

***HuRAM***

**GMM**

***Human RISK ASSESSMENT  
AND  
MANAGEMENT***

**COGNITIVE RISK ASSESSMENT  
FOR  
CONTINUAL ACCESS AUTHORIZATION**





LAYNE PERELLI, PH.D  
OWNER OF GMM  
HUMAN FACTORS EXPERTISE  
TECHNOLOGY INNOVATOR  
BEHAVIORAL SCIENTIST  
RETIRED USAF OFFICER



# ***GRAY MATTER METRICS, LLC***

“The Brains behind *CogSpeed*<sup>™</sup>”



MIKE ROUTEN  
GMM DATABASE MANAGER  
24 YEARS SOFTWARE EXPERTISE  
MICROSOFT SPECIALIST



# THE PROBLEM

**THERE ARE SERIOUS UNADDRESSED SECURITY RISKS TO “THE SYSTEM” FROM  
HUMAN ERROR**

**CAUSED BY**

- **FATIGUE**
- **DRUGS**
- **ALCOHOL IMPAIRMENT**



## PERSONNEL SECURITY SYSTEMS

DO NOT GO FAR ENOUGH TO PROTECT HIGH VALUE ASSETS

- ACCESS GRANTED SOLEY ON VERIFYING IDENTITY
- HUMAN THREAT RISK IS NOT CONTINUALLY ASSESSED



***CURRENTLY***  
***THE COMMERCIAL WORLD***  
***DOES NOT ADEQUATELY***  
***ASSESS AND MANAGE***  
***HUMAN RISK TO THEIR SYSTEMS***



***PROTECTING COMPANIES***

***FROM***

***THEMSELVES***

***FROM***

***INSIDE THREATS***



# WHAT A STATE OF THE ART SECURITY SYSTEM SHOULD DO

- VERIFY HUMAN RISK **BEFORE** ACCESS IS GRANTED
- VERIFY RISK **THROUGHOUT** THE DUTY CYCLE
- NOTIFY MANAGEMENT **IMMEDIATELY** FOR UNACCEPTABLE RISK
- ASSESS RISK FROM **FATIGUE, ALCOHOL, AND DRUGS** WITH ONE SYSTEM
- MONITOR WORLD-WIDE RISK FROM A **CENTRAL LOCATION**
- LOWER **INSURANCE RATES** BY MANAGING HUMAN RISK OBJECTIVELY



# ***THE SOLUTION: CogSpeed***

***THE FIRST BEHAVIOR-BASED CYBERSECURITY SOLUTION  
FOR HUMAN RISK ASSESSMENT***

***POSITIVE ACCESS CONTROL***

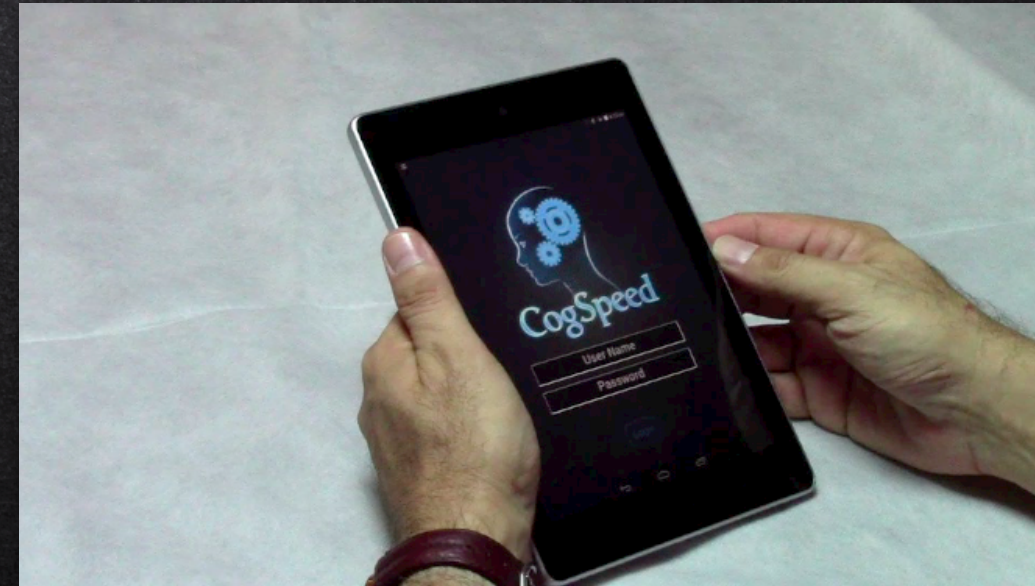
***COGNITIVE RISK ASSESSMENT  
FOR  
CONTINUAL ACCESS AUTHORIZATION  
TO  
ANY JOB SITE***





## ***HUMAN ENGINEERED FOR FIELD USE***

- UNIVERSAL APPLICABILITY  
**NO LANGUAGE REQUIREMENT**
- WORLD-WIDE DEPLOYABILITY  
**WORKS ON ANY MOBILE DEVICE**
- EASY TO LEARN - HARD TO FOOL  
**RELIABLE RISK ANALYSIS**



***PRACTICAL ~ IMMEDIATE ~ DEPENDABLE ~ AFFORDABLE***





- **CONTINUAL** ASSESSMENT THROUGHOUT THE WORKDAY

- **FATIGUE**
- **DRUGS**
- **ALCOHOL**

- **MANAGE RISK** OF HUMAN ERROR

- **PROACTIVE CORRECTIVE ACTION**

- **RESULTS**

- **FEWER ACCIDENTS**
- **PROTECTS HIGH-VALUE ASSETS**
- **MINIMIZES COSTLY MISTAKES**
- **REDUCES LIABILITY AND LAWSUITS**





## **“THE SYSTEM”**

**A EXTREMELY WIDE RANGE OF HIGH-VALUE ASSETS THAT NEED PROTECTION**

- **AIR, LAND, & SEA TRANSPORTATION SYSTEMS**
- **CONSTRUCTION SITES**
- **INDUSTRIAL FACILITIES**
- **POWER PLANTS**
- **FINANCIAL CENTERS**
- **COMPUTER SYSTEMS**
- **MEDICAL FACILITIES**
- **FAA**
- **NSA**
- **MILITARY OPERATIONS**



***THE TOTAL SOLUTION***

# ***HuRAM***

***Based on***



***Technology***



# *HuRAM*

**SCADA**

***(Supervisory Control and Data Acquisition)***

***for***

***Humans in the System***



# *HuRAM*

## *Human RISK ASSESSMENT AND MANAGEMENT*

- *Integrates CogSpeed technology*
- *IMMEDIATE ALERT TO MANAGEMENT WHEN*
  - UNACCEPTABLE RISK DETECTED
- *WORLD-WIDE RISK MANAGEMENT*
  - AT A *CENTRAL LOCATION*





***BEHAVIOR-BASED BIOMETRIC PLATFORM TECHNOLOGY  
FOR  
COGNITIVE RISK ASSESSMENT***

***HuRAM***

POWERED BY CogSpeed





GRAY MATTER METRICS  
SECURE DATA STORAGE

**HuRAM**



TEST  
RESULTS

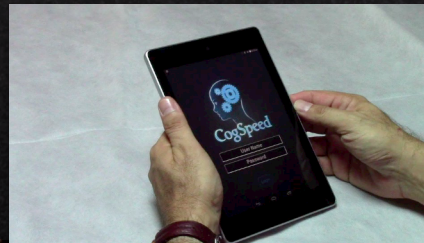
ALERTS

GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER

CORRECTIVE ACTION



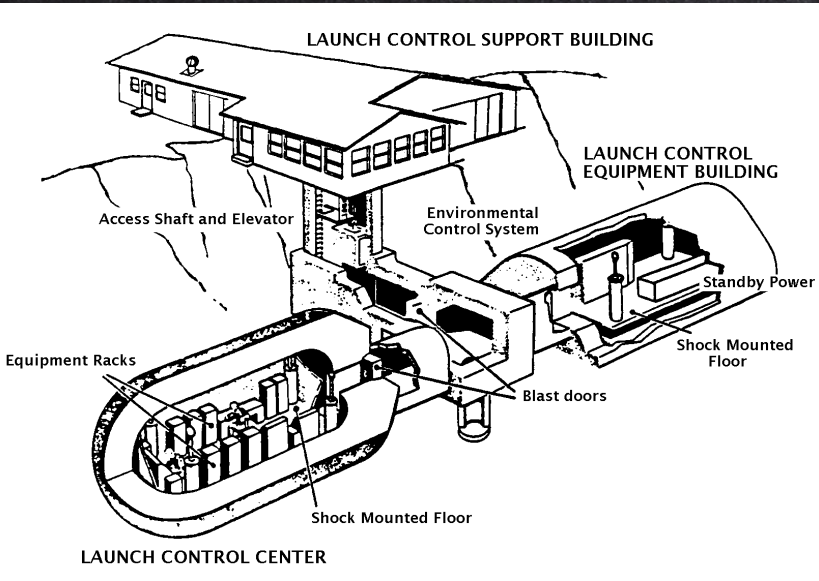
NUCLEAR POWER  
PLANT CONTROL  
ROOM





# GRAY MATTER METRICS SECURE DATA STORAGE

# HuRAM



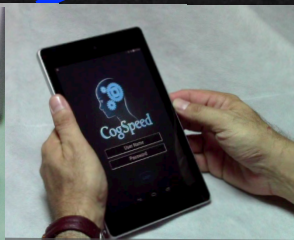
**TEST  
RESULTS**

**ALERTS**

**GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER**

**CORRECTIVE ACTION**

**ICBM LAUNCH CONTROL FACILITY**





GRAY MATTER METRICS  
SECURE DATA STORAGE

**HuRAM**



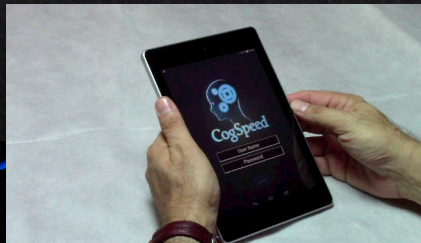
TEST  
RESULTS

ALERTS

GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER

CORRECTIVE ACTION

FAA  
AIR TRAFFIC  
CONTROL CENTER







**NSA CYBER  
WARFARE HQ**

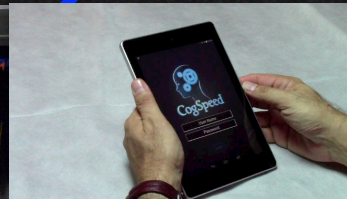
**GRAY MATTER METRICS  
SECURE DATA STORAGE**



**HuRAM**



**TEST  
RESULTS**



**ALERTS**

**GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER**



**CORRECTIVE ACTION**





GRAY MATTER METRICS  
SECURE DATA STORAGE

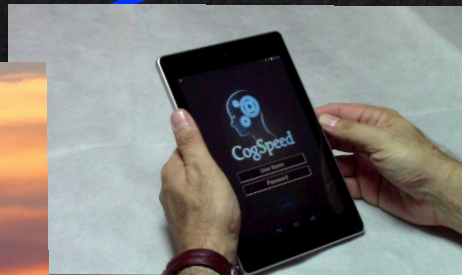
# HuRAM



COMMERCIAL  
AVIATION OPERATIONS



TEST  
RESULTS



ALERTS

GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER



CORRECTIVE ACTION





GRAY MATTER METRICS  
SECURE DATA STORAGE



**HuRAM**



NATIONAL  
FLIGHT OPERATIONS  
CENTER

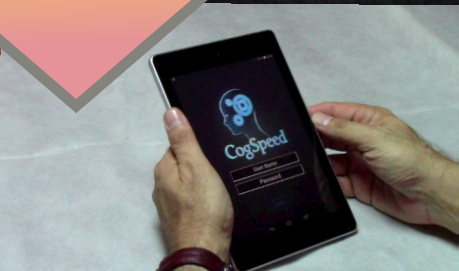
TEST  
RESULTS

GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER

ALERTS



CORRECTIVE ACTION





GRAY MATTER METRICS  
SECURE DATA STORAGE

**HuRAM**



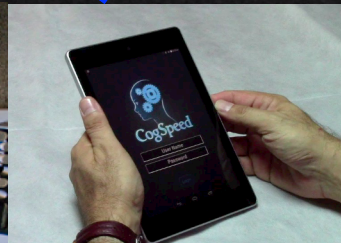
**DRONE WARFARE  
OPERATIONS  
CENTER**



**TEST  
RESULTS**

**GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER**

**ALERTS**



**CORRECTIVE ACTION**





GRAY MATTER METRICS  
SECURE DATA STORAGE



**HuRAM**



GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER



TEST  
RESULTS

ALERTS

CORRECTIVE ACTION

DRIVERS





GRAY MATTER METRICS  
SECURE DATA STORAGE

**HuRAM**

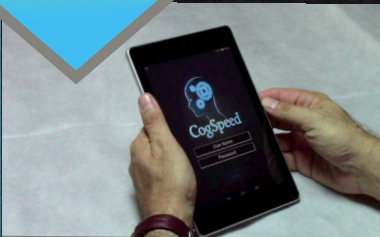


TEST  
RESULTS

ALERTS

GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER

INTERNATIONAL  
SHIPPING CONTROL CENTER



CORRECTIVE ACTION



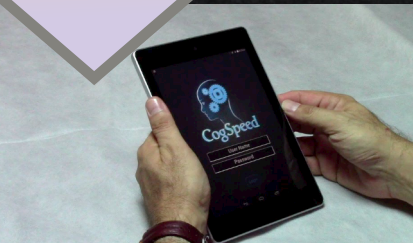


GRAY MATTER METRICS  
SECURE DATA STORAGE

**HuRAM**



**CONSTRUCTION  
WORKERS**



**TEST  
RESULTS**

**ALERTS**

**CORRECTIVE ACTION**

**GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER**





GRAY MATTER METRICS  
SECURE DATA STORAGE

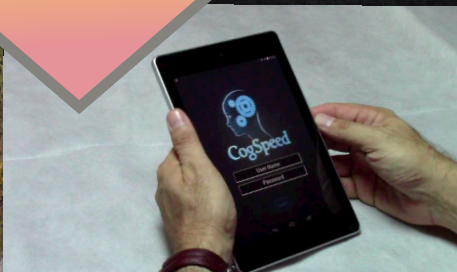
**HuRAM**



**GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER**



**ATHLETES**



**TEST  
RESULTS**

**ALERTS**

**CORRECTIVE ACTION**



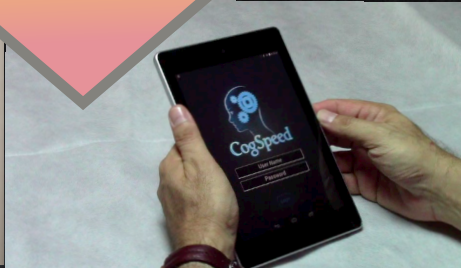
GRAY MATTER METRICS  
SECURE DATA STORAGE



**HuRAM**



**TRAUMATIC  
BRAIN INJURY**



**GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER**



**TEST  
RESULTS**

**ALERTS**

**CORRECTIVE ACTION**



GRAY MATTER METRICS  
SECURE DATA STORAGE

**HuRAM**



TEST  
RESULTS

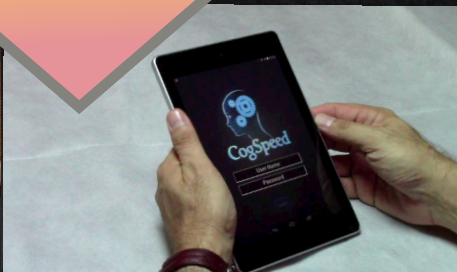
ALERTS

GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER



MEDICAL  
STAFF

CORRECTIVE ACTION





GRAY MATTER METRICS  
SECURE DATA STORAGE



**HuRAM**

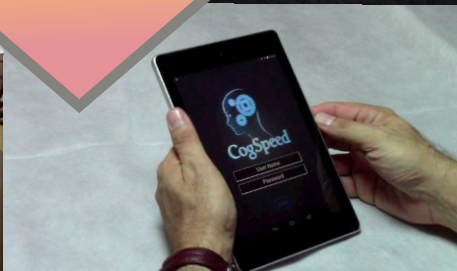


TEST  
RESULTS

ALERTS

GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER

SENIORS



CORRECTIVE ACTION





GRAY MATTER METRICS  
SECURE DATA STORAGE

*HuRAM*



**ANYONE**

**TEST RESULTS**

**ALERTS**

**CORRECTIVE ACTION**

**GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER**





***THE TOTAL SOLUTION***

# ***HuRAM***

***Based on***



***Technology***





**END**







# ***BACK UP SLIDES***



# *CogSpeed*

## ***POSITIVE ACCESS CONTROL FOR ALL WORKERS***

- ***YOUR EMPLOYEES***
- ***YOUR SUBCONTRACTORS***
- ***OTHER CLIENTS***





# ***USE CASES***

***WHERE IS CogSpeed NEEDED?***

***EVERYWHERE THERE IS A HUMAN INVOLVED***

***IN A HIGH-VALUE ACTIVITY***



## **USE CASE: ATHLETES**

- **CONCUSSION MONITORING**
  - **PRE-GAME/PRACTICE ASSESSMENT**
  - **POST-GAME/PRACTICE ASSESSMENT**
  - **RECOVERY PHASE**
- **PROVIDES RECORDS OF PERFORMANCE**
- **HELPS COACHES DECIDE ON NEED FOR FURTHER EVALUATION**
- **NOTIFY/ASSURE PARENTS**
- **CONTINUAL MONITORING DURING RECOVERY PHASE**
- **ALSO PROVIDES BASIC SCREENING FOR FATIGUE, ALCOHOL, OR DRUG USE**



***FATIGUE, ALCOHOL, DRUGS CAUSE  
A HIGH RISK OF HUMAN PERFORMANCE FAILURE***

***TWO APPROACHES TO REDUCING THAT RISK***

- ***HOPE AND TRUST YOU CAN MINIMIZE THE RISK***
- ***IDENTIFY AND CONTROL THE RISK***



## **ORIGINS OF THE TECHNOLOGY CONCEPT**

**UNIVERSITY REACTION TIME EXPERIMENTS**

**PDP 10 DISTRIBUTED COMPUTER NETWORK - 1968**





## ORIGINS OF THE TECHNOLOGY CONCEPT

**SPACE AND MISSILE SYSTEMS ORGANIZATION  
SAMSO 1971-1975**

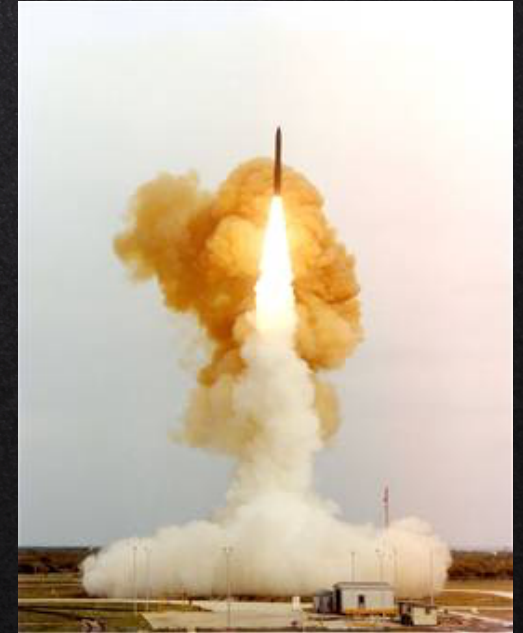
**SURVIVABLE 1ST STRIKE ICBMS  
MX**

**AIRLIFT SIMULATION MODELS**

**AIRCREW UTILIZATION RATE - CREW RATIOS**

**SURVIVABLE COMMAND AND CONTROL  
ARPANET**

**WORLD-WIDE COMPUTER COMMUNICATIONS**





# ORIGINS OF THE TECHNOLOGY CONCEPT



## USAF SCHOOL OF AEROSPACE MEDICINE 1977-1980

### AIRCREW STRESS STUDIES 1976-1980

- FATIGUE RESEARCH PROGRAMS
- EARLY LONG-DURATION SPACE MISSION RESEARCH
- GAT-1 FLIGHT SIMULATORS AND PDP12 COMPUTER AT MY DISPOSAL





**SCHOOL OF AEROSPACE MEDICINE  
BROOKS AIR FORCE BASE  
SAN ANTONIO, TEXAS**

GMM



**CREW  
STRESS  
LABORATORY**



**DIGITAL EQUIPMENT CORP  
DEC PDP 12**





**GENERAL AVIATION TRAINER  
GAT-1**







12  
LMI

Report SAM-TR-80-49

AD A105484

**FATIGUE STRESSORS IN SIMULATED LONG-DURATION FLIGHT**  
Effects on Performance, Information Processing,  
Subjective Fatigue, and Physiological Cost

Layne P. Perelli, Captain, USAF

DTIC  
ELECTE  
OCT 8 1981  
A

December 1980

Final Report for Period March 1977 - January 1980

Approved for public release; distribution unlimited.

FILE COPY

USAF SCHOOL OF AEROSPACE MEDICINE  
Aerospace Medical Division (AFSC)  
Brooks Air Force B. e. Texas 78235





Report SAM-TR-81-37

GMM

**HUMAN-FACTORS EVALUATION OF C-141  
FUEL SAVINGS ADVISORY SYSTEM**

**Layne P. Perelli, Major, USAF**

**December 1981**

**Final Report for Period December 1979 - February 1981**

Approved for public release; distribution unlimited.

**USAF SCHOOL OF AEROSPACE MEDICINE  
Aerospace Medical Division (AFSC)  
Brooks Air Force Base, Texas 78235**





12

Report SAM-TR-82-21

**ESTIMATING AIRCREW FATIGUE: A TECHNIQUE  
WITH APPLICATION TO AIRLIFT OPERATIONS**

AD A 1 2 5 3 1 9

Sherwood W. Samn, Ph.D.  
Layne P. Perelli, Major, USAF

December 1982

DTIC FILE COPY

Final Report for Period October 1980 - September 1981

DTIC  
ELECTED  
MAR 0 4 1983

Approved for public release; distribution unlimited.

USAF SCHOOL OF AEROSPACE MEDICINE  
Aerospace Medical Division (AFSC)  
Brooks Air Force Base, Texas 78235



88 03 04 012



# United States Patent [19]

Perelli

[11] Patent Number: 4,464,121

[45] Date of Patent: Aug. 7, 1984



[54] **DEVICE FOR MEASURING FATIGUE EFFECTS**

[76] Inventor: Layne P. Perelli, 19914 Encino Ridge, San Antonio, Tex. 78259

[21] Appl. No.: 372,771

[22] Filed: Apr. 28, 1982

[51] Int. Cl.<sup>3</sup> ..... G09B 7/04

[52] U.S. Cl. .... 434/236; 273/1 E; 340/365 R; 434/258

[58] Field of Search ..... 272/129, DIG. 5, DIG. 6, 272/DIG. 7; 73/379; 273/1 G, 1 GC, 1 GE, 1 GH, 1 GI, 85 G, 237; 248/367; 434/236-238, 258; 340/365 VL, 365 R; 364/410, 706, 708

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

2,947,092	8/1960	Arnold et al. ....	35/48
3,390,397	6/1968	Friedlander .....	346/33
3,473,239	10/1969	Noseworthy .....	35/21
3,526,971	9/1970	Shipley .....	35/9
3,685,169	8/1972	Blau et al. ....	35/8 R
3,953,929	5/1976	Hansel .....	35/48 R
3,971,142	7/1976	Hollander .....	35/22 R
3,989,242	11/1976	Shankel et al. ....	434/258
4,010,556	3/1977	Ellsworth et al. ....	35/30
4,051,605	10/1977	Toal et al. ....	434/201
4,059,272	11/1977	Pullman .....	273/237
4,086,710	3/1978	Craine .....	35/22 R
4,095,785	6/1978	Conner .....	273/1 GC

4,149,257	4/1979	Nakagiri et al. ....	364/708
4,164,078	8/1979	Goldman .....	35/9 B
4,189,912	2/1980	Washizuka et al. ....	364/708
4,209,735	6/1980	Yoshida .....	364/708
4,323,979	4/1982	Johnston .....	364/708
4,348,744	4/1981	White .....	434/237
4,372,557	2/1983	Del Principe et al. ....	273/85 G

**OTHER PUBLICATIONS**

Perelli, "Effects of Fatigue Stressors on Flying Performance, Information Processing, Subjective Fatigue and Physical Cost Indices During Simulated, Long-Duration Flight's Dissertation," 1980, pp. 83-123.

*Primary Examiner*—Richard C. Pinkham

*Assistant Examiner*—MaryAnn Stoll

*Attorney, Agent, or Firm*—Donald J. Singer; Stanton E. Collier

[57] **ABSTRACT**

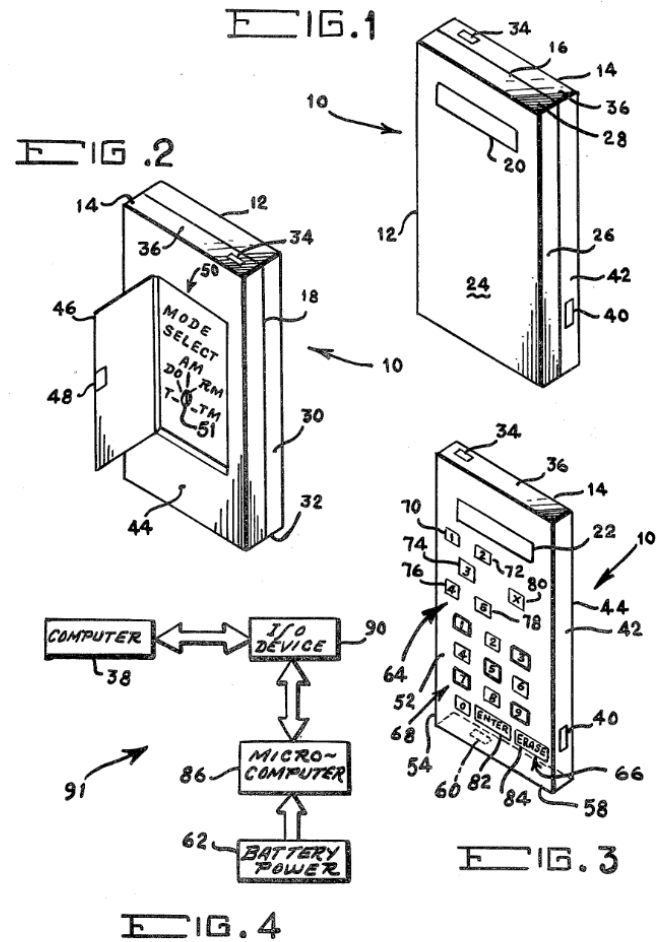
A field portable performance assessment device having an adaptive information processing test programmed therein. The device is used to measure psychological data of personnel working in a real-world environment such as in an aircraft. A microcomputer drives a unique numeric-symbolic display that the test subject must respond to by activating a particular switch. The device is about the size of a hand-held calculator and operates on internal power for extended periods.

**2 Claims, 5 Drawing Figures**



# EARLY "IPAD"

U.S. Patent Aug. 7, 1984 Sheet 1 of 2 4,464,121



# ADAPTIVE ALGORITHM

U.S. Patent Aug. 7, 1984 Sheet 2 of 2 4,464,121

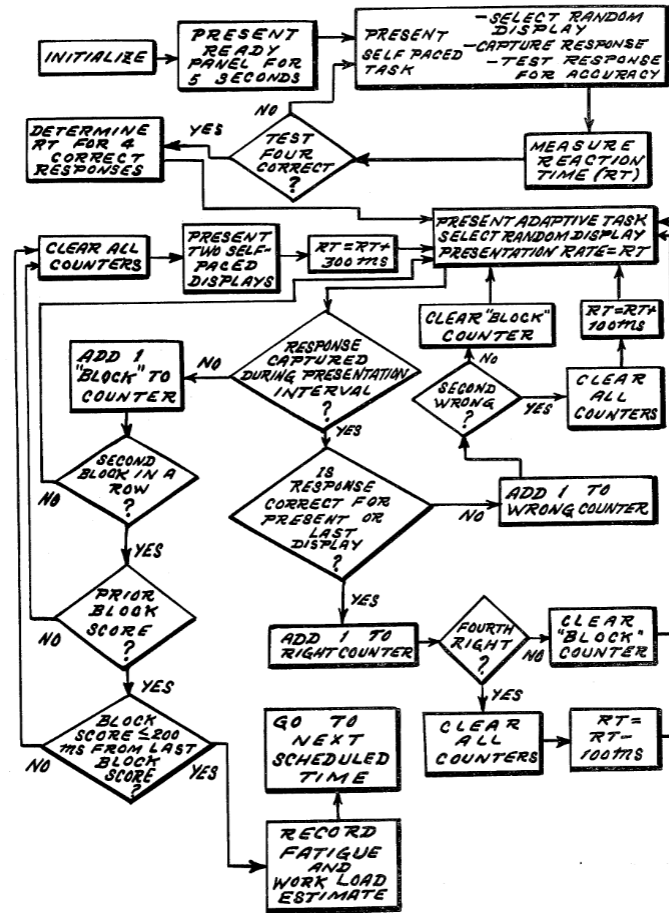


FIG. 5





# THE TEST



Think Fast!











# CogSpeed



**Test Now!**



-18

-12

Time Asleep

10 00 PM Yesterday

Time Awake

6 00 AM Today

Hours in Bed: 8:00

Sleep Quality: Restless



Skip

Ok



Select how you feel right at this moment

**7. FULLY ALERT, WIDE AWAKE**

**6. VERY LIVELY, RESPONSIVE, BUT NOT AT PEAK**

**5. OKAY, ABOUT NORMAL**

**4. LESS THAN SHARP, LET DOWN**

**3. FEELING DULL, LOSING FOCUS**

**2. VERY DIFFICULT TO CONCENTRATE, GROGGY**

**1. UNABLE TO FUNCTION, READY TO DROP**







CPI 69 - 60  
Seem OK, PASSABLE.



ELSR

1 2 3 4 **5** 6 7

Energy Level Self Report

Slept

6h 58m 

Last Test

1/26/2015  
10:32 AM

Awake

5h 1m 

Next Test

N/A

Home



User Name: laynep
2015-04-22 20:42:14
Screen Resolution: 2560x1440
Geoloc: (lat: 29.627166400000004, long: -98.4466348)

ELSR: 4
BRD: 2038.0855999997948
IPR: 0.49065652590848036
CPI: -1.2457965455359523 (VALID)

Test 1
2015-04-22 20:42:14
Endcode: COMPLETE
Test Duration: 71sec
BRD: 2038ms, Self Pace ms: 1251ms
Block Delta: 75ms
Block Range: 875, ( 1201 -> 2076 )
Block Count: 5

Correct Response Time - Mean: 1045.25ms
Correct Response Time - Standard Deviation: 502.0582

000 s:0 3,8,(9),(4),T,(1) N->9 Correct This,t: 3206ms,r: n/a,d: 3206ms
0 Time: 3206, Input:9
001 s:0 5,(E),X,(8),(U),9 E->8 Correct This,t: 1720ms,r: n/a,d: 1720ms
0 Time: 1720, Input:8
002 s:0 (U),F,(E),T,X,(O) 1->O Correct This,t: 1281ms,r: n/a,d: 1281ms
0 Time: 1281, Input:O
003 s:0 (F),N,W,(S),(9),T 2->W Correct This,t: 1350ms,r: n/a,d: 1350ms
0 Time: 1350, Input:W
004 s:0 3,(7),(2),(5),U,1 O->1 Correct This,t: 967ms,r: n/a,d: 967ms
0 Time: 967, Input:1
005 s:1 (F),E,(T),X,O,(W) 5->F Correct This,t: 1654ms,r: n/a,d: 1654ms
0 Time: 1654, Input:F
006 s:1 (S),9,W,(N),(X),O 2->W Correct This,t: 1214ms,r: n/a,d: 1214ms
0 Time: 1214, Input:W
007 s:1 (W),8,(6),7,5,(9) X->6 Correct This,t: 1260ms,r: n/a,d: 1260ms
0 Time: 1259, Input:6
008 s:1 2,(7),8,(3),1,(9) N->9 Correct This,t: 1158ms,r: n/a,d: 1158ms
0 Time: 1158, Input:9
009 s:1 X,(6),2,4,(3),(1) O->1 Correct This,t: 911ms,r: n/a,d: 911ms [1,1,1,1,1,1,1] (100%)
0 Time: 911, Input:1
010 s:2 O,(8),6,(9),(E),4 E->8 Correct This,t: 1281ms,r: 0.99,d: 1282ms,tD: 1300ms [1,1,1,1,1,1,1] (100%)
0 Time: 1281, Input:8
011 s:2 1,3,(6),(2),8,(9) T->3 Correct This,t: 944ms,r: 0.74,d: 944ms,tD: 1275ms [1,1,1,1,1,1,1] (100%)
0 Time: 944, Input:3
012 s:2 6,(X),(8),(3),1,U O->1 No Input,t: n/a,r: n/a,d: 1253ms,tD: 1250ms [1,1,1,1,1,1,0] (87%)
0 Time: 1253, Input:U
013 s:2 5,(E),W,(3),(7),(U) S->7 Correct This,t: 73ms,r: 0.06,d: 73ms,tD: 1250ms [1,1,1,1,1,1,0,1] (87%)
0 Time: 74, Input:7
014 s:2 (W),3,(5),(6),2,4 F->5 No Input,t: n/a,r: n/a,d: 1228ms,tD: 1225ms [1,1,1,1,1,0,1,0] (75%)
0 Time: 1228, Input:F
015 s:2 3,(U),(5),X,(O),S 7->S Correct Last,t: 42ms,r: 0.03,d: 43ms,tD: 1225ms [1,1,1,1,0,1,0,1] (75%)
0 Time: 42, Input:5
016 s:2 (6),2,U,1,(X),(4) W->2 Correct This,t: 1090ms,r: 0.91,d: 1091ms,tD: 1200ms [1,1,1,0,1,0,1,1] (75%)
0 Time: 1090, Input:2
017 s:2 (4),(3),6,7,(9),8 U->4 No Input,t: n/a,r: n/a,d: 1178ms,tD: 1175ms [1,1,0,1,0,1,0,1] (62%)
0 Time: 1178, Input:U
018 s:2 (9),X,3,W,(T),(2) T->3 Correct Last,t: 92ms,r: 0.08,d: 92ms,tD: 1175ms [1,0,1,0,1,1,0,1] (62%)
0 Time: 93, Input:9
019 s:2 U,7,(S),W,(E),(8) 2->W No Input,t: n/a,r: n/a,d: 1151ms,tD: 1150ms [0,1,0,1,0,1,0,1] (50%)
0 Time: 1151, Input:W
020 s:2 (4),(7),(T),(W),5,1 S->7 Correct This,t: 1098ms,r: 0.88,d: 1098ms,tD: 1250ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1098, Input:7
021 s:2 T,(X),2,(S),1,(5) W->2 Wrong,t: 1102ms,r: 0.9,d: 1102ms,tD: 1225ms [1,1,1,1,1,1,0,1] (87%)
0 Time: 1102, Input:X
022 s:2 (2),5,7,(4),3,(8) U->4 No Input,t: n/a,r: n/a,d: 1231ms,tD: 1225ms [1,1,1,1,1,1,0,0] (75%)
0 Time: 1231, Input:U
023 s:2 N,9,(1),(4),(7),(3) O->1 Correct Last,t: 231ms,r: 0.19,d: 232ms,tD: 1225ms [1,1,1,1,1,0,0,1] (75%)
0 Time: 232, Input:4
024 s:2 8,7,(2),5,(4),(9) U->4 No Input,t: n/a,r: n/a,d: 1204ms,tD: 1200ms [1,1,1,1,0,0,1,0] (62%)
0 Time: 1204, Input:U
025 s:2 X,(3),9,2,(8),(4) W->2 No Input,t: n/a,r: n/a,d: 1205ms,tD: 1200ms <BLOCK>
0 Time: 1205, Input:W
026 s:3 (S),3,2,(X),(6),9 X->6 Correct This,t: 2248ms,r: n/a,d: 2248ms
0 Time: 2247, Input:6
027 s:3 (X),(8),(S),T,U,W 7->S Correct This,t: 1946ms,r: n/a,d: 1946ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1946, Input:S
028 s:2 1,(5),3,2,(U),(8) W->2 No Input,t: n/a,r: n/a,d: 1480ms,tD: 1475ms [1,1,1,1,1,1,0,1] (87%)
0 Time: 1480, Input:W
029 s:2 9,F,8,(2),(1),(5) F->5 No Input,t: n/a,r: n/a,d: 1478ms,tD: 1475ms <BLOCK>
0 Time: 1478, Input:F
030 s:3 (T),(2),U,(F),E,X 4->U Correct Last,t: 34ms,r: n/a,d: 34ms
0 Time: 34, Input:X
031 s:3 (1),3,8,4,(9),(6) T->3 Correct This,t: 1316ms,r: n/a,d: 1316ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1316, Input:3
032 s:2 6,(5),(2),9,1,(S) X->6 No Input,t: n/a,r: n/a,d: 1751ms,tD: 1750ms [1,1,1,1,1,1,1,0] (87%)
0 Time: 1751, Input:X
033 s:2 (6),(2),5,(8),7,9 N->9 No Input,t: n/a,r: n/a,d: 1755ms,tD: 1750ms <BLOCK>
0 Time: 1755, Input:N
034 s:3 (3),5,(W),2,6,(1) X->6 Correct This,t: 1274ms,r: n/a,d: 1275ms
0 Time: 1274, Input:6
035 s:3 (7),S,(T),3,N,(O) 1->O Correct This,t: 1057ms,r: n/a,d: 1057ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1056, Input:O

036 s:2 (3),9,5,(6),(7),2 T->3 Wrong,t: 1485ms,r: 0.73,d: 1485ms,tD: 2025ms [1,1,1,1,1,1,0] (87%)
0 Time: 1485, Input:6
037 s:2 W,(1),5,(2),(3),X F->5 Correct This,t: 1282ms,r: 0.63,d: 1282ms,tD: 2025ms [1,1,1,1,1,1,0,1] (87%)
0 Time: 1282, Input:5
038 s:2 9,(2),F,(N),6,(8) N->9 No Input,t: n/a,r: n/a,d: 2007ms,tD: 2000ms [1,1,1,1,1,0,1,0] (75%)
0 Time: 2007, Input:N
039 s:2 (9),(8),E,S,(N),7 8->E No Input,t: n/a,r: n/a,d: 2002ms,tD: 2000ms <BLOCK>
0 Time: 2002, Input:E
040 s:3 3,(7),(4),6,(T),2 X->6 Correct This,t: 1718ms,r: n/a,d: 1718ms
0 Time: 1718, Input:6
041 s:3 2,(3),4,5,(W),(8) U->4 Correct This,t: 1405ms,r: n/a,d: 1406ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1405, Input:4
042 s:2 (6),5,3,(4),(X),7 F->5 Correct This,t: 1192ms,r: 0.52,d: 1192ms,tD: 2275ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1192, Input:5
043 s:2 2,(4),(6),5,3,(T) T->3 Correct This,t: 1203ms,r: 0.53,d: 1204ms,tD: 2250ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1204, Input:3
044 s:2 (7),6,(8),1,(5),4 F->5 Correct This,t: 1238ms,r: 0.56,d: 1238ms,tD: 2225ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1238, Input:5
045 s:2 5,X,(4),(8),7,(1) E->8 Correct This,t: 1090ms,r: 0.5,d: 1090ms,tD: 2200ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1091, Input:8
046 s:2 (9),E,(2),8,F,(1) N->9 Correct This,t: 1384ms,r: 0.64,d: 1384ms,tD: 2175ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1384, Input:9
047 s:2 S,T,(N),(9),(E),F 3->T Correct This,t: 1495ms,r: 0.7,d: 1495ms,tD: 2150ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1495, Input:T
048 s:2 8,(9),(5),7,6,(3) X->6 Correct This,t: 1496ms,r: 0.7,d: 1496ms,tD: 2125ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1496, Input:6
049 s:2 (3),(5),S,(6),8,9 F->5 Correct This,t: 1125ms,r: 0.54,d: 1125ms,tD: 2100ms [1,1,1,1,1,1,1,1] (100%)
0 Time: 1126, Input:5
050 s:2 N,E,(F),(O),(U),7 9->N No Input,t: n/a,r: n/a,d: 2079ms,tD: 2075ms [1,1,1,1,1,1,1,0] (87%)
0 Time: 2079, Input:U
051 s:2 E,(X),(U),W,T,(S) 6->X No Input,t: n/a,r: n/a,d: 2079ms,tD: 2075ms <BLOCK>
0 Time: 2079, Input:X
052 s:4 7,(T),5,(9),(O),E F->5 Correct This,t: 1791ms,r: n/a,d: 1791ms
0 Time: 1791, Input:5
053 s:4 (7),O,1,(8),2,(4) E->8 Wrong,t: 1407ms,r: n/a,d: 1407ms
0 Time: 1406, Input:7
054 s:25 6,(1),(5),4,2,(3) X->6 No Input,t: n/a,r: n/a,d: 0ms

Test Constants
nTrainingRounds: 2
lipr: 0.5
hipr: 1.111
spMaxWrongCount: 5
spMaxRightCount: 4
noResponseTimeout: 10000
maxTestDurationTimeout: 120000
max\_mpStartDuration: 2100
mpMaxRightCount: 1
mpMaxWrongCount: 5
mpMaxSlowdownCount: 8
mpNotThere: 0
notThereDisabled: true
init\_slowdown\_dTD: 75
block\_slowdown\_dTD: 300
wrong\_slowdown\_dTD: 100
speedup\_dTD: 33
speedup\_on\_correct: true
speedup\_on\_wrong: false
speedup\_on\_noinput: false
speedup\_base: -25
speedup\_mod: 0
n\_endmode\_rounds: 2
mp\_rollmean\_size: 8
mp\_rollmean\_min: 0.6
mp\_input\_ends\_round: true
mp\_rt\_buffer\_size: 3
noInputCount: 2
bpRoundCount: 3
n\_inversecolordisplay: 3
p\_displayother: 0.25
p\_invert\_letnum: 0.25
maxBlock\_dTD: 135
maxBadTestsInSession: 3
tutorial\_nSPRounds: 12
tutorial\_nMPRounds: 8
tutorial\_mpRoundStartDuration: 2100
tutorial\_mpRoundDurationDelta: -200
save\_round\_data: true



**CogSpeed v1.00.012**  
**User Name: laynep**  
**2015-04-22\_20:42:14**  
**Screen Resolution: 2560x1440**  
**Geoloc: (lat: 29.627166400000004, long: -98.4466348)**

**ELSR: 4**  
**BRD: 2038.0855999997948**  
**IPR: 0.49065652590848036**  
**CPI: -1.2457965455359523 (VALID)**

**Test 1**  
**2015-04-22\_20:42:14**  
**Endcode: COMPLETE**  
**Test Duration: 71sec**  
**BRD: 2038ms, Self Pace ms: 1251ms**  
**Block Delta: 75ms**  
**Block Range: 875, ( 1201 -> 2076 )**  
**Block Count: 5**  
**Correct Response Time - Mean: 1045.25ms**  
**Correct Response Time - Standard Deviation: 502.0582**

**000 s:0 3,8,(9),(4),T,(1) N->9 Correct This,t: 3206ms,r: n/a,d: 3206ms**  
**0 Time: 3206, Input:9**  
**001 s:0 5,(E),X,(8),(U),9 E->8 Correct This,t: 1720ms,r: n/a,d: 1720ms**  
**0 Time: 1720, Input:8**  
**002 s:0 (U),F,(E),T,X,(O) 1->O Correct This,t: 1281ms,r: n/a,d: 1281ms**  
**0 Time: 1281, Input:O**



000 s:0 3,8,(9),(4),T,(1) N->9 Correct This,t: 3206ms,r: n/a,d: 3206ms  
0 Time: 3206, Input:9

001 s:0 5,(E),X,(8),(U),9 E->8 Correct This,t: 1720ms,r: n/a,d: 1720ms  
0 Time: 1720, Input:8

002 s:0 (U),F,(E),T,X,(O) 1->O Correct This,t: 1281ms,r: n/a,d: 1281ms  
0 Time: 1281, Input:O

003 s:0 (F),N,W,(S),(9),T 2->W Correct This,t: 1350ms,r: n/a,d: 1350ms  
0 Time: 1350, Input:W

004 s:0 3,(7),(2),(5),U,1 O->1 Correct This,t: 967ms,r: n/a,d: 967ms  
0 Time: 967, Input:1

005 s:1 (F),E,(T),X,O,(W) 5->F Correct This,t: 1654ms,r: n/a,d: 1654ms  
0 Time: 1654, Input:F

006 s:1 (S),9,W,(N),(X),O 2->W Correct This,t: 1214ms,r: n/a,d: 1214ms  
0 Time: 1214, Input:W

007 s:1 (W),8,(6),7,5,(9) X->6 Correct This,t: 1260ms,r: n/a,d: 1260ms  
0 Time: 1259, Input:6

008 s:1 2,(7),8,(3),1,(9) N->9 Correct This,t: 1158ms,r: n/a,d: 1158ms  
0 Time: 1158, Input:9

009 s:1 X,(6),2,4,(3),(1) O->1 Correct This,t: 911ms,r: n/a,d: 911ms [1,1,1,1,1,1,1,1] (100%)  
0 Time: 911, Input:1

010 s:2 O,(8),6,(9),(E),4 E->8 Correct This,t: 1281ms,r: 0.99,d: 1282ms,tD: 1300ms [1,1,1,1,1,1,1,1] (100%)  
0 Time: 1281, Input:8

011 s:2 1,3,(6),(2),8,(9) T->3 Correct This,t: 944ms,r: 0.74,d: 944ms,tD: 1275ms [1,1,1,1,1,1,1,1] (100%)  
0 Time: 944, Input:3

012 s:2 6,(X),(8),(3),1,U O->1 No Input,t: n/a,r: n/a,d: 1253ms,tD: 1250ms [1,1,1,1,1,1,1,0] (87%)

013 s:2 5,(E),W,(3),7,(U) S->7 Correct This,t: 73ms,r: 0.06,d: 73ms,tD: 1250ms [1,1,1,1,1,1,0,1] (87%)  
0 Time: 74, Input:7

014 s:2 (W),3,(5),(6),2,4 F->5 No Input,t: n/a,r: n/a,d: 1228ms,tD: 1225ms [1,1,1,1,1,0,1,0] (75%)

015 s:2 3,(U),(5),X,(O),S 7->S Correct Last,t: 42ms,r: 0.03,d: 43ms,tD: 1225ms [1,1,1,1,0,1,0,1] (75%)  
0 Time: 42, Input:5

016 s:2 (6),2,U,1,(X),(4) W->2 Correct This,t: 1090ms,r: 0.91,d: 1091ms,tD: 1200ms [1,1,1,0,1,0,1,1] (75%)  
0 Time: 1090, Input:2

017 s:2 (4),(3),6,7,(9),8 U->4 No Input,t: n/a,r: n/a,d: 1178ms,tD: 1175ms [1,1,0,1,0,1,1,0] (62%)

018 s:2 (9),X,3,W,(T),(2) T->3 Correct Last,t: 92ms,r: 0.08,d: 92ms,tD: 1175ms [1,0,1,0,1,1,0,1] (62%)  
0 Time: 93, Input:9

019 s:2 U,7,(S),W,(E),(8) 2->W No Input,t: n/a,r: n/a,d: 1151ms,tD: 1150ms [0,1,0,1,1,0,1,0] (50%)

020 s:2 (4),7,(T),(W),5,1 S->7 Correct This,t: 1098ms,r: 0.88,d: 1098ms,tD: 1250ms [1,1,1,1,1,1,1,1] (100%)  
0 Time: 1098, Input:7

021 s:2 T,(X),2,(S),1,(5) W->2 Wrong,t: 1102ms,r: 0.9,d: 1102ms,tD: 1225ms [1,1,1,1,1,1,1,0] (87%)  
0 Time: 1102, Input:X

022 s:2 (2),5,7,(4),3,(8) U->4 No Input,t: n/a,r: n/a,d: 1231ms,tD: 1225ms [1,1,1,1,1,1,0,0] (75%)

023 s:2 N,9,(1),(4),7,(3) O->1 Correct Last,t: 231ms,r: 0.19,d: 232ms,tD: 1225ms [1,1,1,1,1,0,0,1] (75%)  
0 Time: 232, Input:4



## Test Constants

nTrainingRounds: 2  
lpr: 0.5  
hipr: 1.111  
spMaxWrongCount: 5  
spMaxRightCount: 4  
noResponseTimeout: 10000  
maxTestDurationTimeout: 120000  
max\_mpStartDuration: 2100  
mpMaxRightCount: 1  
mpMaxWrongCount: 5  
mpMaxSlowdownCount: 8  
mpNotThere: 0  
notThereDisabled: true  
init\_slowdown\_dTD: 75  
block\_slowdown\_dTD: 300  
wrong\_slowdown\_dTD: 100  
speedup\_dTD: 33  
speedup\_on\_correct: true  
speedup\_on\_wrong: false  
speedup\_on\_noinput: false  
speedup\_base: -25  
speedup\_mod: 0  
n\_endmode\_rounds: 2  
mp\_rollmean\_size: 8  
mp\_rollmean\_min: 0.6  
mp\_input\_ends\_round: true  
mp\_rt\_buffer\_size: 3  
noInputCount: 2  
bpRoundCount: 3  
n\_inversecolordisplay: 3  
p\_displayother: 0.25  
p\_invert\_letnum: 0.25  
maxBlock\_dTD: 135  
maxBadTestsInSession: 3  
tutorial\_nSPRounds: 12  
tutorial\_nMPRounds: 8  
tutorial\_mpRoundStartDuration: 2100  
tutorial\_mpRoundDurationDelta: -200  
save\_round\_data: true

## Test Constants

nTrainingRounds: 2  
lpr: 0.5  
hipr: 1.111  
spMaxWrongCount: 5  
spMaxRightCount: 4  
noResponseTimeout: 10000  
maxTestDurationTimeout: 120000  
max\_mpStartDuration: 2100  
mpMaxRightCount: 1

.....



**notice@cogspeed.com**

**To: Layne Perelli, Ph.D. <lperel@me.com>**

**Alert Notice from GMM: Layne Perelli scored: 52**

**Subject: Alert Notice from Gray Matter Metrics for Layne Perelli**

**You have requested notification for all employees scoring below 150.**

**On 8/28/2015 at 9:13 AM, Layne Perelli  
produced a CogSpeed score of 52.**

**Location: 29.42669 Degrees Latitude, -98.49326 Degrees Longitude.**

**Contact information on record:**

**Phone:**

**e-mail: [lperel@me.com](mailto:lperel@me.com)**

**CogSpeed scores below 20 may indicate possible cognitive performance impairment.**

**It is recommended that you take any necessary corrective action in accordance with the procedures established by your Company.**

**Any further dissemination of this information contained in this e-mail should be controlled according to Company privacy policies.**

**THIS MESSAGE IS INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY TO WHICH IT IS ADDRESSED AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED, CONFIDENTIAL, AND EXEMPT FROM DISCLOSURE UNDER APPLICABLE LAW**

**If the Reader of this message is not the intended recipient, or the employee or agent responsible for delivery of this message to the intended recipient, you are hereby notified that any dissemination, distribution, forwarding, or copying of this communication is strictly prohibited. If you have received this communication in error, please notify the sender immediately by e-mail or telephone, and delete the original message immediately. Thank you.**

**Gray Matter Metrics™, LLC**

**19914 Encino Ridge St.**

**San Antonio, TX, 78259**

**210-209-8222**

**[info@graymattermetrics.com](mailto:info@graymattermetrics.com)**

**[graymattermetrics.com](http://graymattermetrics.com)**



# *HuRAM*

## *CENTRALIZED RISK MONITORING HEADQUARTERS*

- *WORLD-WIDE DATA VISUALIZATION*
- *COGNITIVE IMPAIRMENT NOTIFICATION*
- *CORRECTIVE ACTION*
- *BIG DATA ANALYSIS*



GRAY MATTER METRICS  
SECURE DATA STORAGE

*HuRAM*



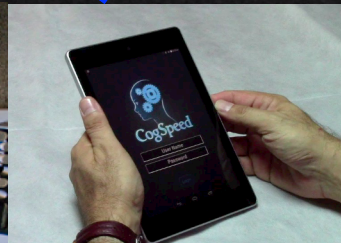
DRONE WARFARE  
OPERATIONS  
CENTER



TEST  
RESULTS

ALERTS

GLOBAL HUMAN RISK ASSESSMENT  
MANAGEMENT CENTER



CORRECTIVE ACTION





# BIG DATA ANALYSIS

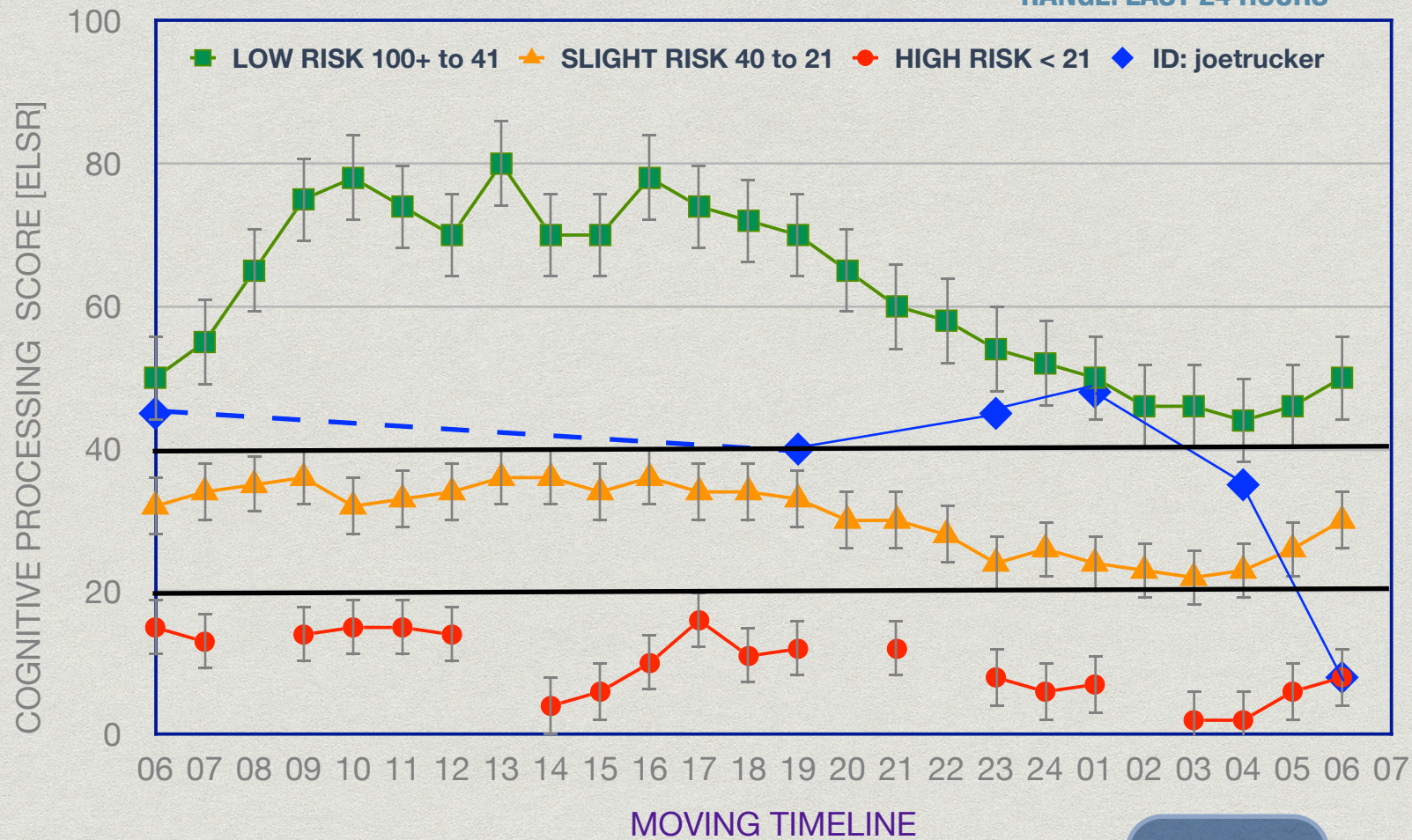
The logo for GMM, consisting of the letters 'GMM' in a light blue, sans-serif font, enclosed within a white rectangular border.

- **COMPARE INDUSTRIES**
  - **COMPANIES**
- **COUNTRIES**
- **EXPERIENCE**
  - **YEARS WORKED**
  - **AGE**
  - **COMPANY**
- **TIME OF DAY**
- **DAY OF WEEK**
- **SOCIO-EC STATUS/DEMOGRAPHICS**
- **INDIVIDUAL DIFFS**
  - **TIME AWAKE**
  - **SLEEP QUAL**
  - **SUBJECTIVE VS OBJECTIVE**
- **ACCIDENT DATA**
- **MILES DRIVEN**
- **ROUTES**



# FLEET RISK ASSESSMENT

END DATE: 07/14/2015  
RANGE: LAST 24 HOURS



REFRESH

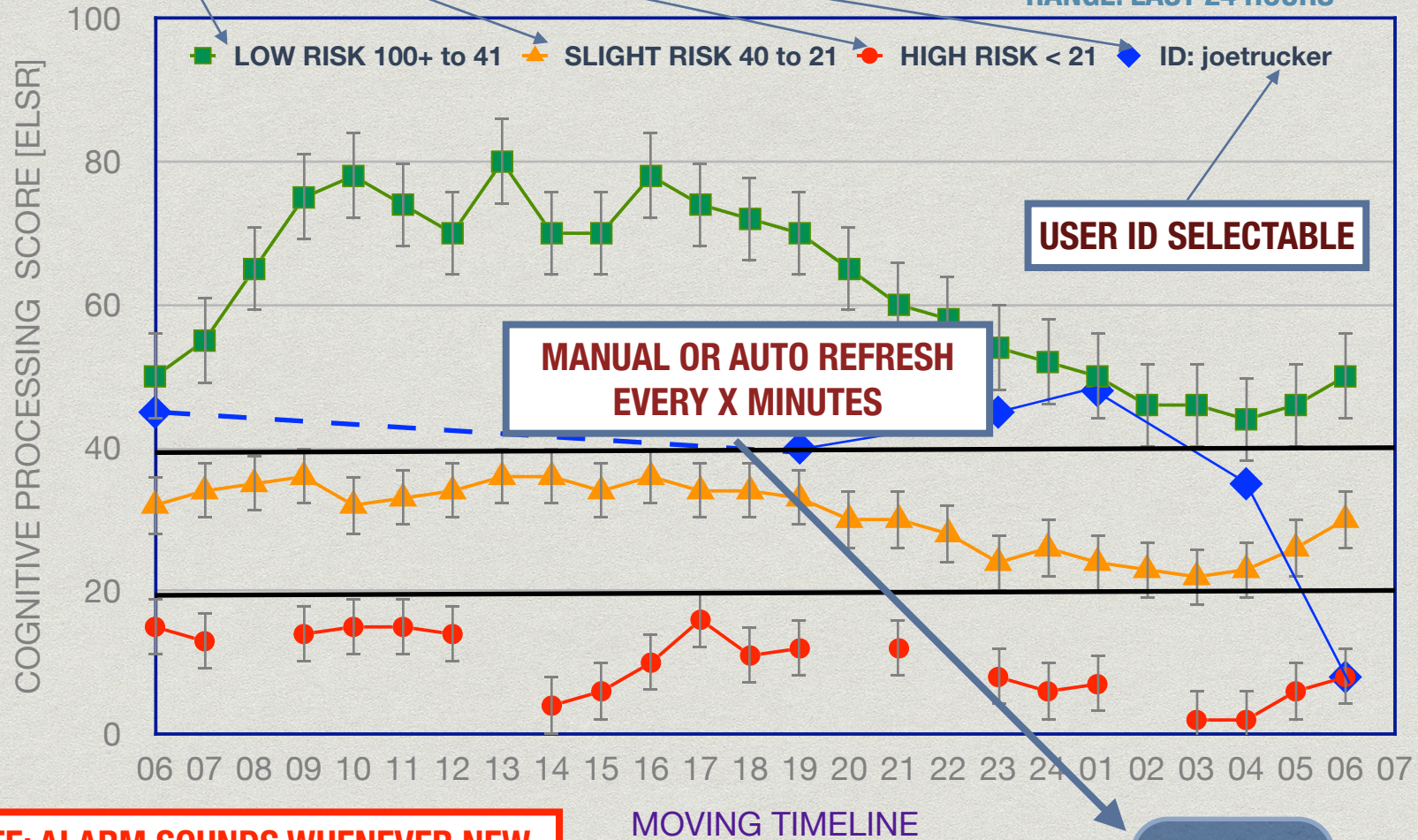


**TOGGLES GRAPH ON OR OFF**

**DATE AND RANGE SELECTABLE**

*FLEET RISK ASSESSMENT*

END DATE: 07/14/2015  
RANGE: LAST 24 HOURS



**MANUAL OR AUTO REFRESH  
EVERY X MINUTES**

**USER ID SELECTABLE**

**NOTE: ALARM SOUNDS WHENEVER NEW  
HIGH RISK SCORE OCCURS**

MOVING TIMELINE

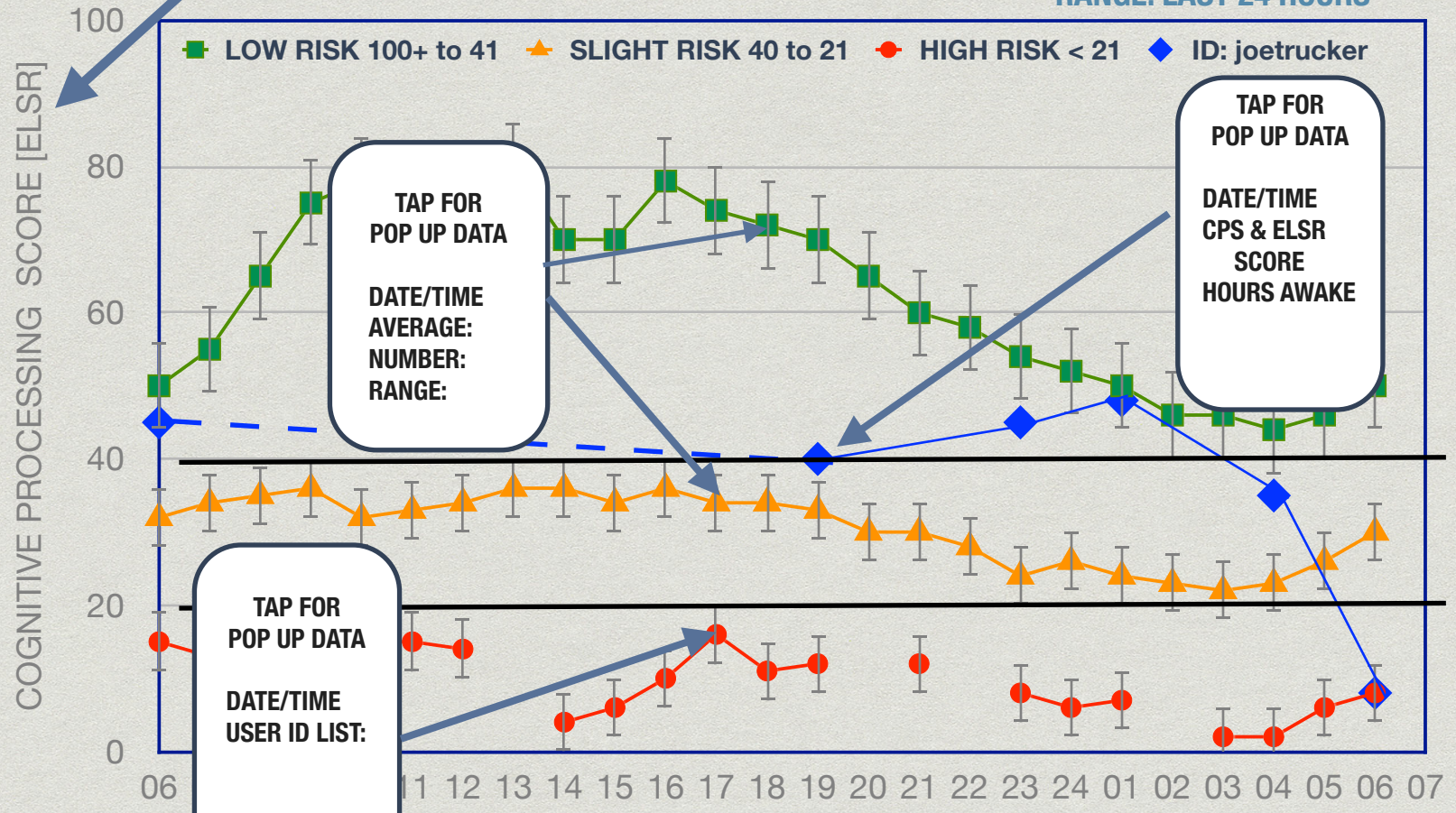
**REFRESH**



**TOGGLE BETWEEN CPI AND ELSR**

### FLEET RISK ASSESSMENT

END DATE: 07/14/2015  
RANGE: LAST 24 HOURS



MOVING TIMELINE

**REFRESH**







# COMPETITION



- **DASH-CAM VIDEOS AND EYE-TRACKERS**
- **SALIVA ANALYSIS**
- **KEYBOARD TRACKERS**
- **SUBJECTIVE QUESTIONNAIRES**
- **BREATHALYZERS**
- **CONSULTANTS**
- **HOPE AND TRUST**
- **FEDERAL REGULATIONS**
-





## ***HUGE OPPORTUNITY***

- ***SOLE PROPRIETOR OF OBJECTIVE SOLUTION TO CRITICAL SOCIAL AND FINANCIAL PROBLEM***
- ***UNTAPPED MULTI-BILLION DOLLAR WORLD-WIDE MARKET***
- ***CAN BECOME AN INDUSTRY STANDARD REQUIRED BY COMPETITORS***

## ***REVOLUTIONARY TECHNOLOGY***

- ***NO IDENTICAL COMPETITION - YET***

## ***NEVER-ENDING DEMAND***

- ***SUSTAINABLE***
- ***PEOPLE WILL ALWAYS GET TIRED, DRUGGED, DRUNK, AND OLD***



# **WIDE-OPEN OPPORTUNITY**



- **GROUND FLOOR**
- **LOW COST OF ENTRY**
- **LOW RISK OF FAILURE**
- **GLOBAL MONITORING OF COGNITIVE RISK**
  - **YOUR OPERATORS**
  - **YOUR SUBCONTRACTORS**
  - **OTHER CLIENTS**
- **WORLD-WIDE LEADER IN COGNITIVE ASSESSMENT TECHNOLOGY**
  - **CORNER AND CONTROL THE MARKET**
- **COST SAVINGS & LOWER INSURANCE RATES**
- **HuRAM FITS WITH EXISTING AECOM PROGRAM**
  - **Enterprise Risk Assessment & Protection (ERAP)**



# *BENEFITS AND COST SAVINGS*



- **SAVE LIVES AND AVOID ACCIDENTS**
- **REDUCE HUMAN ERROR AND IMPROVE PERFORMANCE**
- **LOWER RISK OF PERSONNEL INITIATED SECURITY MISTAKES**
- **AVOID COSTLY EQUIPMENT LOSS AND DAMAGE**
- **IMMEDIATE, SIMPLE, INEXPENSIVE DRUG AND ALCOHOL SCREENING**
- **MOTIVATE IMPROVED REST AND HEALTH HABITS**
- **SUPPORT BIG DATA ANALYTICS FOR OPERATIONAL DECISIONS**
- **MINIMIZE LAWSUITS AND LOWER LEGAL FEES**
- **REDUCE LIABILITY EXPOSURE FOR LOWER INSURANCE COSTS**
- **IMPROVE CORPORATE IMAGE WITH PRO-ACTIVE ENHANCEMENT OF PUBLIC SAFETY**



# SYSTEM SECURITY



- **DATA BASE CAN'T BE DESTROYED, MODIFIED, OR STOLEN**
- **SERVER PROTECTED FROM DOS ATTACK AND MALWARE INJECTION**
- **SIMULTANEOUS USER LOAD WON'T CRASH SYSTEM**
- **STRICT FORMAT REQUIREMENTS FOR JSON DATA ACCEPTANCE**
- **ACCESS TO PERFORMANCE DATA RESTRICTED TO TRUSTED AGENTS**
- **PERFORMANCE MONITOR ONLY REQUESTS AND RECEIVES DATA  
COMPANY CAN'T MODIFY DATABASE OR SERVER**
- **LOGONS TRACKED BY GEOLOC**





# SECURITY ENHANCEMENTS FOR CRITICAL USE CASE

- **TAMPER -PROOF DEVICE CASE**
- **RECORD USER DATA ENTRY ON DEVICE CAMERA**
- **TWO-FACTOR AUTHENTICATION TOKEN FOR ID VERIFICATION**
- **CREATE AND SEND UNIQUE DEVICE ID SIGNATURE**





***CogSpeed TESTING IS SECURE***

***CAN'T STEAL A PERSON'S ACTUAL***

***COGNITIVE PERFORMANCE CAPABILITY***