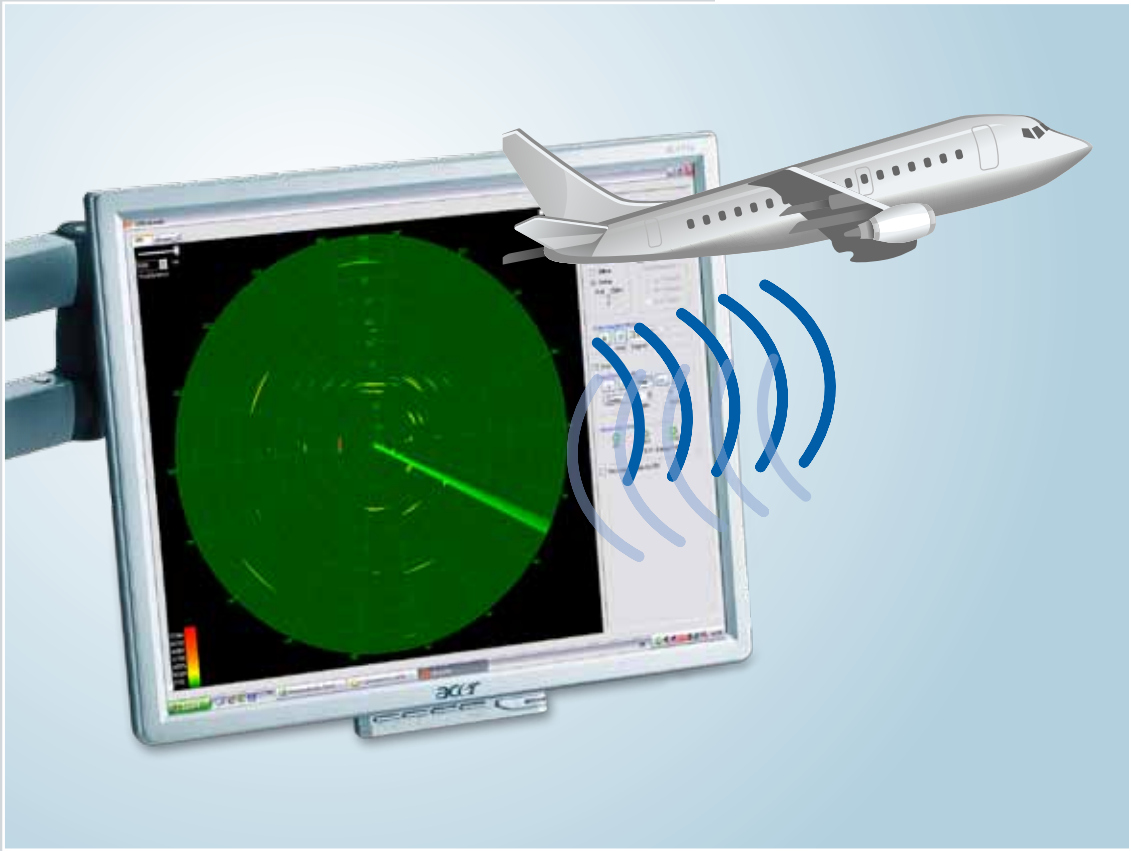
NEW!

LUCAS-NÜLLE

Training system for modern radar technology

A practice-oriented training system to teach complex topics in radar technology in a simple fashion



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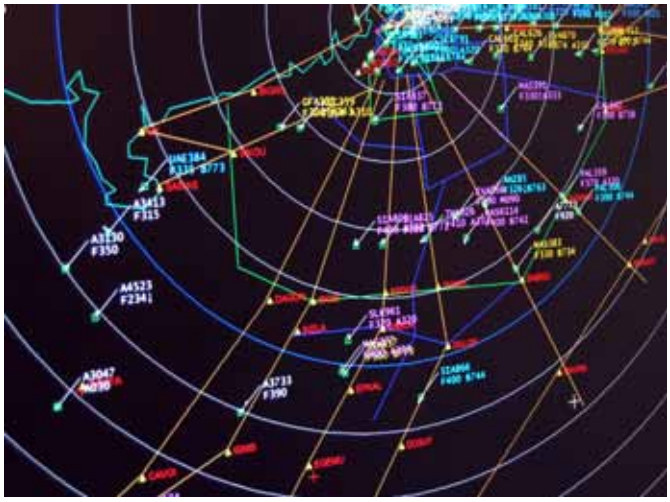
Overview of radar technology

"Radio Detection and Ranging" is better known by its acronym 'radar'. It represents a method for locating and measuring the distance to objects using radio echoes and measuring the time it takes for reflected electromagnetic waves to return to their source.

Radar has developed from its origins as a purely military application and is now used in such areas as aircraft safety, coast guarding, traffic control, security and a variety of related arenas. Active radar equipment for such uses predominantly provides an image using a pulse radar design. Common devices include primary and secondary radar equipment, either passively evaluating the reflected echo from a target or utilising targets with their own transponders, which respond to radar pulses and send their own signals back.



The technology in use is highly complex. Actual systems often use highly energetic pulses which can be very dangerous for human beings. It usual to use frequencies at the top end of the radio spectrum while the measuring equipment is extremely expensive and systems are not easy to use properly. Systems are frequently used in applications with major safety demands and only a small circle of qualified people are authorised to operate them, invariably making them unsuitable for training purposes.

All this makes radar training complicated, expensive and inaccessible to many. Not only planning, maintenance and repairs, but also everyday operation of radar installations, require basic knowledge relevant to modern practice, which needs to be gained on genuine equipment. There is a great need for personnel in these areas throughout the world in both military and civil operations.

Blended learning training system

Lucas-Nülle's radar technology training system is design to train technicians, engineers and operators for areas such as air traffic control, coast guarding, road traffic monitoring, safety and various related applications.

The blended learning course not only conveys the fundamental knowledge specific to radar in both theory and in practice, but also covers the latest technology. The centrepiece of the training system is a rotating fan-beam antenna with a radar base station. Echoes of ultrasonic pulses are digitalised, transmitted to a computer via a wireless link and then used to display targets on a screen in real time. The system's secondary radar transponder supports Mode Alpha (identification) and Mode Charlie (altitude).

Functionality and applications for both primary and secondary radar sets are covered in the integrated course by means of theoretical content, animated images and interactive tests, backed up with numerous informative experiments. Due to the physical analogies between UHF radar and ultrasonic sonar, the knowledge gained can be applied to radar systems directly.

The training system has been developed for use in normal classrooms. It requires no authorisation and presents no hazards to trainees or students.

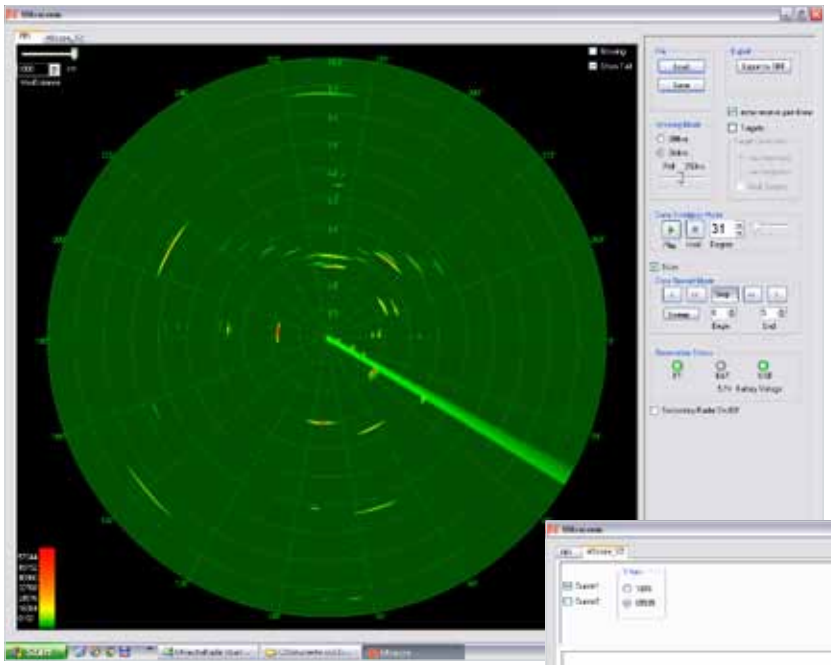
Equipment

- Radar base station
- Radar sub-module
- Rotating antenna base with USB port
- Set of passive targets
- Secondary radar transponder (active target)
- Accessories: power supply, charger, stand for targets, leads
- Interactive Lab Assistant software

Interactive course software

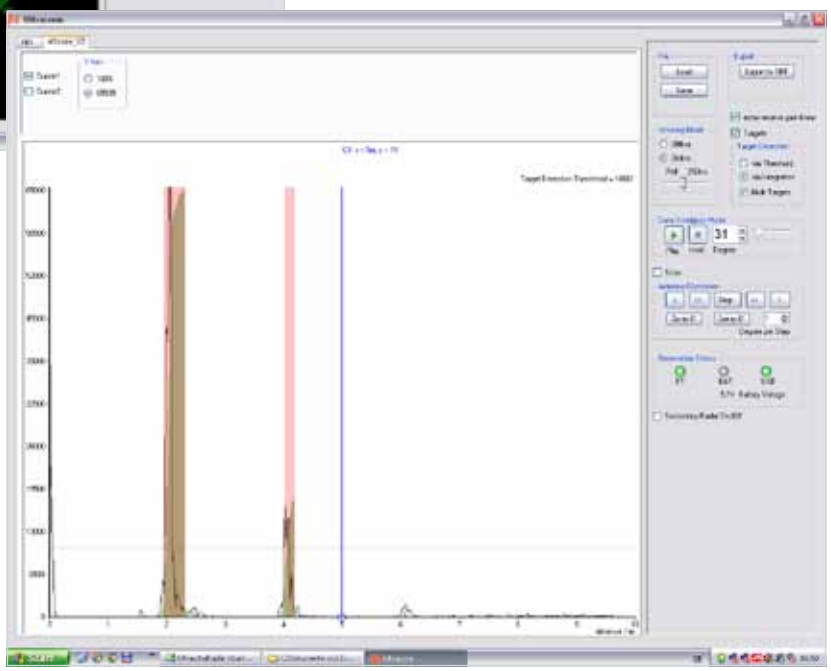
The blended learning course conveys the fundamentals specific to radar with all the necessary theoretical contents and uses animated illustrations. In order to achieve reproducible results, the course includes precise and well-tested experiment instructions. Experiments are conducted on an interactive platform, i.e. measurements are entered into boxes provided for the purposes and the program itself can check whether the answers are correct as well as providing feedback to the student. The course is completed with tests of knowledge.

This combination of training course and experiment platform means that students can learn quickly and successfully, as well as providing them with a good understanding of radar technology. The virtual instruments display measurements in real time on realistic displays, including PPI and A-scope formats, and also allow equipment for the experiments to be remotely controlled.



PPI scope functions

- 360° display of measurements
- Imaging of active and passive targets
- Detection of target-ID and height for active targets
- Calibration of 0° position
- Continuous rotation of antenna
- Rotation to pre-defined angle
- Inching mode



A-scope functions

- Display of signal amplitude as a function of distance
- Adjustable thresholds
- Measurement of target distances

All measurements can be saved and played back later on as well as being displayed in real time. This means that typical scenarios can be stored and explored at a later date, even in the absence of the hardware.

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Contents of Interactive Lab Assistant course software

- Basic principle of radar
  - Acoustic longitudinal waves
  - Wave equation for ultrasound
  - Common aspects of wave equations for ultrasound and electromagnetic waves
  - Focussing of outgoing wave
  - Determining transmission characteristic
- Reflection and transmission from boundary surfaces
  - Characteristic sound impedance
  - Characteristic wave impedance
  - Electromagnetic waves in a medium
  - Reflection response to ultrasound for various materials
- Quantitative observation of echoes
  - Radar equation
  - CFAR thresholds
- Types of radar systems
  - Distance resolution for pulse radar
- Secondary radar
  - Squawking
  - Squawk response code

System properties and technical data

- Signal/noise ratio >96 dB
- Beam 15°
- Range of up to 10 metres
- Fan-beam antenna with integrated laser pointer
- Operating frequency 56 kHz
- Rotating antenna base with rugged and low-play drive
  - Angular resolution 0.0125°
  - USB port
- Power supplied to base station from rechargeable batteries
- Power supplied to transponders from rechargeable batteries

Benefits to you

- Simple, informative and interesting experiments
- Integration between training course and experiment platform
- Not physiologically harmful; usable in any room
- No authorisation necessary and no limits to usage
- Passive radar
- Active radar with ID squawking and measurement of altitude

Hardware equipment set SO3538-5R, ILA course SO4206-9X
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Further information can be found in our communications technology catalogue

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