smoke emitted by diesel engines

PCB PROTOTYPE MACHINE

Make: Enthu Technology **Model:** PCBMATE-300W

Specifications:

- Resolution (X/Y): 0.3125 Micrometre
- Working Area (X/Y/Z): 220x330x120 (mm)
- Min Width Line: 0.1mm (4 mil)
- Drilling: 0.2 -3.175mm (8-125 mil)
- Maximum Drilling Cycles/Min: 50
- Main Axle Rotating Speed: 30000 RPM
- Max working speed: 3500mm/min
- Repositioning accuracy: 0.01-0.02mm

Purpose

Engraving, Drilling and Masking PCB

TIG & MIG WELDING MACHINE

Make: KEMPPI **Model:** Minarc Tig 200 Evo MLP & X3 400

Specifications:

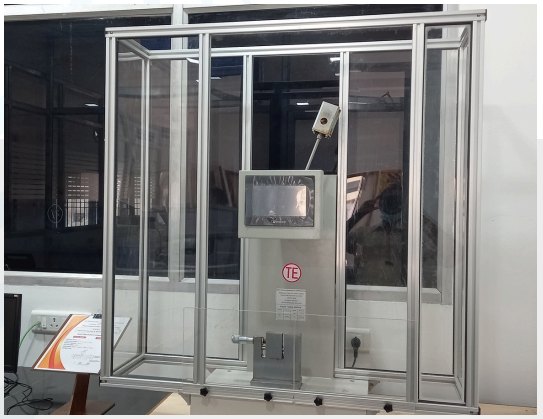
- Welding current range: 5-200A
- Welding voltage range: 10-18V
- Stick electrode sizes: 1.5-4.0 mm
- Weld Metal Thickness: up to 5 mm
- Welding current range: 25-400A
- Welding voltage range: 15-38V
- Wire Feeder; Wire diameter: 0.8-1.6 mm
- Weld Metal Thickness: up to 40 mm

Purpose

Aluminum, Copper, Steel, Nickel, etc.,
To melt and join pieces of metal

DIGITAL IZOD IMPACT TESTING MACHINE

Make: Jinan **Model:** TEXC-22D



Specifications:

- Evaluate impact properties of plastics materials as per ASTM D standards
- Capacity - 22 J
- Impact velocity - 3.5 m/s
- Pre elevation - 160°
- Gribs span - 40mm, 60mm, 70mm and 95mm

Purpose

To test impact toughness of hard plastic, GFPA, Fiberglass and other non-metal materials.

CNC WOOD ROUTER

Make: Easy Tech CNC **Model:** ET 8x4 Servo PCPTR

Specifications:

- Working area: 2440x1220 mm
- Z-Gantry clearance: 250mm
- Servo motors and drives on all axes
  Spindle: 5.5kW water cooled metal spindle (Permanent torque), 24000 rpm
- Rapid transverse speed: 25 meter/minute
- Max working speed: 15 meter/minute
- Rotary attachment: 3 ft long and 8" dia.

Purpose

Engraving, Cutting& Carving
Woods Engraving Aluminium & Granite

CNC PLASMA CUTTER

Make: Easy Tech CNC **Model:** ET8X4 PL CNC

Specifications:

- Working area: 2440x1200 mm
- Z- Gantry clearance:150mm
- Rapid transverse speed: 25 meter/minute
- Max working speed: 18 meter/minute
- Plasma: Thermal Dynamics,A80 - USA
- Output Range: 30-80 Amps
- Production Piercing: 1/2" (12 mm)
- Maximum Piercing: 3/4" (20 mm)

Purpose

Cutting steel & stainless steel plates

CNC TURNING CENTER

Make: ACE **Model:** JOBBER XL

Specifications:

- Maximum Turning Diameter: 270 mm
- Maximum Turning Length: 400 mm
- Distance between Centers: 425 mm
- Max. Boring Bar Diameter: 40 mm
- Spindle Size: A2-5
- Spindle Speed: 50-4000 rpm
- Spindle Motor Power Fanuc: 5.5kW/ 7.5kW
- No. of Turret Stations: 8

Purpose

Precision cutting of parts into cylindrical shapes

CNC VERTICAL MACHINING CENTER

Make: Jyoti **Model:** PX40

Specifications:

- Table Size: 915x460 mm
- Rapid Traverse: 25 meter/minute
- Cutting feed: 10 meter/minute
- Spindle motor speed: 8000 rpm
- Spindle Motor Power Fanuc: 7.5kW/ 5.5kW
- Spindle Nose: BT-40
- No. of Tools: 10
- Maximum Tool Diameter: 125 mm/89 mm

Purpose

Precision cutting of parts using vertical spindles

SINGLE CYLINDER FOUR STROKE DIESEL ENGINE TEST RIG ATTACHED WITH EGR

Make: MM Tools & Equipments **Model:** LS4A

Make: Kirloskar **Model:** AV1

Purpose

Diesel Engine Test

Specifications:

- Analyse the combustion, performance and emission characteristics of various fuels.
- Maximum speed - 1500 rpm
- Stroke length - 110 mm
- Bore diameter - 80 mm
- Brake power - 3.7 kW
- Compression ratio - 16.5:1

PH.D. PROGRAMMES

Biotech, Civil, CSE, IT, EEE, ECE, Mech, Mechatronics, Nano Tech, Textile, Chemistry, Mathematics

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