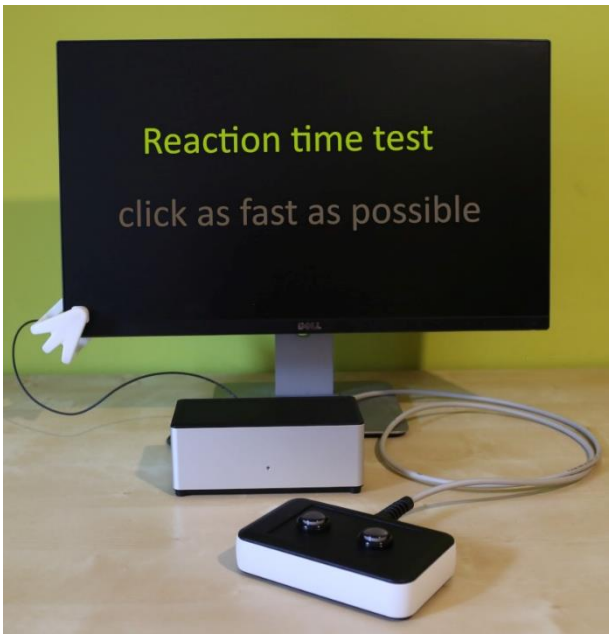
Response Box 2.0

The Response Box 2.0 is a next-generation, compact, and modular trigger box designed for precise real-time synchronization of experimental inputs, achieving timing accuracy down to one millisecond. It links visual stimulus triggers to physical response inputs and can synchronize with external devices such as olfactometers, breathing monitors, EEG, or TMS via TTL-compatible channels. The system is engineered for high-precision reaction time measurement and robust integration across a wide range of experimental paradigms.

The system comprises three primary components. The Trigger Box serves as the central unit of the system. It is powered and connected to the experiment workstation via a USB 2.0 interface. The ***ViStiSync*** unit functions as the visual interface of the system and is compatible with a variety of monitors, accommodating different shapes and dimensions. ***Interactive Pads*** are designed to capture the subject's responses. Multiple configurations of the interactive pads are available, including options with one, two, or four digital on/off buttons, as well as an analog force pad button for measuring the pressing force.



Built on widely available hardware such as STM32, the device is not locked to proprietary ecosystems. This ensures ***no licensing fees***, long-term support, easy sourcing, and community-driven enhancements. Leveraging open-source tools means users benefit from a vast ecosystem of libraries, documentation, and community support, unlike proprietary environments that may restrict access or require vendor-specific tools or IDEs. Updating or adapting experimental logic is straightforward, reducing turnaround time for protocol changes.

Maintains compatibility with CyNexo's ***Sniff-0*** and ***Spir-0***, allowing synchronized delivery and measurement of visual, olfactory, auditory and respiratory events.

Main features

The Response Box 2.0 replaces the Arduino-based environment with ***MicroPython***, an open-source ***Python 3*** implementation optimized for microcontrollers. This shift empowers users with a modern, accessible, and ***flexible programming interface***, leveraging the global Python ecosystem for rapid prototyping and customization. It allows direct control of the hardware (Interactive Pads, ViStiSync, RGB LED, digital inputs/outputs, onboard timers, etc.) with concise, readable code. Arduino support is still available through customized ***STM32duino***.

True real-time system: the ***ViStiSync*** digital eye captures the screen variations and synchs it with the pad interactions

USB interface to power the device and communicate to the host PC through an emulated serial port supported by all operating systems

Compatible with the most diffused application frameworks such as MatLab®, Octave, E-Prime®, LabView®, PsychoPy

Custom build electronics module minimises noise and delays to allow a precise synchronization from/to external TTL compatible devices

Multiple **Interactive Pads** configurations available and customizable to specific research needs (available upon request)

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Trigger Box SPECIFICATIONS	
OS support	*Windows®, MAC®, GNU/Linux*
Software compatibility	*Python, MatLab®, Octave, C, C++, E-Prime®, LabView®, PsychoPy*
Communication to PC	*USB 2.0 Virtual COM Port (USB-CDC ACM)*
Video or analog triggering	*2 channels, up to 200Hz*
Trigger I/O	*Input: 1 BNC, configurable as TTL (0-5V) or LVTTL (0-3.3V). Optional 2nd input.* *Output: 1 BNC, configurable as TTL (0-5V) or LVTTL (0-3.3V). Opt. 2nd output.*
Expansion ports	*USB 2.0 full-speed host interface (future uses)*
Internal storage *(user accessible)*	*Onboard 4MiB flash memory for custom scripts and data storage* *Onboard 16KiB EEPROM for configuration storage*
External storage	*One microSD card for custom scripts and data storage*
Power	*Self-powered by 5V USB connection to PC (< 2.5W)*
Compliance	*CE EN 61000-6-3:2007*
Dimensions	*200 x 100 x 70mm*
Weight	*470g*

Interactive Pads SPECIFICATIONS	
Trigger mechanism	*Totally customizable as force pad or up to 6 coloured buttons upon request*
Cable length	*1.2m (customizable)*
Dimensions	*100 x 50 x 30mm*
Weight	*160g (2 button version)*
Power	*Self-powered trough the Trigger Box connection*

ViStiSync Screen Sensor SPECIFICATIONS	
Shape	*3D printed plastic monitor sensor, adaptable to almost all flat monitor models by a simple and adjustable three points clamp*
Sensors	*One phototransistor. Addition phototransistor available as an option*
Positioning	*Any screen corner*
Screen thickness	*Min: 9 mm* *Max: 35 mm*
Screen bevel	*Max: 35 mm wide*
Cable length	*1.2m (customizable up to 3m)*
Dimensions	*140 x 58 x 67mm (MAX)*
Weight	*110g*

RELATED PRODUCTS	
Olfactometer	*Sniff-0*
Breathing monitor	*Spir-0*
HD Audio extension	*Spir-0 with HD Audio Box plugin*

OPTIONS / ADD-ONS

- Alternative keypads, with different number, layout, colours or types of buttons
- Ruggedized carrying case
- Customized solutions to meet your specific research needs