

# Just-In-Time Jamming of Enemy Detonation Signals

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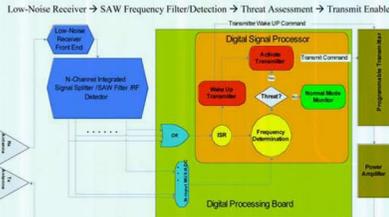
## Why Just-In-Time Jamming (JITJ)?

- Problem**
  - Barrage Jamming:
    - Wideband jamming disrupts all communications (not just the enemy's) and uses too much power
      - Only feasible for vehicle, fixed-wing aircraft, or fixed installation mounts
    - Narrowband jamming requires knowledge of threat frequency and uses too much power
      - Man-portable units are feasible, but time-limited because transmitter is always on
  - Reactive Jamming:
    - FPGA systems consume too much power, take up too much space and are not always fast enough
      - Man-portable units are very limited in bandwidth and operational time
- Solution**
  - Analogue Real-Time Spectrum Analysis
    - Fast, low-power receiver to determine threat frequency in real-time

## JITJ BASICS

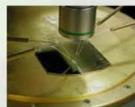
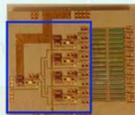
- Reason to Go Analog:**
  - Analogue hardware is FAST
  - Passive hardware consumes NO power
- Goal** → Man-Portable Reactive Jamming System
- Approach**
  - High-efficiency low-noise amplifiers (LNA)
  - N-way power divider with signal gain
  - High-Q surface acoustic wave (SAW) filter bank with integrated RF power detectors
  - Low-power digital signal processor (DSP)
    - Driven by hardware interrupts to reduce processing overhead
    - Focus on the receiver; jamming technology already exists

## How JITJ TECHNOLOGY WORKS



## BREAKTHROUGHS — NOT JUST IMPROVEMENTS

- 1 x N active splitter
  - Enables multiple parallel channels
  - Low power consumption design
- Pyroelectric detectors convert RF to DC volts
  - Patent pending
  - Passive → consumes no power
  - Still needs some engineering work to be practical
- High-Q SAW filters
  - 300kHz at 900-1000MHz → Q = 3000
  - New process to yield a single wafer with filters at precisely-tuned adjacent frequencies
    - Normally 1 wafer, 1 frequency

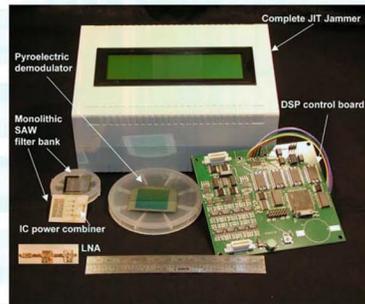


## ANALOG/DIGITAL INTEGRATION

- Hardware Spectrum Analyzer
  - No FFT required
  - Replaces 10+ CMCX FPGA
- Integrated Splitter/Filter/Detector
  - Permits analog, real-time spectrum analysis
- Low-Power DSP Board Design
  - Software decision algorithm for flexibility
  - Fully programmable for multiple applications
  - Interrupt driven for speed, efficiency
  - Enables brief, pinpoint jamming
    - Activates transmitter only when threat is present, silent otherwise → hard to detect, defend against



## MAN-PORTABLE JITJ UNIT



## APPLICATIONS

- Passive Wireless Sensors
  - Zero-power wake up circuit
    - Extend sensor life through reduced power consumption
  - Wireless sensors for aircraft
- "Pocket" Real-Time Spectrum Analyzer
- Signal Intelligence
  - Real-Time Data Reduction
- Technical Security Counter-Measures
  - Detect covert transmissions at or near secure facilities

