A New Generation of Active Intrusion Detection System for Physical Protection

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Outline

1. The Millimeter Wave Radar Detection System
2. Features of Millimeter Wave Radar Detection System
3. Application of Millimeter Wave Radar Detection System
4. Future of Intrusion Detection System
## The Millimeter Wave Radar Detection System

<table>
<thead>
<tr>
<th>Distance</th>
<th>10km</th>
<th>1km</th>
<th>100m</th>
<th>10m</th>
<th>1m</th>
<th>10cm</th>
<th>1cm</th>
<th>1mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Frequency</td>
<td>Long Wave</td>
<td>Middle Frequency</td>
<td>High Frequency</td>
<td>Very HF</td>
<td>Extra HF</td>
<td>Ultra HF</td>
<td>Extremely HF</td>
<td></td>
</tr>
<tr>
<td>Low Frequency</td>
<td>Low Frequency</td>
<td>Middle Wave</td>
<td>Middle Wave</td>
<td>Short Wave</td>
<td>Very Short Wave</td>
<td>Decimeter Wave</td>
<td>Centimeter Wave</td>
<td></td>
</tr>
<tr>
<td>30KHz</td>
<td>300KHz</td>
<td>3MHz</td>
<td>30MHz</td>
<td>300MHz</td>
<td>3GHz</td>
<td>30GHz</td>
<td>300GHz</td>
<td></td>
</tr>
</tbody>
</table>

- **Ultrasonic radar**
- **Doppler radar**
- **Infrared**
The Millimeter Wave Radar Detection System

**Radar:**
distance measuring,
determine the location and velocity of the target

**Server:**
analyze the behavior of the target
determine if the object has malicious act
The Millimeter Wave Radar Detection System

Navtech Advanced Guard ®

Frequency: 76~77GHz
Scanning Radius: 1.5km
Accuracy: 30cm
Height: 3~10m
Price: $250,000
Features of Millimeter Wave Radar Detection System

**Low False Alarm Rate**
- strong penetration ability for fog, dust
- detection feature not affected by weather

**Active Detection**
- detection for any object within a radius of 1.5km
- behavior analysis ability

**Path Tracking**
- keep track of motion trajectory of the intruder

**Easy Installation**
- physical barrier not necessary, very few cables, low construction cost
Application of Millimeter Wave Radar Detection System

Open Area Detection

-- open water
-- material storage site
Application of Millimeter Wave Radar Detection System

Positioning

-- vehicle
-- overspeed detection
-- important material
Application of Millimeter Wave Radar Detection System

Temporary Barrier

-- temporary barrier during construction
-- compensation detection method for broken sensors
-- easy to dismount for different situation
# Future of Intrusion Detection System

## Need for Evolution
- New threat such as airborne attack is becoming real
- There are problems with traditional detection system

## Enhanced Detection
- Multiple sensing modes to distinguish interference
- More detection features for higher resolution

## Enhanced Integration
- Behavior analysis, Target tracking
- Facilitate the response force

## Cost Effective
- Can be reduced greatly by proper design
- Implicit additional value
## Evolving of Intrusion Detection System

<table>
<thead>
<tr>
<th></th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Generation</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Generation</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Detection Principle</strong></td>
<td>Existence of Signal</td>
<td>Complex Signal Processing</td>
<td>Multiple sensors Target driven</td>
</tr>
<tr>
<td><strong>Typical Product</strong></td>
<td>Active Infrared</td>
<td>Microwave Electric Field</td>
<td>Radar detection Multiple sensor network</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>Line detection High false alarm rate Easy to bypass</td>
<td>Volume detection High reliability High false alarm rate</td>
<td>Volume detection High reliability Low false alarm rate</td>
</tr>
<tr>
<td><strong>Function</strong></td>
<td>Produce alarm</td>
<td>Produce alarm Provide location of intrusion</td>
<td>Provide behavior analysis, trajectory tracking</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>Based on the length of perimeter</td>
<td>Based on the length of perimeter</td>
<td>Total cost optimized by proper design</td>
</tr>
</tbody>
</table>
Conclusion

1. Millimeter-wave radar detection system is a very effective new intrusion detection method.

2. We have used the millimeter wave radar in nuclear power plant for several applications.

3. It should be encouraged to introduce new detection technologies to face increasing threat.
谢谢！
THANK YOU！