



advanced infoneering, inc.
delivering essential information



leadership statement

Mission

Advanced Infoneering Inc (AI2) is a software engineering firm dedicated to developing systems that manage and enhance information in a human compatible form to improve performance through software and Live Virtual Constructive technologies. We focus on creating and building superior analysis tools and user interfaces by leveraging knowledge from the science and technology community.

Vision

AI2 team members use a systems design process combining innovative research and direct human involvement to develop technology to solve difficult training challenges. Our vision is to use **Advanced engineering** methods to deliver essential **information** to our customers.

core competencies

AI2 has focused its research activities on three primary areas.

Physiological and Cognitive Measurements

AI2 uses a wide array of physiological sensors to build an objective measurement of a subject's cognitive workload and situation awareness. The cognitive and physiological measures also serve as a quantitative manifestation of a student's learning curve and make it possible for the trainer to detect plateaus in learning. Sensor suite includes eye tracking, EEG sensor battery, SPO2 %, breathing rate, and heart rate variability. These sensors are ruggedized to fit onto a jet aircraft with little/no discomfort or distractions to the pilot. Our physiological suite combines these sensors with flight technical performance tracking such flight path, flight track error, cross track error, air speed, course deviation, and reaction time.

Graphical User Interfaces

A unique AI2 specialty area is the development of highly complex, unique graphical user interfaces (GUIs) that leverage a human factor engineering design process. Our GUIs provide visual, audio, and playback capabilities, which can be viewed either in real time or later as a video of the event.

Live Virtual Constructive (LVC) Environment

The AI2 team has worked extensively in the LVC environment utilizing various types of High Level Architecture (HLA) to allow communications between ground-based subjects, on laptops and in a full-scale simulator, and two actual jet aircraft, L29s. The ability to have an airborne pilot react realistically to a computer-generated scenario with both virtual and constructive elements provides both continual training assessment and physiological/neurophysiological measurements for later analysis.



products/services/ other application areas of technology

Computer Languages and Libraries

- Open GL and extension libraries
- Java, Javascript, JQuery, Java Plug-in Framework
- PHP
- C and C++
- MS SQL and MySQL
- Actionscript
- wxWidgets
- Python
- Adaptive Communication Environment (ACE)
- Incorporating Smart-Eye echnologies

Development Areas

- AI and neural networks
- GUI interfaces: Linux, Windows, and connectivity between the two operating systems
- CAD

Software Management

- Large Application Development
- Experience in writing design documents and user manuals
- Customer-Engineer interface: customer requirements to engineering requirements translation
- Object Oriented Programming (OOP), Design patterns

Synthetic Flight Bag

Controlled Flight into Terrain (CFIT) and Collision with Obstacles remains a leading cause of loss of hull and life in general aviation. The 2002 Nall Report indicates most weather-related accidents involved aircraft striking objects or terrain at high airspeeds or crashing out of control, sometimes after pilot-induced structural failure. In addition, flight at night increases the severity of crashes. One of the leading causes is lack of situation awareness in conditions of reduced visibility. NASA, under the Aviation Safety and Security Program, has been conducting research that has lead to certified Synthetic Vision Systems. Presently, these certified systems are very costly. AI2 in conjunction with the Operator Performance Laboratory at The University of Iowa conducted human factors research to determine the optimal display characteristics of a portable, low-cost Synthetic Vision System. The result of this work is the Synthetic Flight Bag™.

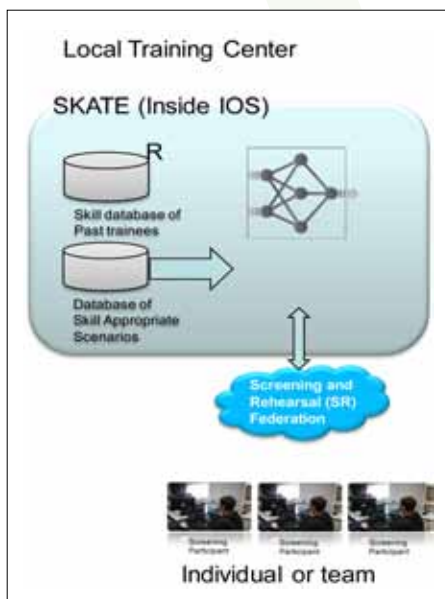
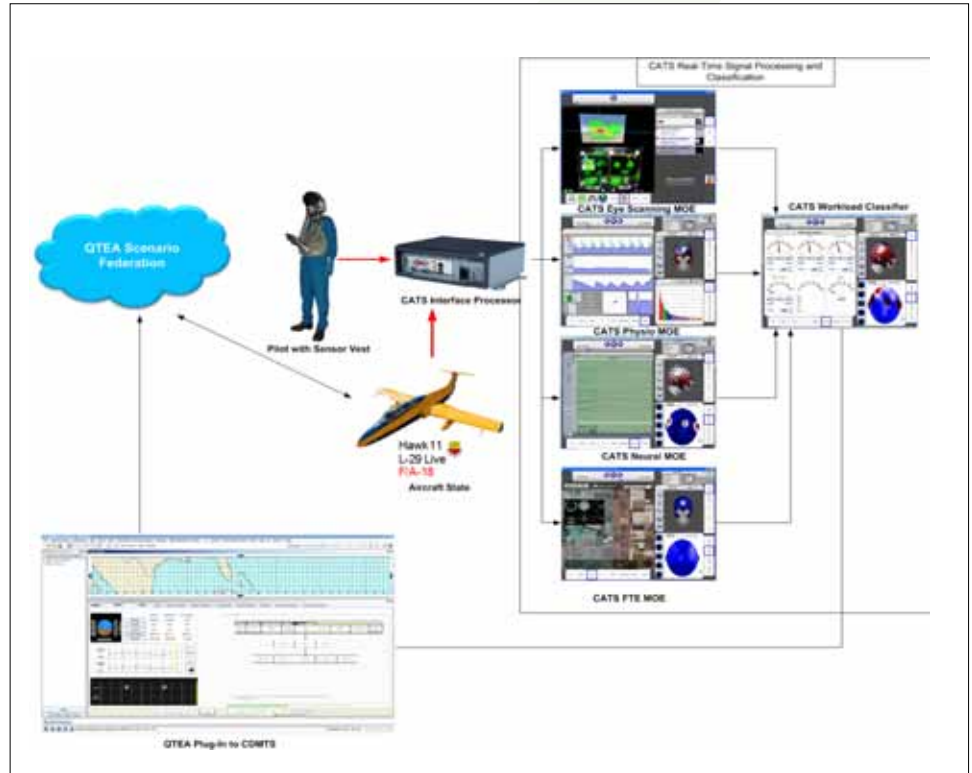


Representative Projects

QTEA

The Quality of Training Effectiveness Assessment (QTEA) system is a complex, multi-use tool that gives trainers a real-time picture of the performance of a trainee based on human physiological and cognitive data, flight technical, and mission specific data. QTEA can also determine simulator fidelity. Currently, Virtual Environments (VE) design is guided by subjective design models involving multiple design iterations based on trial and error. Our approach quantifies VE fidelity requirements in terms of desired behavioral patterns in the trainee as quantified by physiological measures. The final result is our

proposed system will enable quantitative specification of VE fidelity requirements and thus avoid costly over specification. The system also quantifies the student's workload and allows the instructor to increase or decrease the training intensity or detect learning plateaus. The ultimate goal is to create training software, which continually changes automatically based upon the responses of various trainees' input either increasing or decreasing the workload. We expect to see a 15% to 20% reduction in training time through our optimized system.



SKATE

AI2's Skill Appropriate Training Environment (SKATE) assessment tool can quickly quantify skill levels of trainees, teams, or units, and then generate skill-appropriate training scenarios components that can be configured into the exercise to fulfill the training objectives of the trainees commensurate with their individual/team skill level. This optimizes the learning curve of those involved in the exercise preventing boredom in those not sufficiently challenged and avoiding a death spiral of failure when one person/team fails at the assigned task due to its difficulty level. Either of these reduces the value of the training exercise and/or increases costs. Ultimately, SKATE will provide a continuous skill-level assessment of disparately skilled trainees, teams, and units in a joint training exercise while maintaining the overall integrity and realism of the mission itself.

ROBD

AI2 is the prime contractor (3 subcontractors) for the Reduced Oxygen Breathing Device (ROBD) training device. The ROBD simulates hypoxia by providing mixed gas through an aviator's oxygen mask for hypoxia recognition and recovery training. The project pairs the ROBD with a simple flight simulator in order to provide pilot training that includes experiencing the symptoms of hypoxia while performing flying tasks. The ROBD project combines existing hardware with advanced visuals and physiological measurements to create a realistic, yet cost effective, aviation-training environment. Current plans are to place roughly 30 such simulators at various training naval training locations throughout the US.



markets/customers

Customers

Government

- Office of Naval Research (ONR)
- Naval Air Warfare Center, Training System Division (NAWCTSD)
- National Aeronautics and Space Administration (NASA)

Private

- The University of Iowa
- Rockwell Collins, Inc.
- TYBRIN Corp.

International

- SmartEYE AB

Partners

Our current research and commercialization partners include:

- Operator Performance Laboratory at The University of Iowa
- Rockwell Collins, Inc.
- Alion Science and Technology Corp (Alion)
- Aptima Inc
- Renaissance Science Corporation (RSC)
- SmartEye AB
- Don Selvy Enterprises (DSE)

profile

Advanced Infoneering Inc (AI2) was founded in 2005 as a small software and information technology company. The company has two primary focus areas: software GUI development and net-centric Live Virtual Constructive training. With the exception of senior management, all employees hold either engineering or computer science degrees at various higher education levels. Via partnering agreements, AI2 has access to a complete Live Virtual Constructive environment including laptops, a full scale simulator, and actual jet aircraft. Current contracts include both research and development and commercialization work with the US Navy, other US government entities, and private industry. Today the company has active contracts valued at over \$6M, including an IDIQ contract, with additional work under negotiation.



contact information

Address: 433 Hwy 1W
Iowa City, IA 52246

Phone: (319) 248-9503

Fax: (319) 248-9503

Email: nhamel@advancedinfoengineering.com



advanced infoengineering, inc.
delivering essential information

www.advancedinfoengineering.com

