Coordination and participation in major research projects and other initiatives

MAJOR RESEARCH PROJECTS

- Renewable energy and ICT for energy sustainability
  (Project for the development of Smart Cities Living Lab in the cities of Syracuse, Riccione and Agordo)
- MISE/CNR research program for the innovation of the national electric system

INFRASTRUCTURE

- Test Centre for Energy Technology
- Testing room for the optimization of different classes of internal combustion engines
- Large size and in scale combustion reactors and plants
- Nuclear fusion: RFX machine, linear plasma machine (Gym) for the magnetic confinement of plasmas
- Naval basins among the largest in the world
- Test Track performance analysis for agricultural machinery
- Experimental Farm for the viticulture and forestry
- Pilot factories for footwear products customized for the de-manufacturing
- Experimental building for construction technologies
- Platforms for high-performance computing and data infrastructure

DIITET   www.diitet.cnr.it

DEPARTMENT OF ENGINEERING,
ICT AND TECHNOLOGIES
FOR ENERGY AND TRANSPORT

IAC - Institute for Applied Mathematics "Mauro Picone"
IASI - Institute for System Analysis and Computer Science "Antonio Ruberti"
ICAR - Institute for High Performance Computing and Networking
IDASC - Institute of Acoustics and Sensors "Orso Mario Corbino"
IEIIT - Institute of Electronics, Computer and Telecommunication Engineering
IFAC - Institute of Applied Physics "Nello Carrara"
IFP - Institute for Plasma Physics "Piero Caldirola"
IGI - Institute of Ionized Gas
IIT - Institute for Informatics and Telematics
IM - Institute for Research on Engines
IMAMOTER - Institute for Agricultural and Earthmoving Machines
IMATI - Institute for Applied Mathematics and Information Technologies
IMEM - Institute of Materials for Electronics and Magnetism
INSEAN - Marine Technology Research Institute
IRC - Institute for Research on Combustion
IREA - Institute for Electromagnetic Sensing of the Environment
ISSIA - Institute of Intelligent Systems for Automation
ISTI - Institute of Information Science and Technologies "Alessandro Faedo"
ITAE - Institute for Advanced Energy Technologies "Nicola Giordano"
ITC - Construction Technologies Institute
ITIA - Institute of Industrial Technologies and Automation

DIITET

Department of Engineering, ICT and Technologies for Energy and Transport

Institutes | 21

Permanent employees | 1500, including 900 researchers and technologists

Main research themes | Energy
Transportation
ICT
Production Systems
Construction
Nanotechnology and new materials
Sensors
Aerospace
Applied Mathematics
Interdepartmental Global Security
Protection and promotion of cultural heritage
Health and well-being;
Actions for the climate and mitigation of natural hazards
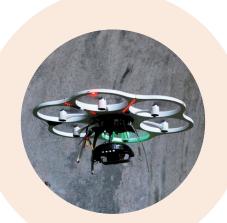Sustainable agriculture and food security

Patents | The Department manages 78 patents in the following areas:
aerospace, costruction, energy, ICT, sensor,
production systems, trasportation

Spin-offs | The Department participates in 8 spin-offs in the following areas:
• International activities in the field of information technology and communication
• Security of computer networks and information systems
• Measurements and innovative services on the effects of electromagnetism
on industrial processes, environment and human health
• Computer services, data processing activities, designing embedded computing,
cloud computing services
• Scientific R&I in engineering, matematics, physics and natural sciences
• Political and economic training
• Study design and implementation of software and hardware for wireless
communication devices
• Production development and installation of support systems for marine,
lake and river navigation and environmental monitoring

Main technologies developed

ICT
Internet of the future; smart networks; pervasive embedded systems; sensor networks; Big Data analytics; advanced computing; knowledge discovery and management, robotics; electronic and optoelectronic/photonic devices; cyber-security; Digital Agenda; e-energy; e-health; bio-engineering and bio-informatics.

PHOTONICS
Development of instruments such as optoelectronic/photonic applications in medicine, diagnostic and therapeutic minimally invasive laser, optoelectronic and photonic technologies for the conservation and restoration of cultural heritage.

MICRO-AND NANO-ELECTRONICS
Sensors and electronics for medical diagnostics, analysis of food quality, water, soil and forests monitoring, infrastructure monitoring.

NANOTECHNOLOGY AND ADVANCED MATERIALS
Development and study of nanosystems for applications in medicine and environmental problems. Materials for energy; nano-material graphene/graphite at low cost; materials for magnetic refrigeration; advanced materials for agricultural machinery.
Multifunctional, nano-mesa materials for biomedical, advanced sensors and construction industry applications.

PRODUCTION SYSTEMS
Methodologies, tools and technologies for the factory of the future; custom manufacturing; advanced solutions for monitoring complex manufacturing processes; de-manufacturing processes, modular and reconfigurable vehicles, virtual reality environments to support production.

CLEAN ENERGY, SAFE AND EFFICIENT
Generation and micro-generation of clean and efficient energy, (including renewable sources - solar, wind, marine, biomass). Controlled thermonuclear fusion; exploitation and efficient use of renewable energy sources including the energy storage systems, smart grids.

SUSTAINABLE CONSTRUCTION
Construction technologies for energetic efficiency, safe, high performance; sustainable buildings.

SMART, SUSTAINABLE AND INTEGRATED TRANSPORT
Road vehicles and marine propulsion engines; electric motors; hybrid engines; ICT for sustainable, intelligent urban mobility; mathematical methods and models for solving transportation problems.

SUSTAINABLE AGRICULTURE AND FOOD SECURITY
Precision agriculture: smart use of chemicals and fertilizers, integrated land and rural areas management and systems techniques with high energy efficiency and low environmental impact; traceability of production and distribution networks in the food industry.

MARINE RESEARCH
Monitoring of the vessel security; marine transport with low environmental impact; predictive models of the waves and ocean atmosphere interaction; Sea Search and Rescue systems; automatic anti-collision systems for boats.

CLIMATE ACTIONS AND MITIGATION OF NATURAL HAZARDS
New technologies and tools to measure and observe the Earth and Universe systems; methods of remotely sensed data processes; environmental technologies; airborne remote sensing satellite; integrated systems (remote sensing and in-situ platforms) for understanding the functioning of ecosystems and the impacts of human activities.

CONSERVATION, MANAGEMENT AND ENHANCEMENT OF CULTURAL HERITAGE
Technologies for the monitoring of cultural heritage; Safety and Security of cultural heritage; digitization and advanced modeling.

SAFE SOCIETY
Cyber-security (data and software design security, network security, protection of cyber-physical systems, smart grid security); security of smart cities; safe buildings; monitoring and protection of critical infrastructure.