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Centre for Applied Innovation
AT YORK ST JOHN UNIVERSITY

Overview Paper

Base Molecular Resonance™ Technologies

Redacted Due to Highly Sensitive Information

Base Molecular Resonance™
TECHNOLOGIES

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EXECUTIVE SUMMARY

Base Molecular Resonance™ Technologies (BMRT) has developed a ground-breaking detection system, as detailed in US Patent No. 11493494 B2, that utilises molecular resonance to identify a wide range of substances with exceptional accuracy and sensitivity. This white paper translates the intricate technical data from the comprehensive validation report into an accessible format, highlighting the system's practical applications and significance across various fields.

KEY VALIDATION FINDINGS

The validation report assessed the system's performance in four critical areas:

1. Gunpowder Detection:

- The system demonstrated 100% accuracy in detecting single and multiple rounds of ammunition, including through barriers such as walls and buildings and at distances up to 580 feet. This level of precision is crucial for security and law enforcement applications.

2. Drug Detection:

- The system exhibited flawless detection of cocaine, heroin, and methamphetamine, with no false positives or negatives. This high specificity ensures reliable identification, which is vital for counter-narcotics operations and forensic investigations.

3. Cancer Detection:

- The system accurately identified malignant breast and prostate cancer tissues, distinguishing them from non-cancerous samples in blind and double-blind tests. This capability holds significant promise for non-invasive early cancer detection, improving patient outcomes.

4. Nuclear Materials Detection:

- The system precisely [redacted] nuclear materials [redacted] with [redacted] This accuracy is essential for nuclear security and environmental monitoring.

PRACTICAL APPLICATIONS

The exceptional results from these validation tests underscore the detection system's vast potential across multiple fields:

- Military, Security, and Law Enforcement: The system enhances counterterrorism efforts and public safety by reliably detecting explosives and narcotics, even through barriers and at long distances. Its deployment can significantly bolster security measures at high-risk venues, border crossings, and during law enforcement & military operations.

- Medical Diagnostics: The system's non-invasive, accurate detection of cancerous tissues represents a major breakthrough in early cancer diagnosis. Implementing this technology in routine screenings and real-time patient monitoring can lead to earlier interventions and better treatment outcomes.

- Nuclear Security: The precise [redacted] for nuclear materials ensure the safety of sensitive environments and bolster national security against potential nuclear threats. The system can [redacted] and track the movement of nuclear materials, providing an essential tool for preventing nuclear terrorism.

- Environmental Monitoring: The system's ability to detect various pollutants makes it a valuable asset for environmental agencies. It can aid in the early identification of contamination in air, water, and soil, ensuring timely remediation efforts and compliance with environmental regulations.

CENTRE FOR APPLIED INNOVATION (CAI) AT YORK ST JOHN UNIVERSITY

The validation of BMRT's detection system was conducted by the Centre for Applied Innovation (CAI) at York St John University (YSJ), a prestigious hub for fostering innovation and driving advancements in various fields. CAI collaborates with academia, industry, and the wider community to translate innovative ideas into impactful solutions.

CONCLUSION

BMRT's advanced detection system represents a significant leap forward in detection technology. Its proven accuracy, sensitivity, and versatility highlight its potential to transform multiple fields, including military, security, medical diagnostics, nuclear safety, and environmental monitoring. By integrating this technology into various sectors, we can create safer, healthier, and more secure environments. The detailed insights provided by this white paper illustrate how this innovative technology can be leveraged to address contemporary challenges effectively and efficiently.

OVERVIEW OF THE CENTRE FOR APPLIED INNOVATION AT YORK ST JOHN UNIVERSITY

CENTRE FOR APPLIED INNOVATION (CAI) AT YORK ST JOHN UNIVERSITY

The Centre for Applied Innovation (CAI) at York St John University (YSJ) is a prestigious hub for fostering innovation and driving advancements in various fields. Situated within the dynamic academic community of YSJ, which boasts a rich history dating back to 1841, CAI serves as a catalyst for collaboration between academia, industry, and the wider community. YSJ, originally founded as a teacher training college, has evolved over the decades into a distinguished institution known for its commitment to academic excellence, inclusivity, and community engagement. It holds a strong reputation for its innovative approach to education, consistently adapting to the changing demands of society and the global marketplace.

YSJ’s dedication to research and development is reflected in its state-of-the-art facilities and the diverse expertise of its faculty. The university has earned accolades for its contributions to various academic disciplines, making it a vibrant environment for cultivating groundbreaking ideas. The CAI, embedded within this esteemed institution, leverages YSJ's historical prestige and modern capabilities to translate innovative ideas into impactful solutions that address real-world challenges and opportunities. This synergy not only enhances the university's mission but also significantly contributes to regional and national development, reinforcing YSJ’s status as a cornerstone of academic and applied innovation in the UK.

CENTRE DIRECTOR: PROF PHILIPPE B. WILSON

Prof Philippe B. Wilson is the Associate Pro Vice-Chancellor for Innovation and Knowledge Exchange at York St John University and the Director of CAI. A Franco-British healthcare scientist, Wilson also serves as Chief Scientific Officer of NHS Willows Health. His research focuses on developing tools and technologies for translational medicine with applications in human, environmental, and animal health. Notably, his work includes significant advancements in nuclear magnetic resonance (NMR) technologies for point-of-care applications.

Wilson's notable accolades include being named in Forbes Magazine's 2018 "30 Under 30" for Healthcare and Medicine, highlighting his significant contributions to the field. His leadership at CAI continues to drive forward innovative research and foster collaborations that address critical global challenges. Professor Wilson received his PhD in Quantum Chemistry and specializes in Molecular Resonance.

INTRODUCTION

In an age where technological advancements rapidly redefine the boundaries of what is possible, Base Molecular Resonance™ Technologies (BMRT) stands at the forefront with its ground-breaking detection system. This system, detailed in US Patent No. 11493494 B2, harnesses the power of molecular resonance to offer unparalleled capabilities in detecting a diverse range of substances. This white paper is crafted to bridge the gap between the intricate technical data from the comprehensive validation report and a lay audience, emphasising the system's applications and significance in various fields.

REVOLUTIONISING DETECTION TECHNOLOGIES

Traditional detection methods, such as metal detectors, radiation detectors, chemical sensors, and chromatographs, have long been the mainstay in security and forensic science. However, these methods often face significant limitations in detection range, sensitivity, and the ability to identify non-metallic or non-radiative substances. For instance, metal detectors rely on the magnetic properties of metals, while radiation detectors are specific to radioactive emissions. Consequently, these conventional technologies may not effectively detect non-metallic threats or substances present in minute quantities, thereby limiting their utility in comprehensive security and forensic applications.

The advanced detection system developed by BMRT transcends these limitations through a fundamentally different approach. By utilising electromagnetic radiation and resonance frequencies tailored to the unique atomic structures of target materials, this system achieves exceptional accuracy and sensitivity. This enables it to detect a wide variety of substances, including explosives, narcotics, cancerous tissues, and nuclear materials, at variable distances depending on the mass and atomic composition of the target.

PURPOSE AND SCOPE OF VALIDATION

The primary objective of the validation report was to rigorously evaluate the performance of BMRT's detection system across multiple applications, ensuring its sensitivity, specificity, and reliability. The report covers extensive evaluations in four key areas:

1. Gunpowder Detection:

- Assessing the system's capability to detect various types of ammunition, including different calibres and manufacturers.

- Evaluating detection through barriers such as walls and entire buildings, as well as in moving vehicles.

- Testing sensitivity to distance, material density, and mixed rounds.

2. Drug Detection:

- Examining the system's ability to identify cocaine, heroin, and methamphetamine.

- Ensuring high specificity with no false positives or negatives.

- Validating detection consistency across different drug samples.

3. Cancer Detection:

- Determining the accuracy in detecting malignant breast and prostate cancer tissues.

- Conducting blind and double-blind tests to distinguish cancerous from non-cancerous tissues.

- Evaluating the system's potential for non-invasive early cancer detection.

4. Nuclear Materials Detection:

- Measuring the system's accuracy in identifying [redacted] nuclear materials [redacted]

- Confirming the triangulated coordinates' precision with actual geographic locations.

- Assessing the system's application in nuclear security and environmental monitoring.

KEY FINDINGS AND THEIR IMPLICATIONS

The validation report's findings are a testament to the detection system's advanced capabilities:

- Gunpowder Detection: The system consistently detected single and multiple rounds of ammunition, regardless of calibre or manufacturer, demonstrating 100% detection accuracy with no false positives or negatives. It maintained high sensitivity and reliability through various barriers and at significant distances, making it a robust tool for military, security and law enforcement applications.

- Drug Detection: The system exhibited high specificity in detecting cocaine, heroin, and methamphetamine, accurately identifying these substances without false positives or negatives. Its precision and consistency across different drug samples underscore its potential in counter-narcotics operations and forensic investigations.

- Cancer Detection: The system successfully identified malignant breast and prostate cancer tissues, distinguishing them from non-cancerous samples in both blind and double-blind tests. The absence of false positives and negatives highlights its reliability and potential as a non-invasive diagnostic tool, offering significant improvements in early cancer detection and patient outcomes.

- Nuclear Materials Detection: The system demonstrated remarkable accuracy [redacted] enabling precise identification of potential threats and ensuring safety in sensitive environments.

EXPANDING HORISONS WITH BMRT'S DETECTION SYSTEM

The practical implications of these findings are vast, extending across multiple fields:

- Military, Security, and Law Enforcement: Enhanced detection of explosives and narcotics can significantly bolster counterterrorism efforts, border security, and public safety at venues such as sports stadiums, concert arenas, amusement parks, transportation hubs, corporate campuses, educational institutions, government buildings, military bases, and critical infrastructure facilities.

- Medical Diagnostics: The system's potential for non-invasive early cancer detection represents a major breakthrough in medical diagnostics, offering a reliable and efficient method to improve patient outcomes through early intervention.

- Nuclear Security: Accurate detection [redacted] is vital for national security and environmental monitoring, ensuring the safe handling and storage of nuclear materials and protecting against potential threats involving weapons of mass destruction.

- Environmental Monitoring: The system's ability to detect a wide range of substances makes it a valuable tool for monitoring environmental pollutants and ensuring compliance with safety regulations.

OVERVIEW OF TESTS

Base Molecular Resonance™ Technologies (BMRT) has developed an extraordinary detection system capable of identifying a wide range of substances, from explosives and drugs to cancerous tissues and nuclear materials. This overview highlights the incredible results from a series of rigorous tests, demonstrating the system's ground-breaking performance and unparalleled accuracy.

1. GUNPOWDER DETECTION

Objective: To evaluate the system's ability to detect gunpowder in various challenging scenarios.

Single and Multiple Rounds: The system was tested with single and multiple rounds of ammunition from various manufacturers. It consistently detected every type of ammunition tested, including different calibres and manufacturers, with 100% accuracy. This means it identified each and every round without any errors, showcasing its precision and reliability. This level of performance is crucial for security applications where missing even a single round could have catastrophic consequences. The system's ability to flawlessly detect diverse types of ammunition underlines its versatility and robustness, making it an indispensable tool for law enforcement and military use.

Detection Through Barriers: Remarkably, the system maintained its high sensitivity even when detecting ammunition through walls, entire buildings, and in moving vehicles. This

capability is critical for real-world security applications where threats may be concealed behind physical obstacles. The tests demonstrated that the system could effectively identify the presence of ammunition through common building materials, ensuring that hidden threats are not missed. This ability to detect through barriers significantly enhances the system's utility in various environments, from urban settings to remote locations, providing an essential advantage in securing large areas and protecting public spaces.

Sensitivity to Distance: To see how far away the system could detect ammunition, tests were conducted at increasing distances. The system proved effective at detecting a fully loaded AR-15 up to an astonishing 580 feet away and one (1) .22 calibre bullet up to 71 feet away, making it ideal for long-range security operations. This long-distance sensitivity ensures early detection and enhances safety measures, giving security personnel the crucial time needed to respond to potential threats. The ability to maintain accuracy over such distances is a testament to the advanced technology behind the system, setting a new standard for detection capabilities in the industry.

2. DRUG DETECTION

Objective: To assess the system's ability to identify various illegal drugs with precision.

Cocaine, Heroin, and Methamphetamine: The system's performance in detecting these common illegal drugs was flawless, with 100% accuracy and no false positives or false negatives. This level of precision is crucial for law enforcement and counter-narcotics efforts, ensuring that only the correct substances are identified. In scenarios where a mistake could mean the difference between intercepting a dangerous drug shipment and missing it entirely, this system's reliability is invaluable. The tests confirmed that the system could accurately identify even minute traces of these drugs, proving its effectiveness in diverse operational conditions, from routine traffic stops to large-scale interdictions.

Consistency Across Samples: Different samples of each drug were used to ensure the system's reliability. The system's detection capabilities remained consistent across all samples, highlighting its robustness and trustworthiness in real-world scenarios. This consistency is critical in ensuring that the system can be relied upon in various settings, from urban environments to remote areas. The ability to consistently identify different forms and purities of these drugs reinforces the system's applicability across the spectrum of drug enforcement

operations, providing law enforcement agencies with a powerful tool to combat drug trafficking and abuse.

3. CANCER DETECTION

Objective: To explore the system's potential in non-invasive medical diagnostics by detecting cancerous tissues.

Breast and Prostate Cancer: The system was tested with samples of malignant (cancerous) breast and prostate tissues. It accurately identified the cancerous tissues and distinguished them from non-cancerous ones with impressive accuracy. This capability can revolutionise early cancer detection, offering a powerful tool for improving patient outcomes. Early detection is crucial in the fight against cancer, and the system's ability to accurately identify malignant tissues without invasive procedures represents a significant advancement in medical diagnostics. By potentially enabling earlier and more accurate diagnoses, this system can help doctors provide better-targeted treatments and improve survival rates for cancer patients.

Blind and Double-Blind Tests: To eliminate bias, the system was tested in blind and double-blind conditions. In blind tests, the operators did not know whether the samples were cancerous. In double-blind tests, neither the operators nor the evaluators knew the nature of the samples. The system excelled in both scenarios, reliably identifying cancerous tissues without any false positives or negatives. This unbiased testing underscores the system's reliability and potential as a non-invasive diagnostic tool. The rigorous testing conditions ensure that the system's performance is robust and dependable, providing a reliable alternative to more invasive diagnostic methods and potentially transforming the landscape of cancer detection.

4. NUCLEAR MATERIALS DETECTION

Objective: To verify the system's ability [redacted] nuclear materials, ensuring safety and security.

[redacted] The system demonstrated exceptional accuracy in detecting [redacted] with remarkable precision. This accuracy is vital for national security and environmental monitoring, providing reliable detection [redacted] The tests confirmed that the system could detect these substances even when they were shielded or concealed, ensuring that no potential threat goes unnoticed.

[redacted] The system's ability to determine the exact [redacted] was confirmed to be highly precise. [redacted] This precision is essential for security agencies tasked with monitoring and protecting sensitive sites, ensuring that any potential threats can be accurately and quickly identified. The system's capability to provide [redacted] nuclear materials enhances its utility in various scenarios, [redacted] making it a crucial tool for maintaining national and global security.

GENERAL DISCUSSION

The results from the extensive validation tests of Base Molecular Resonance™ Technologies' (BMRT) advanced detection system not only highlight its exceptional performance but also underscore its vast potential for practical applications across various fields. This discussion aims to delve into how these remarkable capabilities can be applied in real-world scenarios, providing tangible benefits in security, medical diagnostics, nuclear safety, and environmental monitoring.

MILITARY, SECURITY, AND LAW ENFORCEMENT

The detection system's flawless performance in identifying gunpowder and explosives, even though barriers and at significant distances, marks a significant advancement in security technology. Here's how these capabilities can be practically applied:

- Counterterrorism and Public Safety: The system's ability to detect ammunition and explosives through walls and buildings can be a game-changer for counterterrorism operations. It allows military and security forces to identify potential threats hidden within structures, ensuring that interventions can be made before an attack occurs. This is particularly crucial in high-risk areas such as airports, train stations, military bases, federal buildings, and public events where large crowds gather.

- Border Security: With the system's long-range detection capability, border security personnel can effectively monitor and intercept illegal arms trafficking. The ability to detect concealed weapons in vehicles or containers provides an added layer of security, preventing the smuggling of firearms and explosives into the country.

- Law Enforcement: The system's precision in detecting a wide range of ammunition types makes it invaluable for police forces. During raids or searches, officers can quickly identify the presence of hidden firearms and ammunition, ensuring safer and more efficient operations. This capability is also useful for routine traffic stops, where the system can be used to scan vehicles for concealed weapons.

MEDICAL DIAGNOSTICS

The detection system’s high accuracy in identifying cancerous tissues, without invasive procedures, holds immense potential for revolutionising medical diagnostics:

- Early Cancer Detection: Early detection of cancer significantly improves treatment outcomes and survival rates. The system’s ability to accurately identify malignant breast and prostate tissues could be implemented in routine health screenings. Non-invasive and highly reliable, this technology can encourage more people to undergo regular check-ups, leading to earlier diagnosis and treatment.

- Non-Invasive Diagnostics: The system’s non-invasive nature is particularly beneficial for patients who are unable or unwilling to undergo traditional biopsy procedures. By providing a painless and quick diagnostic method, it can enhance patient comfort and compliance, leading to better health outcomes.

- Real-Time Monitoring: The system could be integrated into primary care offices and medical facilities for continuous monitoring of patients at high risk of developing cancer. This real-time capability allows for timely intervention, potentially catching the disease in its nascent stages.

NUCLEAR SECURITY

The precise detection [redacted] for nuclear materials position the system as a critical tool for nuclear security and safety:

- Protection of Nuclear Facilities: The ability to accurately [redacted] The system can detect any unauthorised [redacted] providing an immediate alert to security personnel.

- National Security: In the context of national defence, the system can be deployed to safeguard against nuclear terrorism. Its precise detection capabilities ensure that any illicit transport of nuclear materials can be intercepted, preventing the possibility of a nuclear attack.

ENVIRONMENTAL MONITORING

Beyond security and medical applications, the system's ability to detect a wide range of substances can significantly enhance environmental monitoring efforts:

- Environmental Monitoring: For environmental agencies, the system offers a reliable method for tracking and managing nuclear waste. Accurate location and identification of nuclear materials ensure that they are handled and disposed of safely, protecting the environment and public health.

- Pollution Detection: The system can be used to detect pollutants in air, water, and soil. Its sensitivity to various chemical compounds allows for the early identification of

contamination, enabling timely remediation efforts. This is particularly valuable in industrial areas where the risk of chemical spills and emissions is high.

- Compliance with Regulations: Regulatory bodies can utilise the system to ensure compliance with environmental standards. By accurately detecting and measuring pollutants, the system provides a reliable means to enforce regulations and protect natural resources.

- Research and Development: Environmental scientists can leverage the system's capabilities for research purposes. Studying the presence and impact of various substances in different ecosystems can lead to better understanding and development of strategies to mitigate environmental damage.

CONCLUSION

The advanced detection system developed by Base Molecular Resonance™ Technologies represents a significant leap forward in detection technology. Its proven accuracy, sensitivity, and versatility across a range of applications highlight its potential to transform multiple fields. From enhancing military, security and law enforcement to revolutionising medical diagnostics and ensuring nuclear and environmental safety, the practical applications of this system are vast and impactful.

By integrating this technology into various sectors, we can create safer, healthier, and more secure environments. The detailed insights provided by the system enable proactive measures, timely interventions, and comprehensive monitoring, ultimately contributing to the well-being and security of society.