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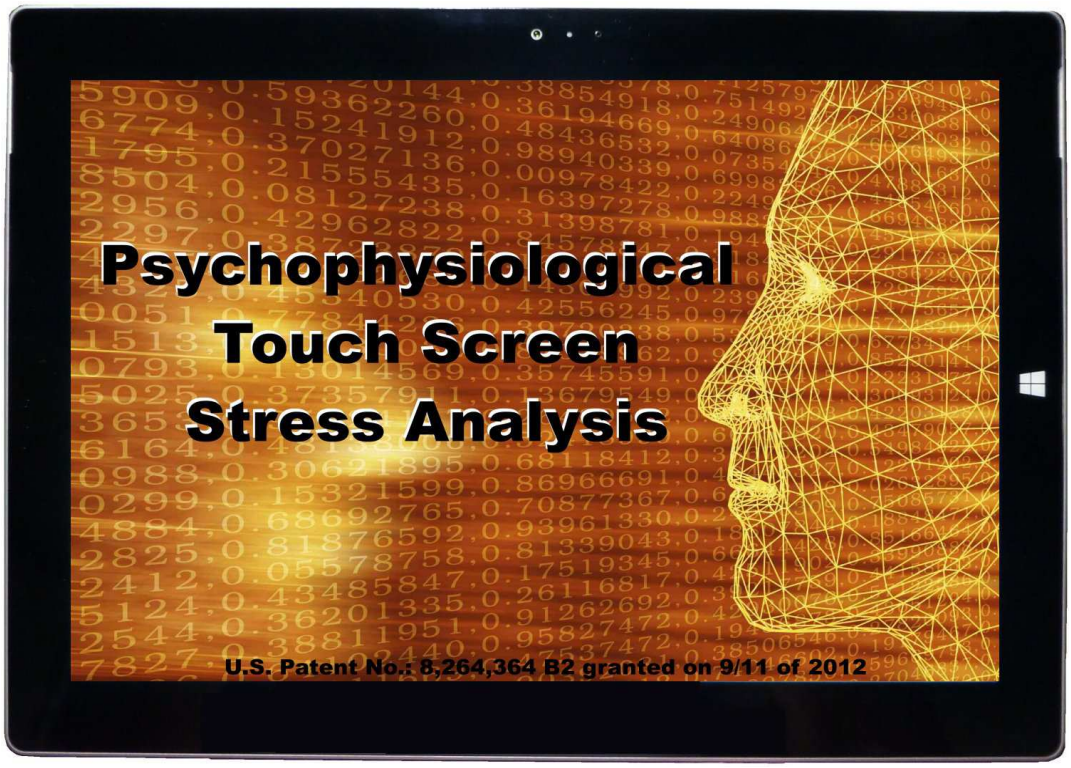

MicroSoft Surface 3 Pro Tablet

WHITE PAPER

PSYCHOPHYSIOLOGICAL TOUCH SCREEN STRESS ANALYSIS (PTSSA) Applied to Security and Investigative Screening

U.S. Patent No.: 8,264,364 B2 granted on 9/ 11 of 2012

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CONTACT INFORMATION

Phil Sprague
President/Inventor/CTO
PRS, LLC
phil@pvsa.net
Cell: 858.518.1160
Office: 858.768.0705

www.pvsa.net

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COMPANY BACKGROUND

The PRS, LLC team designed and built an innovative security screening system based on psychophysiological responses captured on advanced, specialized touch screen computers. This system is an objective investigative focus tool for agencies to screen for potential threats involving weapons of mass destruction, smuggling, terrorism, and many other criminal acts.

This investigative focus tool will identify those who are being less than truthful concerning specific issues that warrant further interviewing and/or investigation, in less than 3 minutes. This advanced technology has a proven accuracy of greater than 90% in two scientific studies conducted by PhD forensic psychologists.

The patented Psychophysiological Touch Screen Stress Analyzer (PTSSA) technology utilizes proprietary algorithms to identify involuntary heightened psychophysiological responses in a specially structured examination through carefully formulated questions.

The PTSSA system is committed to prompting full disclosure; uncover truth, and less than truthful statements and/or answers to direct questions. This technology serves as a tremendous intelligence gathering tool for government and industrial clients in assisting them to obtain reliable information from individuals. The PTSSA technology performs with the highest level of integrity. We believe deeply in our technology and follow the principle of continuous improvement of the technology as well as our business operations.

We are confident that over time its technical capability will contribute significantly to enhanced security worldwide.

CONTENTS

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PSYCHOPHYSIOLOGICAL TOUCH SCREEN TECHNOLOGY:

Significant Psychophysiological Response
SPR
The measured reaction to a question that, based on a comparative analysis indicates a question has provoked an emotional and physiological response.

The PTSSA technology is capable of capturing psychometric information on how a person emotionally reacts to a structured set of questions displayed on a specialized touch screen computer. The highly sensitive screen can be configured to measure minute, but significant variances in the touch used to answer Yes/No questions. This information is then analyzed using proprietary algorithms that process the subject's responses to the series of questions to determine which, if any, created a heightened response or "Significant Psychophysiological Response" (SPR). In general, the more reactive the person's response, the higher the SPR and the greater the correlation will be to potential risk.

Emotional and cognitive reactions to the psychological stimulus of highly structured and carefully crafted questions manifests in muscle tremors, which can be quantified, and measured. Details of the PTSSA's ability to generate meaningful information from micro muscle tremors is proprietary and patented technology which uses scientific methods and procedures closely related to those utilized in voice stress analysis and the polygraph. This will be described later.

A tremor is an unintentional, somewhat rhythmic, involuntary muscle movement involving movements (oscillations) of one or more body parts. Tremors are the most common of all involuntary movements and can affect the hands, arms, head, face, vocal cords, trunk, and legs. Most tremors occur in the hands. A more familiar type of tremor is the chattering of teeth, usually induced by cold temperatures or by fear.

Source:

PENNSTATE HERSHEY
Milton S. Hershey Medical Center

Muscle tremors are a proven indicator of psychological stress. As the PTSSA system displays individual questions, it measures the involuntary micro-muscle tremor variances of each person's emotional reaction every time their finger touches the specialized touch screen computer in response to a question. These variances are detected in as little as one hundredth of a second.

Our team has spent more than a decade developing highly innovative, objective screening tool, designed to identify and detect individuals who are a real and present threat. The PTSSA kiosk and desktop stations utilize psychophysiological stress

analysis algorithms to identify individuals with an abnormal reactivity to standard or specialized security screening questions. Our team is headed by Phil Sprague who developed and patented the PTSSA. It serves as a powerful deterrent, as an well as objective means for identifying individuals involved in weapons of mass destruction, smuggling, terrorism, and other types of criminal activities. The technological foundation for patented PTSSA technology is built upon decades of validation studies from Voice Stress Analysis and its predecessor, the polygraph.

The PTSSA technology records and analyzes the results of involuntary muscle tremors, similar to the polygraph and voice stress analysis, but is able to do so using the advanced technologies of highly sensitive touch screen computers and digital processing of data from the physiological inputs using proprietary algorithms. The PTSSA technology builds on the well-understood science of psychophysiological responses refined over decades of work with investigative focus technologies, but is able to gather and process the information in a fraction of the time and at significantly lower cost.

PTSSA TECHNOLOGY AS AN AIRPORT SECURITY TOOL

Security screening at airports has undergone major changes since the 9/11 attacks. Because potential threats to airline transportation are constantly evolving, they are causing the tools of detection and investigation to evolve as well. Security systems must now encompass far more than metal detection for standard weapons such as guns or knives. With the advent of the 3D printing, it is necessary to detect plastic weaponry as well as liquid and dry explosives, caustics, and bombs implanted within the human body. Despite the considerable advances in technology and organization, a recent study conducted by TSA concluded current screening methods missed 75% of fake bomb components at Los Angeles International Airport, 60% at Chicago O'Hare, and 20% at San Francisco International, run by private security. These are unacceptable failure levels when dealing with such potentially enormous consequences. In 2015, undercover TSA agents were able to pass through security screening with weapons on or about their bodies 95% of the time.

TSA spent $900 million on the S.P.O.T. program from 2007 to 2013 the GAO reported S.P.O.T. was only slightly better than random chance in detecting potential threats.

In addition to the challenges posed by identifying weapons it is highly desirable for customs and immigration officers to know more about the intent and truthfulness of the people passing through their airports and borders.

Recently, there has been a much greater focus on Intelligence Screening. This involves linking a person's background information with biometric verification to establish a risk profile. These efforts are a step forward, but they are expensive and operationally intricate. Expense and complication limit the usefulness of this option.

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AIRPORT SECURITY PROCESS INTEGRATION:

The PTSSA technology is designed as a uniquely efficient, low-cost mass screening system with an easily deployable and expandable infrastructure.

One trained agent can monitor multiple stations simultaneously, thereby establishing an ultra-efficient screening process.

The PTSSA technology offers an ideal tool for detecting individuals posing potential threats in airports and other transport terminals, including but not limited to, border crossings, immigration offices, embassies, cargo inspections, and internal agency infrastructures. Counter terrorism was the primary development focus of the PTSSA technology.

"OBJECTIVITY" WITHIN THE RISK PROFILING EQUATION.

Is it possible to establish a reliable risk profile of a person based upon behavioral clues? The answer is "Yes", although this form of risk identification is typically concentrated to secondary screenings and must be performed by agents with specialized training. The inherent weakness of these symptoms is one of subjectivity. Accuracy and reliability results are too often based upon an agent's training level and proficiency with the methods used.

Incorporation of an objective investigative tool into the behavioral risk screening process offers powerful new possibilities. The PTSSA technology provides agents with a fast and effective tool that combines biometric and psychometric testing.

Currently a person is rarely, if ever, asked security related questions. If they are, there are no means of timely or accurate verification. An exception to this is the very effective system of questioning that Israeli airport security is based on, but it is a time consuming process.

The PTSSA technology presents 18 carefully selected and structured questions in the person's native language. The potential threats test, presents questions related to weapons, smuggling, and terrorist activities with added known outcome internal validation questions.

The information from each PTSSA pre-boarding or pre-entry test is processed in real time by a PTSSA computer server, which contains special algorithms that will determine how the person emotionally reacted to each survey question. The PTSSA technology is a sophisticated investigative focus tool designed to generate a risk assessment regarding a person's veracity and connection concerning weapons concealment, smuggling, terrorism, and/or other criminal behavior.

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If no Significant Psychophysiological Reaction (SPR) patterns are detected in the Basic Screening Test (BAT), then the person will simply continue through the screening station.

However, if the person exhibits high SPR reaction patterns to the issues of weapons concealment, smuggling, or terrorism during the BAT, and it is determined that a pre-established criteria is met, it is recommended a Secondary Screening Test (SST) be conducted directly by a higher level agent. The SST takes less than 3 minutes to complete. If no further abnormal stress reaction patterns are detected in this secondary testing, the traveler will simply continue through to the boarding or entry process the station.

If the traveler continues to exhibit consistently abnormal stress reaction patterns in the SST, it is suggested the subject be carefully interviewed and examined by qualified security personnel before access or entry.

One of the key features of the PTSSA process is that it eliminates the potential of analyst error and/or bias. No other investigative focus system matches PTSSA's combination of accuracy, reliability, versatility, and speed. The PTSSA system can simultaneously screen thousands of individuals, and produce easy to interpret results. For individuals who cannot read their own native language, an audio feature can complement the system.

This paper does not suggest other security measures currently in place be removed or displaced with the implementation of PTSSA technology. To the contrary, it will greatly enhance current security screening capabilities.

The PTSSA System (May 2014)
https://www.youtube.com/watch?v=YuuvN8QHONU

Admiral Peter Hekman (ret) KFMB News story (January 2010)
https://www.youtube.com/watch?v=ZnCRQ0Cg-XQ

Lagos Nigeria Testing (December 2010)
https://youtu.be/PGsEQ70kM6g

Voice Stress Analysis (June 1983)
https://www.youtube.com/watch?v=uRmVgFWbP6k

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Risk Assessment Security Screening at Ports of Entry/Exit

At the March 6, 2013 World Aviation Security Conference in New York City, NY, professionals from the World's Government Security Agencies, Airlines, and Airport Operations were surveyed as to the following question:

"What is the most important contributing factor of [Passenger] Risk Assessment?"

Intelligence	**42%**
Behavioral Analysis	**21%**
Known Traveler	**15%**
Passenger Data	**15%**
Flight and Passenger Type	**6%**

The most startling aspect of these survey results is there are virtually no objective tools currently available in the marketplace for security screening administrators to use in behavioral analysis! The PTSSA technology is also a highly effect intelligence gathering tool and can be very helpful to known traveler programs, as well as gathering passenger data. The PTSSA system provides the first such technology available for an objective and ultra fast mass-screening process and risk assessment.

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PTSSA SAMPLE SYSTEM CONFIGURATION FOR AIRPORT AND BORDER SECURITY:

The pre-boarding evaluation is perhaps the most important part of the security measures needed at any port of entry/exit. In the past, risk assessment interviews could only be evaluated by security professionals based on training and intuition, and only then after extensive questioning.

Here is an outline of a sample system configuration illustrating how travelers would interface with the PTSSA.

1. Each traveler would approach an available PTSSA Kiosk Screen and swipe their ID card or passport through a card reader so the information will be associated with the test results.

2. The Screen will prompt them to select their preferred language. The PTSSA Potential Threats Tests are currently available in several languages, with an option of more.

3. Introduction screens explain the test and establish a psychological pre-conditioning of the traveler.

4. Approximately 18 questions are presented on the touch screen in the person's native language (also in audio), which requires them to touch either a "Yes" or "No" answer. The basic survey takes about 60 to 90 seconds to complete.

5. Results are displayed on an administrator's display screen. The traveler's screen displays a green "Please Proceed", or red "Please Wait" screen image. The wait screen prompts Security personnel to stage a secondary interview and more comprehensive screening process.

The following diagram depicts a hypothetical system installation of 28 touch screens that can screen 28 individuals simultaneously. The test takes less than 3 minutes to complete. At station 29 there are 3 touch screens (26, 27, and 28) that are utilized for Secondary Screening. Station #29 has a touch screen computer monitor that is used for reporting results.

The Security Screening Agent would touch #1 on the report screen. The number turns red indicating a potential threat. A small window would open displaying the survey results (see below).

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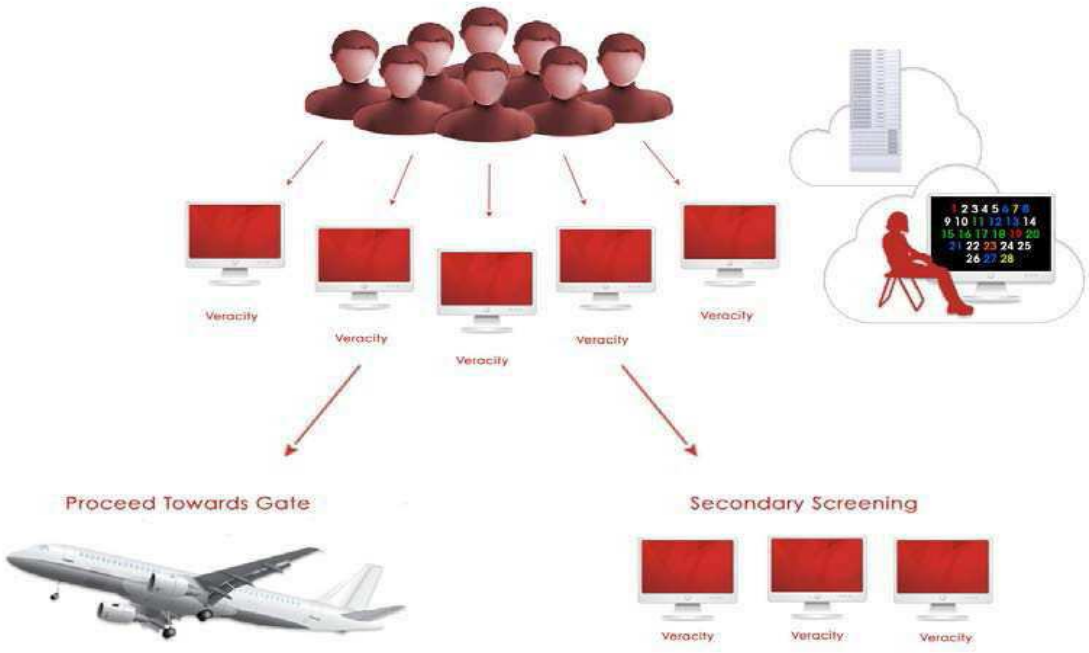

FIRST PROOF OF CONCEPT STUDY FOR THE PTSSA TECHNOLOGY

A study was concluded in 2005 to determine whether or not the Psychophysiological Touch Screen Stress Analyzer (PTSSA) is capable of capturing a psychophysiological response to a series of text stimuli.

In this study, a truth verification survey was administered to 25 different subjects. This survey was adapted for the PTSSA technology from a psychological preconditioning questionnaire developed for voice stress analysts and polygraph examiners in the 1980's.

Each test subject read the adapted questionnaire on the computer touch screen of the PTSSA system. The subject then answered each of the 65 questions by touching the "Yes" or "No" buttons located at the bottom of the touch screen. After each touch screen answer button was touched by the subject, the next question was automatically displayed. Only the last 13 questions of the touch screen survey were analyzed to determine emotional reaction patterns (the same procedure followed in voice stress analysis and polygraph).

Immediately after the touch screen survey was completed, a Psychophysiological Voice Stress Analysis (PVSA) examination was administered to each subject. The 26 questions asked were the same as the last 13 questions administered by the PTSSA system. The PVSA examination was prerecorded and played back through headphones placed over the subject's ears. The subject's "Yes" or "No" verbal responses to each question were digitally recorded by means of a boom microphone attached to the headphones. The microphone was place in a position just to right of the subject's mouth, approximately 1 inch. After the PVSA examination was administered, each "Yes" or "No" verbal response was analyzed to determine the subject's emotional reaction patterns.

CONCLUSION: There was a 100% correlation between the PTSSA technology and PVSA concerning the relevant and control questions. This evidence substantiates, beyond a reasonable doubt, that when the subject touches the specialized computer touch screen, in response to the stimuli displayed on the touch screen, the psychophysiological response was captured accurately.

A SECOND PROOF OF CONCEPT STUDY FOR THE PTSSA TECHNOLOGY

In 2009 a second study was conducted. In this study 147 individuals were given a 15 question Potential Threats Test used for identifying smugglers and terrorists on the PTSSA system. The survey was administered in a non-threatening environment, the same as the 2005 proof of concept study. The first 5 questions were used to adapt the person to answering and responding to questions on the touch screen. Questions 6 through 8 concerned weapons; questions 9 through 11 concerned smuggling; questions 12 through 14 concerned terrorism; and question 15 was a non-threatening closing question. A factor analysis and standard deviation was completed on the 147 tests. This test allowed for further refinement of the question set as well as introduction screen lay-out and examination instructions. The PTSSA technology was able to further detail and capture important data regarding populous baseline averages and ranges.

Results indicated the emotional reaction to each question decreased from the beginning of the survey to the end of the survey. This decrease of 8.97% in emotional reaction was because the subjects relaxed and adapted to on the PTSSA system.

REAL WORLD ENVIRONMENT FIELD ACCEPTANCE TEST OF THE PTSSA TECHNOLOGY.

The Known Outcome Test (KOT) was designed to provide additional evidence that the Touch Screener System can accurately determine when a person is practicing deception. This KOT was one of the examinations that were administered from November 30 to December 14, 2010 at the Lagos, Nigeria International Airport to a number of adult passengers and security agents without regard for their age, ethnicity, or gender. This testing process was monitored and observed by officials from the Nigerian Civil Aviation Agency (NCAA) and the Federal Aviation Administration of Nigeria (FAAN).

The KOT is a 16 question test, with 4 questions concerning the number 4. The KOT test subject is instructed to intentionally lie to any question concerning the number 4 appearing on the computer touch screen. Because of the benign subject matter (no jeopardy or perceived threat), the PTSSA technology must detect abnormal reaction patterns (deception) 2 out of 4 times concerning the number 4. The last question, 16, “Did you ever lie to escape deserved punishment’, was used in an attempt to induce an emotional reaction from the test subject, even if answered truthfully.

CONCLUSION: The reliability of the KOT examination was 99.163% in detecting when a person was being less than truthful.

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TWO SCIENTIFIC STUDIES BY Ph.D. FORENSIC PSYCHOLOGISTS

Several real-world studies with actual jeopardy assessing PTSSA accuracy were conducted with subjects in court-ordered drug treatment programs in San Diego, CA. The first validation study consisted of 77 participants, required to maintain sobriety, who took both a PTSSA test asking about their treatment and abstinence and a lab-confirmed urinalysis drug test. The PTSSA technology proved to be 92% accurate in determining if a test subject used illegal drugs. The results of this peer-reviewed study were published in the *International Journal of Psychiatry and Mental Health* (Pizitz et al, 2014, 2, 70-76).

To determine the reliability of the findings from Pizitz (2014), a replication study was executed with a separate test participant sample consisting of 101 known drug and alcohol users. The results of this second validation study were consistent with the first validation study demonstrating the reliability of the PTSSA technology. This second validation study was published in the American Journal Of Applied Psychology (Pizitz, Scheuber, Wallner, & Fernandez (2015).

A REAL WORLD STUDY CONDUCTED IN MEXICO

In October 2015, PTSSA representatives in Mexico City completed a second round of testing with employees at a hotel, a car dealership, a Pemex gas station, and a clothing manufacturing company. Over 400 tests were administered in 3 days. The average testing time per subject was about 2.5 minutes.

The Mexico representatives employed a professional interviewer/interrogator who is retired from Mexican Federal law enforcement. Subjects classified by PTSSA as a high or very high risk, were sent to the professional interviewer/interrogator for further evaluation. In each case, more information was obtained from the high risk subjects, and proved the touch screen analysis agreed with the interviewer/interrogator 100% of the time. Also, a number of employees quit their job during this screening process before they were tested.

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APPENDIX A: OTHER APPLICATIONS

Airport Passenger Screening and Ports of Entry

A. Passengers
B. Internal Security Threats
C. Personnel Screening
D. Counter Terrorism applications

Law Enforcement and Governmental Agencies - city, county, state, federal

A. Job and License Applicants
B. Post Screening of Employees
C. Criminal Investigative Interviews
D. Post Criminal Conviction (Probation and Parole)
E. Work Release Programs
F. Drug use monitoring
G. Child custody issues
H. Corrections Prisoners and Visitors
I. Counter Terrorism
J. Verification of Information from witnesses, suspects, informants

Embassies and Consulates screening

A. Individuals issued Visas
B. In Country Personnel
C. Counter Terrorism
D. Documentation Verification

Military

A. Recruits
B. Combatant Detainee Interview
C. Counter Terrorism
D. Criminal Investigative Interviews and Verification of Information
E. Prisoners and Visitors

Department of Defense Contractors and Sub Contractors

A. Job Applicants
B. Counter Terrorism
C. Security Clearance protocol
D. Drug use

Private Investigators and Security Contractors

A. Job Applicants (as permitted by the Federal Employee Polygraph Protection Act)
B. Verification of Information from witnesses, suspects, informants
C. Polling Surveys

Secure Space and Classified Information Access Control

A. Verifying intent to use classified access or information
B. Verification of removal of classified information without permission
C. Intent of exploiting access
D. Intent of disseminating classified information

For additional detailed information see **www.pvsa.net**