BirdRad: A Mobile Avian Radar For Near-Range Sampling Of Bird Populations

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**Report Documentation Page**

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<table>
<thead>
<tr>
<th>a. REPORT</th>
<th>b. ABSTRACT</th>
<th>c. THIS PAGE</th>
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<tbody>
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Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
Overview

- Background to BirdRad Project
- Status of BirdRad Avian Radar
- Planned Enhancements
  - Current
  - Future
History
- Weather Radars (WRS-88 or NEXRAD) Used to Study Migratory Birds
  - Coverage Gaps
- 1999: DOD Legacy Contract To Sid Gauthreaux at Clemson University

Design Requirements
- Primary User Community: Natural Resources Managers
  - Application to BASH Came Later
- Portability - Within & Between Sites
- 360° Azimuth
- Range 0-6 NMi
- Measure Horizontal & Vertical(!) Location of Birds
- Affordable
Status

- First BirdRad Unit Delivered in 2001
- Units Currently Operational At:
  - MCAS Cherry Point
  - NAS Patuxent River
  - NAS Point Mugu
  - NAS Whidbey Island
  - USAFB Elmendorf
  - SSC San Diego (R&D)
Current Configuration
Sample BirdRad Display
NAS Whidbey Island 12 Nov 2002 17:09 PST
Capturing A Near-Miss
Narrow Radar Beam

- **Radar Beam Width**: 4°
  - More Accurate Target Altitude
  - Larger “Cone of Silence” - Unsampled Volume Above & Below Beam
- **Antenna Angle**: 5-10°
Enhancements

- BirdRad System Met Design Goals
  - Highlighted Additional Requirements
- 2002: NAVFAC Tasks SSC San Diego to Research Additional Requirements of BirdRad Users
- SSC Extends Analysis of Requirements
General Requirements

- Analyzed Resource Managers’ Requirements for Bird Activity Data in General

Survey Methods

- Incidental observations 64%
- Visual census (area) 45%
- Bird detection radar 45%
- Mist Net 9%
- Point-count surveys 36%
- Other 18%
Use Case Analysis

- Uniform Modeling Language (UML)
- Aid Both Programmers & End-Users to Understand System Capabilities
  - “What’s In, What’s Out”
## Proposed Enhancements

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Enhancements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Signal Processing</td>
<td>▪ Clutter Removal</td>
</tr>
<tr>
<td></td>
<td>▪ Data Acquisition System</td>
</tr>
<tr>
<td></td>
<td>▪ Data Visualization</td>
</tr>
<tr>
<td>Furuno Controls</td>
<td>▪ Remote Operations</td>
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<tr>
<td>Operations, Not R&amp;D</td>
<td>▪ Environmental Controls</td>
</tr>
<tr>
<td>Technical Feasibility &amp; Cost</td>
<td>▪ Birds vs. Insects</td>
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<td>▪ “Cone of Silence”</td>
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<th>Status</th>
<th>In Progress</th>
<th>Planned</th>
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<th>On Hold</th>
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<td>Digital Signal</td>
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*Note: Status indicates current phase of development.*
Proposed Enhancements

- **Current Enhancements (Sicom Systems Ltd.)**
  - Digital Signal Processing
    - Rutter Graphics Rsi4000RT
  - Target Tracking Program
    - MT-Tracker™

- **Future Enhancements**
  - Remote Scheduling and Control Program
  - Output to RDBMS With Feed to GIS
Current Enhancements

- Target Trails Display (Optional - Emulates Furuno 2155BB)
  - Yellow Heads & Blue Tails
- User Can Select The Background:
  - Target Trails (Standard)
  - Target Trails (Clutter Removed)
  - Map
  - Blank
- User Can Select The Overlay:
  - Targets
  - Tracks
  - Both
- Replay Video
Current Enhancements

- Apply Clutter Map
  - Residual Clutter
  - Heads & Tails

NAS Patuxent River: 21 Jul 2004 11:39 EDT
Current Enhancements

- Display **Targets** (Circles) & **Tracks** (Squares)
Current Enhancements

- Image Showing Targets & Tracks Only
Current Enhancements

- Example Of Longer Range
  - Note: Airplane at 8 o’clock, Ships at 5 o’clock
Is this really 24 nmi?
Gerry Key, 8/17/2004
Current Enhancements

- Crank Up Sensitivity
  - More Targets
    - Close to Residual Clutter/Noise Level
  - More False Alarms
    - Increases Processing Load on the Target-Tracking Program
    - MT-Tracker™ Has Handled This Load

NAS Patuxent River: 21 Jul 2004
Trailer

- SSC Charleston → SSC San Diego
  - On Hold – Field Testing of HW/SW Enhancements
Future Enhancements (FY05)

- Remote Control
  - Control Radar On/Off/Standby
  - Preprogram Sampling Times & Configuration
  - Alarms & Notification

- GIS & Database
  - Export XML
    - SensorML
  - Load Into Relational Database
    - Generalized Data Model With Other Measurement Data
    - Configuration As Well As Measurement Data
  - Visualize Using Standalone and Web-Based GIS

- Comparison Study with MARS – October 2004
Future Plans

- Web Services
- Data Streaming
  - Digitized Raw Radar Data on the Net
  - Security Issues
- Other Sensors
  - Thermal Imaging (Insects)
  - Wind Speed Profilers (Insects)
- Taxonomic Identification
- Air Traffic Control? – No Plans
Questions?

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