From electromagnetic physics to complete operational systems.

RF, electromagnetics, antennas, GPR, pulse/UWB electronics, SDR/DSP, synchronization, localization and advanced system design.

FROM PHYSICS TO OPERATIONAL SYSTEM

One engineering chain. Measurement integrity preserved from the field to the decision.

40+

years of hands-on engineering across electronics, RF, electromagnetics, sensing, communications, technical security and specialized system development.

ENGINEERING WITHOUT ARTIFICIAL BOUNDARIES

Deep expertise across the whole technical chain.

Many difficult engineering problems do not belong to one discipline. Antenna behavior affects the receiver. Clock quality affects localization. Pulse shape affects GPR resolution. DSP decisions affect what an operator can trust. Kostet approaches these as one connected engineering problem.

ONE CHAIN

The objective is not simply to make each block work. It is to make the entire measurement and decision chain physically correct, explainable, robust and useful in practice.

RF & electromagnetics

Receiver architecture, RF paths, matching, filters, gain distribution, dynamic range, interference, propagation, EMC/EMI and measurement.

Antennas & structures

Broadband and specialized antennas, GPR antennas, Vivaldi, log-spiral, TEM-horn and related electromagnetic structures.

Fast electronics

Pulse generators, nanosecond-class switching, triggering, pulse shaping, timing and high-speed measurement interfaces.

SDR & DSP

Real-time receivers, channelization, demodulation, detection, diversity/MRC, spectrum analysis and recording.

Timing & localization

GNSS/PPS, disciplined references, hardware timestamps, TDOA, DF and distributed sensing geometry.

Complete systems

Hardware, firmware, Linux, networking, storage, APIs, visualization, automation, commissioning and documentation.

BREADTH

The same engineering discipline is applied from component-level RF/EM work to distributed, software-defined operational systems.

RF & ELECTROMAGNETIC ENGINEERING

Design around what the electromagnetic field actually does.

Strong RF engineering begins before the ADC and continues long after it. Kostet combines analytical understanding with practical experience of real hardware, real interference and real operating environments.

- Receiver and RF-front-end architecture: sensitivity, selectivity, overload behavior, noise figure, linearity and dynamic range.
- RF path design: filters, preselectors, LNAs, attenuators, switching, couplers, splitters, cabling and calibration strategy.
- Interference and coexistence analysis: strong-signal behavior, intermodulation, spurious responses, leakage, shielding and grounding.
- EMC/EMI investigation and mitigation, including difficult problems where coupling mechanisms are not obvious.
- Propagation and coverage reasoning for practical system design, including terrain, line-of-sight and uncertainty.
- Measurement-system design where absolute level, phase, timing and calibration integrity must be preserved.

MEASURE

A measurement system should not silently reshape reality to make the display look better. Gain, calibration, timing and uncertainty must remain traceable to the physical measurement.

TYPICAL ENGAGEMENTS

Examples of RF engineering work

Architecture review

Independent review of receiver chains, RF paths, dynamic-range assumptions and measurement integrity.

Troubleshooting

Investigating unexplained noise, overload, instability, loss of sensitivity, timing errors and field failures.

Special-purpose design

Creating RF front ends, monitoring receivers and instrumentation for unusual frequency ranges or operating constraints.

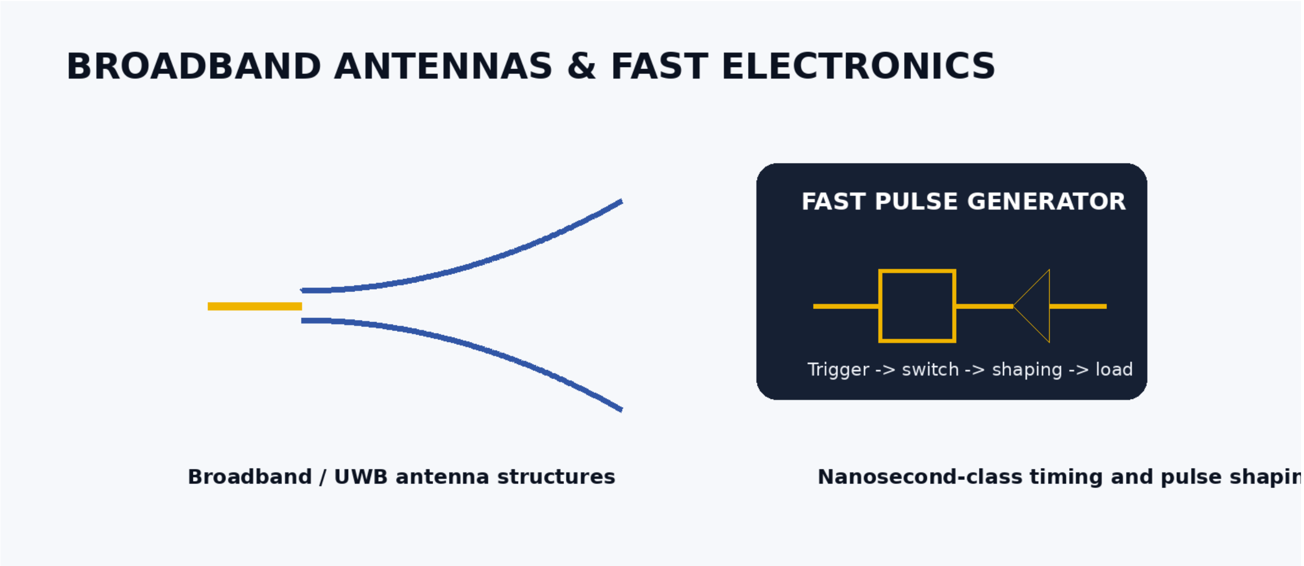
Prototype to field system

Taking a concept through design, prototype, measurement, calibration, software integration and commissioning.

ANTENNAS & GPR

Broadband structures for demanding time-domain and RF applications.

Antenna design is treated as part of the complete system: impedance, transient behavior, ringing, radiation pattern, near-field coupling, physical construction and the receiver/transmitter interface all matter.



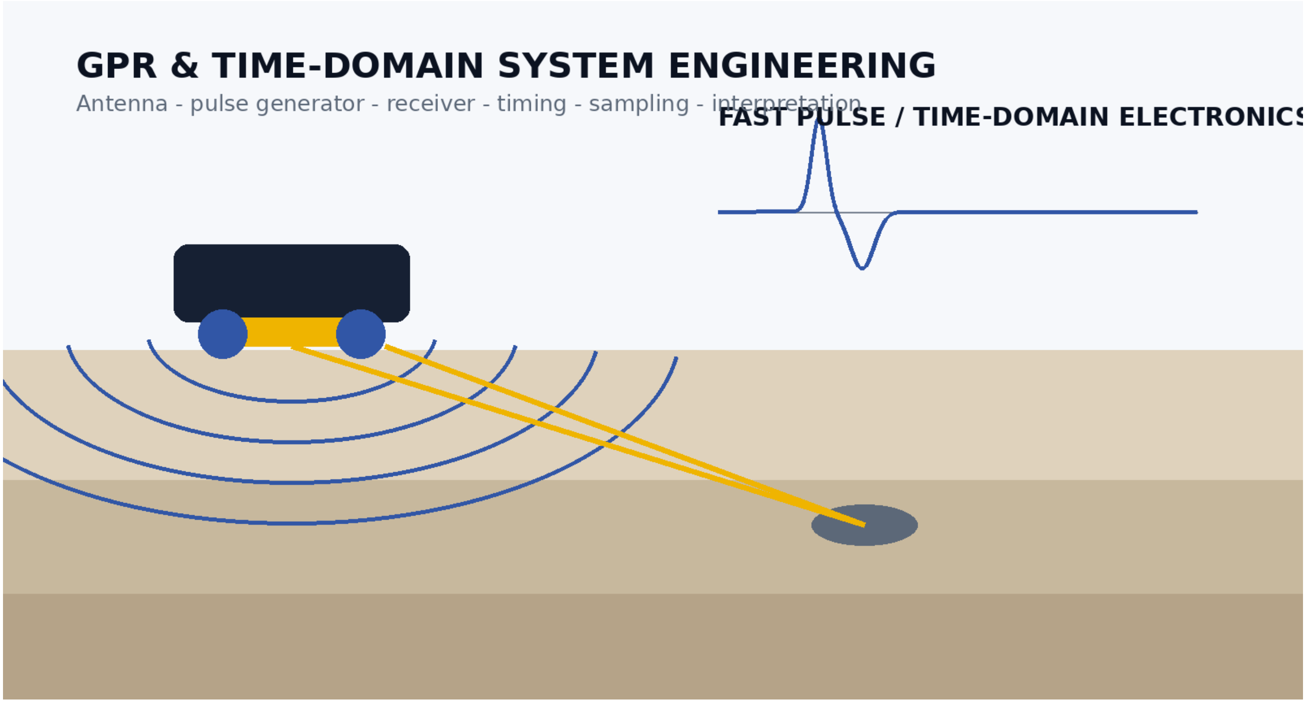
- GPR antenna systems, including broadband and time-domain behavior where pulse fidelity and ringing are critical.
- Vivaldi, log-periodic/log-spiral, TEM-horn and other broadband or directional antenna concepts.
- Antenna/feed transitions, baluns, matching structures, shielding and mechanically practical integration.
- Near-field and coupling problems where standard far-field antenna assumptions are insufficient.
- Prototype development and practical characterization using time- and frequency-domain measurements.
- Co-design of antenna, transmitter pulse, receiver bandwidth and signal-processing strategy.

SYSTEM VIEW	For GPR and UWB, the antenna is not an isolated component. Its impulse response, coupling and ringing directly determine what the complete radar can resolve.

GPR, PULSE & UWB SYSTEMS

Fast pulses, difficult dynamic range and precise timing.

Ground-penetrating radar and other time-domain systems combine electromagnetics with high-speed electronics, sampling, synchronization and interpretation. The interesting engineering is often found at the boundaries between those disciplines.

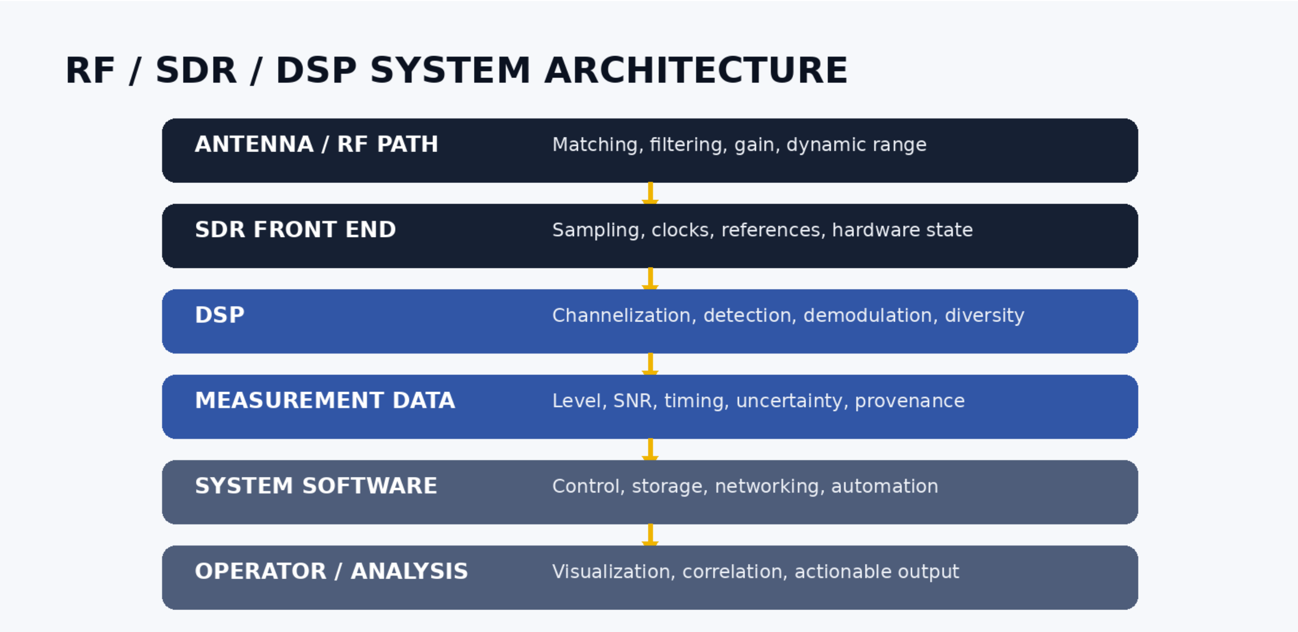


- Pulse-generator concepts: fast switching, pulse shaping, trigger architecture, amplitude control and load behavior.
- Transmit/receive isolation, recovery time and protection when very small echoes must be measured shortly after a large transmit pulse.
- Sampling and timing architecture for repeatable, low-jitter time-domain measurements.
- Receiver bandwidth, dynamic range, baseline stability and suppression of systematic artifacts.
- Antenna/pulse/receiver co-design to improve range resolution and reduce ringing.
- Complete GPR architecture from electromagnetic front end to processing, visualization and field workflow.

SDR & DSP

Turn flexible RF hardware into trustworthy instruments.

Software-defined radio is valuable because it moves functionality into software - but good results still depend on disciplined RF architecture, correct sampling assumptions and DSP that respects the measurement.



- SDR receiver architecture using platforms such as bladeRF, RTL/Kraken-class receivers and other suitable hardware.
- NBFM and other demodulators, filtering, channelization, squelch/access logic and audio processing.
- Diversity reception and maximal-ratio combining (MRC), including branch alignment and quality weighting.
- Wideband spectrum monitoring, signal detection, persistent signal tracking, IQ/audio recording and analysis.
- Separation of acquisition, DSP and user-interface rates so presentation never back-pressures core measurement.
- Linux services, hardware discovery, stable device mapping, configuration, diagnostics and automated installation.

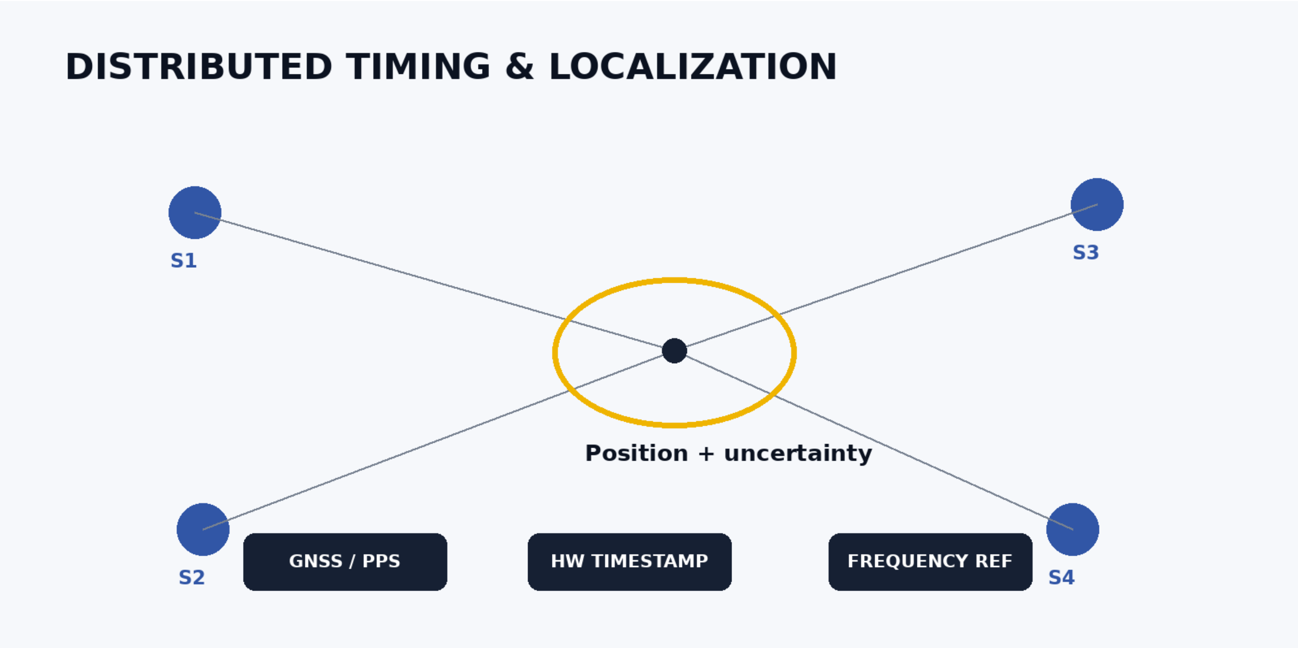
EXAMPLES

Kostet-developed systems such as IRIS II and MRS demonstrate the same principle at different scales: combine RF discipline, DSP and operational software into one coherent instrument.

TIMING, SYNCHRONIZATION & LOCALIZATION

When microseconds are too coarse.

Distributed RF measurement and localization depend on knowing not only what was received, but exactly when, where and with what uncertainty it was measured.



- GNSS/PPS-based synchronization and separation of frequency discipline from absolute epoch synchronization.
- Hardware sample counters and timestamping rather than relying on host/USB timing for precision measurements.
- TDOA system architecture, synchronized IQ capture, cross-correlation, ambiguity handling and weighted localization.
- Direction finding and geometric fusion with explicit bearings, probability regions and uncertainty.
- Sensor position, timing quality, reference lock and measurement uncertainty retained as first-class metadata.
- Distributed architectures that preserve local autonomy while enabling central correlation and analysis.

UNCERTAINTY

A localization result is not just a latitude and longitude. The method, geometry, timing quality, contributing sensors, confidence and uncertainty are part of the result.

PROTOTYPES & COMPLETE SYSTEM DESIGN

From proof of concept to maintainable field equipment.

Kostet can work at the component level, but the distinctive capability is integrating hardware, firmware, signal processing and software into a complete operational system.

Electronics & hardware

Analog/digital electronics, embedded interfaces, RF switching/control, timing hardware, sensors and custom interface units.

Embedded & firmware

ESP32 and other embedded platforms, acquisition, control, communications, provisioning and robust field behavior.

Linux & edge compute

Raspberry Pi and x64 Linux platforms, systemd services, hardware access, watchdogs, logging and unattended operation.

Networking & APIs

Distributed nodes, secure data exchange, versioned interfaces, resilient local operation and central coordination.

Data & analysis

Measurement models, historical storage, correlation, uncertainty, geospatial processing and evidence provenance.

Operator interface

Web interfaces, diagnostics, system health, workflow design and presentation that exposes rather than hides system state.

DELIVERABLE

A project can range from a focused design review or prototype to a complete engineered system including installation, commissioning, documentation and long-term technical support.

INVESTIGATION & SPECIALIST PROBLEM SOLVING

For problems that do not fit the standard cookbook.

Some of the most valuable engineering work begins when a system behaves in a way that the datasheet, simulation or conventional explanation cannot account for.

- Root-cause investigation of unusual RF, electromagnetic, timing, DSP or system-level behavior.
- Structured experiments that separate hardware effects from software, configuration and environmental effects.
- Measurement plans designed to disprove hypotheses rather than merely confirm the first plausible explanation.
- Technical-security and specialized RF applications where discretion, traceability and robust evidence handling are essential.
- Independent technical review of existing designs, supplier claims, performance limitations and proposed architectures.
- Development of unusual instruments or sensing concepts when no suitable commercial product exists.

FIRST PRINCIPLES	The approach is to reduce a difficult problem to observable physical mechanisms, build measurements that distinguish them, and then engineer the solution around what the evidence actually shows.

EXPERIENCE THAT CONNECTS DISCIPLINES

More than a list of technologies

Four decades of practical work across electronics, radio communications, RF/EM engineering, sensing, technical security and advanced system development provide a broad reference frame for new problems. That matters when the correct solution sits between traditional disciplines rather than inside one of them.

WORKING WITH KOSTET

Focused specialist support or complete engineering responsibility.

Engagements can start with a difficult technical question and grow only as far as the problem requires.

ENGAGEMENT	BEST FOR	TYPICAL OUTPUT
Technical review	Architecture or performance questions	Independent findings, risks and recommended actions
Investigation	Unexplained behavior or failure	Measurement plan, root cause and corrective design
Concept / feasibility	New capability or unusual instrument	Architecture, trade-offs, prototype plan and risk reduction
Prototype development	Need to prove the physics and implementation	Working hardware/software prototype with measured results
System engineering	Multi-discipline operational system	Integrated hardware, DSP, software, networking and documentation
Specialist support	Existing engineering team needs deep RF/EM input	Focused design contribution, review, troubleshooting or mentoring

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KOSTET

Engineering insight where RF, electromagnetics, electronics, timing, DSP and complete system design meet.

www.kostet.se