J15   In-Air Trajectories (IATs): Applications of an Emerging Handwriting Characteristic

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Learning Overview: The goals of this presentation are to introduce attendees to Electromagnetic Resonance (EMR) technology and the capabilities of the application of such technology to digitally captured signatures and to comprehension of the analysis and research capabilities of such technology to the area of forensic handwriting examination.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by familiarizing attendees with the use and capabilities of EMR technology.

The development and incorporation of digitally captured signatures (also known as biometric signatures) in routine business transactions worldwide has led to the advancement of the technology used in that process. As a result, several new features (either entirely new or old but represented in a new quantitative way) are now available for the forensic expert to analyze. One of these features relies on the capabilities of EMR technology that allows for a digitizer pad to locate the position of the tip of the compatible stylus without the need for actual contact between the two and hence map the trajectory of the stylus while moving in the air.

IATs—also known as in-air movements—are the invisible movements that are executed when the pen is lifted above the writing surface. These movements can be recorded using an electronic capturing device (e.g., a signature pad) of appropriate technology (i.e., EMR). The aim of this presentation is to demonstrate the potential of IAT analysis in forensic and non-forensic areas.

In the forensic field, research suggests that IATs are individualized characteristics that differ between genuine and forged signatures, with an increase in duration, jerk, and absolute size in the latter case. In the medical field, findings suggest an association between changes in IATs and different pathologies such as Alzheimer's disease, Parkinson's disease, multiple sclerosis, and depression, among others. Non-forensic research also supports the hypothesis that IATs are a part of the open loop motor program, as they are not influenced by writing systems or visual feedback. In conclusion, this study proposes the analysis of IATs along with on-surface trajectories in digitally captured signatures and reinforces the need to develop adequate methodology for IAT analysis. Further research should also be conducted to verify the repeatability of IATs, their identifying value, and to determine whether they are redundant.

Finally, additional information before and after the execution of a signature formation—that are now available for analysis with the proper software/hardware combination—will be discussed.

Biometric, In-Air, Signatures