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CURRENT STATUS AND DEVELOPMENT TRENDS OF ACOUSTIC PROTECTION SYSTEMS

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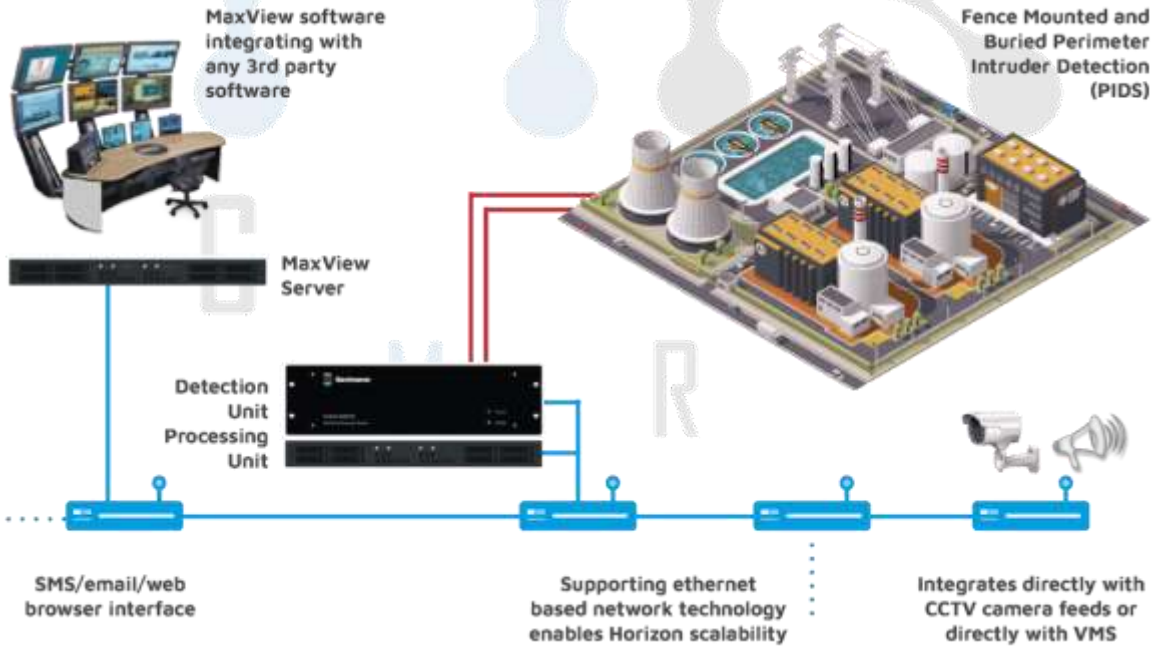
Abstract. This in the article acoustic guard systems current status and development trends analysis Modern technologies , that is including artificial intellect and the car study methods based on working outgoing acoustic guard systems opportunities and their efficiency discussion Research to the results according to this systems security in providing high to effectiveness in reaching important role to play determined .

Key words: acoustic guard , artificial intelligence , signal again performance , safety systems , machine study

Modern in the world security provide the most important from issues one is considered . Technological development as a result acoustic guard systems human activity and objects observation for wide is being used . Such systems in real time acoustic signal analysis through threats to determine help gives .

Acoustic guard systems voice or vibration signals again work through security provides . This systems sensors , microphones and special software supply through to work Modern solutions , in particular artificial intelligence (SI) and the car study algorithms using analysis to do opportunities is expanding .

Home part



Categorized in the facility external effects and risks determination for acoustic from signals benefit efficiency system .

1. Acoustic guard systems main components

Acoustic guard systems following main from components consists of :

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Sensors and microphones : in the environment acoustic signals acceptance Sensors every kind frequency sounds determination and them digital to look to bring for Microphones are used . and sounds high accuracy with writing to take and the noise filtering to the possibility has . Modern microphones between directional and many omnidirectional types there is are , they are known one to the environment suitable accordingly is selected . Also , high efficient MEMS sensors and laser microphones security in systems wide is applied .

Signal **again performance module:** signals filtering , noise reduce , analog- from digital to look transfer and important features separate to take for This is used . module Fourier transform , Wavelet transform and edge frequencies separation such as algorithms through the alarm optimizes the signal . again processing module signals accuracy increase and wrong signals eliminate to grow opportunity gives .

Data analysis to do block : artificial intellect and the car study algorithms using signals analysis This will do . module of signals spectral characteristics , amplitude and frequency changes The signal spectrum anomalies , noisy in the environment changes and independent sound events special algorithms using is determined . The data analysis to do block inside following processes done increased

- **Features separation.** Signal main parameters separate to take .
- **Regional and time according to analysis.** The alarm various in the regions and time between check .
- **Anomalies definition.** The car study based on unexpected sounds to determine .
- **Classification.** Objects voiced signatures according to separation and categorization .

This of processes all in real time in mode performance for high effective calculation systems and optimized algorithms demand will be done .

- **Informant to do system.** security broken in case message send function This system performs in real time . the alarm again performance module and analysis to do block with connected become , threaten when detected automatic accordingly information sends . Notified to do following methods through done increased :
- **SMS and electronic mail:** to users security according to notifications send
- **Mobile applications through warning.** Special program real time via in mode message to deliver .
- **To the system connected siren and lights.** Visual and audio signal through message to give
- **Internet protocols through integration:** other security systems with synchronous work

This system threats minimize and to them fast answer to give opportunity gives .

2. Acoustic guard systems types

Acoustic in Table 1 guard systems main types and their advantages cited .

System type	Advantages
Passive acoustic systems	Low energy spends , long in the distance work takes
Active acoustic systems	Precise results gives , to the noise resistant
Based on SI worker systems	High accuracy , autonomous work opportunity

3. Acoustic guard systems technological development

Modern acoustic systems artificial intellect and deep Deep Learning approaches based on working The following formula is used to calculate the signal again at work applies to :

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$$S(f) = \int_{-\infty}^{\infty} s(t)e^{-j2\pi ft}\,dt$$

This on the ground :

- S(f) — frequency signal in the field ,
- s(t) — time signal in the field ,
- f — frequency ,
- j — abstract unity ,
- $e^{-j2\pi ft}$ — exponential weight function .

Fourier transformation sound signals to individual frequencies separation through important acoustic features to determine help gives . From this except for , Wavelet transform and spectral analysis methods are also used , noisy in the environment signals clear distinction opportunity will be created . In the future this technologies in real time work speed increase and accuracy improve for will be improved .

· Fourier transformation types **:**

- Discrete Fourier transformation (DFT)
- Quick Fourier transform (FFT)
- Continuous Fourier transformation (CFT)

· Fourier transformation acoustic in the analysis role **:**

- Noises separate to take and filtering
- Voice signals to frequencies separation
- Sound patterns determination

· Examples and practice **:**

- Planned acoustic security in the system Fourier from transformation how use
- Spectral analysis methods and their real situations impact

Methods : Acoustic guard systems analysis to do and develop for following from methods used :

Experimental Analysis : Acoustic sensors various under the circumstances work efficiency measurement .

Data again Operation : Signals filtering , Fourier and Wavelet transforms using information optimization .

Based on SI worker algorithms : Machine study models from the test transfer

Results

1. Accuracy and sensitivity increase – Artificial intellect based on worker acoustic systems more precisely signals analysis does and false positive rate reduces.
2. Noise and background sounds Filtering – Modern algorithms various in environments accuracy saved without necessary sounds separate takes .
3. Autonomous work and energy Efficiency – Some systems minimum energy spend , spend term performance possible .
4. Quick analysis and real- time monitoring – Alarm again work speed increase because of threats immediately determination and message to give opportunity there is .
5. Many network application possibility – Acoustic guard systems not only security , maybe industry , medicine , military industry and can also be used in smart city projects possible .

Summary

Acoustic guard systems modern security in technologies important place Artificial intellect and car study approaches together , and the efficiency of this system is increasing . Research results this

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shows that acoustic the alarm again work algorithms further develop and optimization through security level increase possible In the future this systems further reinforcement and real time in mode work opportunities expansion to the goal appropriate will be .

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