EventIDE Software White Paper

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1 SOFTWARE DESCRIPTION

EventIDE is an integrated development environment that simplifies designing and running cutting-edge behavioral experiments. It features a versatile GUI designer incorporating selection of modern programming languages and visual tools for stimulus presentation, data collection, and research hardware control. The core innovation of EventIDE is that researchers can choose a balance between coding and visual drag-and-drop design according to their personal preferences. This flexibility applies to all aspects of experiment design and makes EventIDE a very intuitive yet powerful tool.

Along with the richest feature set, extensive hardware support, and utmost timing accuracy, EventIDE is capable of boundless customization through integration with existing research packages and user extensions. While fulfilling all requirements for running regular behavioral studies, EventIDE delivers many advanced features, including real-time eye-tracking analysis, synchronized data recording, and online signal processing. These features enable seamless expansion of standard behavioral experiments with multi-modal data collection, neurofeedback, and closed-loop techniques.

1.1 KEY SOFTWARE FEATURES

- User-friendly GUI that visualizes all stages of experiment design and data collection
- Inline scripting with selection of programming languages (Python, C#, VB) and pluggable libraries
- Rich feature set for stimulus presentation, data collection, and online analysis
- Modular architecture allowing integration with existing research packages and user extensions
- Utmost timing accuracy with real-time resolution in 0.02 ms
- Multi-modal data acquisition with embedded drivers for popular research hardware
- Suitable for researchers of all levels and across multiple fields of study

1.2 SOFTWARE EFFICIENCY

To determine whether adoption of new software is justified, it is crucial to verify that it outperforms existing competitors or packages. Besides financial considerations, software efficiency can be assessed by comparing the workload required to implement the same task across different software packages.

The following tables provide an approximate comparison of coding workloads (measured in terms of code length and complexity) for two common experimental tasks.

1.2.1 Stroop task

	Python (PsychoPy)	MatLab (Psychophysics toolbox)	Visual Basic	Python or C# (EventIDE)
Number of unique API functions (complexity)	48	45	72	4
Overall code length in lines	244	120	380	12

1.2.2 Attentional blink in RSVP

	Python (PsychoPy)	MatLab (Psychophysics toolbox)	Visual Basic	Python or C# (EventIDE)
Number of unique API functions (complexity)	84	52	72	13
Overall code length in lines	409	190	520	59

The tables clearly demonstrate that EventIDE outperforms other packages. Even for a relatively elaborative task, such as RSVP, the coding workload is approximately five times less, both in terms of code length and complexity.

1.3 History

EventIDE was initially developed as a neuroscience tool with high demands for precision and reliability. Over the next eight years, the software gained popularity and was adopted by numerous research labs worldwide for diverse research projects. The following table provides a list of research institutes currently utilizing the software.

1.4 Hardware/Software requirements

Platforms: PC, Surface Pro, Mac with Bootcamp

Recommended PC configuration: Intel Core i7, 16GB RAM, 1.0TB SDD, USB 3.0 and A dual - monitor graphics board.

Supported OS: Window XP/Vista (older version), 7, 8, 10, 11.

1.5 Integration with other packages

In addition to creating user extensions, EventIDE allows for seamless integration with various research-related software packages:

- FieldTrip for advanced signal analysis
- LSL for signal acquisition
- MATLAB for calculus and data analysis
- OpenCV for fast computer graphics and vision algorithms
- OpenVibe for signal acquisition and processing
- Math.NET Numerics for ultra-fast numerical computations
- Psychophysics Toolbox for vision and neuroscience functions
- PsychoPy for stimulus presentation and psychophysics functions
- Unity for 2D or 3D task design and VR

1.6 Supported hardware

1.6.1 Eye-trackers

- Arrington Research
- EyeLink
- EyeTech
- Eye Tribe
- Pupil labs
- SMI
- Tobii
- Tobii Glasses 2/3

- Gazepoint
- ISCAN
- Jazz-Novo
- Mirametrix
- LiveTrack
- Eyelogic
- Any analogue eye-tracker via DAQ boards.
- GazePointer (webcam software)

1.6.2 Bio-hardware (EEG, MEG, ECG, NIRS) for multi-modal data acquisition, online visualization and recording

via direct drivers:

Artinis, ANT/EEGO, Biograph Infinity, Biosignal Plux, Brain Products, BrainMaster, Biosemi, Empatica, Emotiv, HeartLive, Hypnodyne ZMax, Neulog, Neurosky, Nonin, OpenBCI, Shimmer , TMSi (Refa&Saga) and any other signal hardware connected via the Advantech, National Instruments, Measurement Computing DAQ boards.

via third-party protocols, such as LSL, OpenVibe, FieldTrip and OpenEEG:

ANT/EEmagine, ANT/Neuro, Artinis (NIRS), Cognionics, Corvision (NIRS), CTF/VSM, EGI, gTec, Neuroelectrics, Neuroservo, mBrainTrain, MCS/MKS, Micromed, MindMedia, Mitsar, Muse, NIRS.

1.6.3 Virtual reality hardware

via direct drivers	via Unity integration
• Oculus Rift • Oculus Remote • Oculus Touch	• Google Cardboard • Oculus Rift/Go/Quest • Vive Pro • Vive Focus Pro • Vive Focus 3

1.6.4 Motion capture and gesture recognition hardware

- Kinect for Windows
- Leap Motion

1.6.5 Hand-writing recognition and drawing hardware

- Touch screen
- Pen tablet
- Trackball mouse

1.6.6 Music hardware

- MIDI-compatible devices, for example, electronic pianos

1.6.7 Common psychophysics hardware

- CRS Stimulus processors
- Cedrus response boxes
- MC, NI, Advantech and Arduino DAQ boards
- All HID- compatible input devices, such as joysticks, gamepads, response boxes
- Bi-directional synchronization via LPT, COM, USB, network protocols and DAQ cards
- Parallel access to multiple keyboards and mice

1.7 CURRENT USERS

EventIDE was initially developed as a neuroscience tool with high demands for precision and reliability. Over the next eight years, the software gained popularity and was adopted by numerous research labs worldwide for diverse research projects. The following table provides a list of research institutes currently utilizing the software.

Country	City	Institute
Australia		
	Melbourne	The University of Melbourne
	Sydney	University of New South Wales
Chile		
	Santiago	Universidad de Chile
	Concepción	Universidad Catolica de la Santisima Concepcion
China		
	Beijing	Beijing University
	Shanghai	Tongji University
	ShenZhen	ShenZhen Institute of Neuroscience
	ShenZhen	ShenZhen University
	Hangzhou	Zhejiang University
France		
	Paris	Brain and Spine Institute
	Paris	Institute de la Vision
	Paris	Centre Attention & Vision
	Toulouse	Brain and Cognition Research Centre (CerCo)
	Lyon	Institute for Cognitive Sciences
	Lyon	Stem-cell and Brain Research Institute
	Marseille	Institute of Neuroscience of la Timone
	Grenoble	The Université Grenoble Alpes
Germany		
	Bochum	Ruhr-University Bochum
	Göttingen	German Primate Centre
	Furtwangen	Furtwangen University
	Greifswald	Institute for Psychology
Israel		
	Haifa	Israel Institute of Technology
Italy		
	Trieste	The International School for Advanced Studies
	Verona	University of Verona
	Florence	University of Florence
Mexico		
	Mexico	University Autonomous of the Morelos State
Japan		
	Koto City	Shibaura Institute of Technology
Spain		
	Barcelona	University of Barcelona
	Barcelona	Universitat Pompeu Fabra
	Valencia	Universidad Politècnica de València
	Tarragona	Universitat Rovira i Virgili
Switzerland		
	Zürich	University Hospital of Zürich
	Fribourg	University of Fribourg
the Netherlands		
	Amsterdam	University of Amsterdam
	Maastricht	Maastricht University
UK		
	Edinburg	Heriot Watt university
	Canterbury	Canterbury Christ Church University
	Luton	School of Computer Science & Technology
	London	Kingston University London
USA		
	Dearborn	University of Michigan- Dearborn
	Cedar City	Southern Utah University
	Boston	Massachusetts General Hospital
	Charlottesville	University of Virginia
	Medford	Tufts University
	Brunswick	Bowdoin College

1.8 ADDITIONAL INFORMATION

More software details are available on the company website, https://www.okazolab.com