

**FREELY-BEHAVING
CELLULAR-RESOLUTION
MULTI BRAIN REGION
OPTOGENETICS & CALCIUM IMAGING**

INTRODUCTION

The OASIS Implant is a ground-breaking platform for simultaneous single-cell resolution optogenetics and calcium imaging in freely-behaving animals in the deep-brain, cortex, or spinal cord. Whether you are investigating a single region or multiple regions at the same time, this is the all-optical solution for your freely-behaving experiments. The OASIS Implant is purposefully designed to be reconfigurable and scalable, such that researchers can easily tackle both current and future *in vivo* optogenetics and imaging applications. Truly understand the link between neural circuits and behaviour using the OASIS Implant.

FUTUREPROOF TECHNOLOGY

The OASIS Implant is not simply a product but a platform onto which you can build your complete *in vivo* imaging and photostimulation system. It is a reconfigurable solution that allows you to put together the components required for your current research goals including different wavelengths of illumination, spatiotemporal control of stimulation, cameras, imaging fibers, and more. By adding the necessary components to your system as time progresses, your OASIS Implant can evolve as your experiments evolve. With the OASIS Implant platform you can seamlessly transition from fiber photometry functionality to cellular-resolution calcium imaging capability or from widefield optogenetic stimulation to single-cell patterned stimulation.

FEATURES

- Cellular Resolution Optogenetics and Imaging
- Designed for Experiments in Freely-Behaving Animals
- Simultaneous Multi-Region Illumination
- Light-Weight Headmount
- Reconfigurable Futureproof Platform
- Easy Synchronization with Behavioural Equipment
- Third-Party Camera Compatible

APPLICATIONS

- Deep-Brain Optogenetics and Calcium Imaging
- Multi-Region Optogenetics and Calcium Imaging
- Cortex-Wide Optogenetics and Calcium Imaging

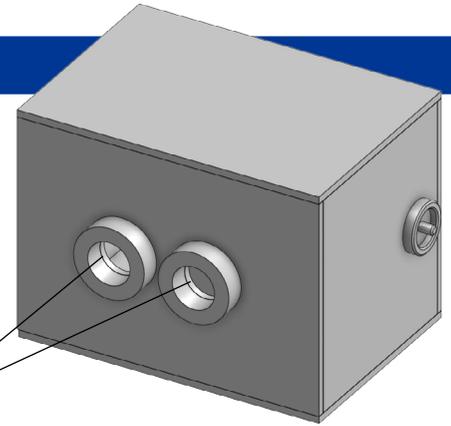


THE OASIS IMPLANT PLATFORM

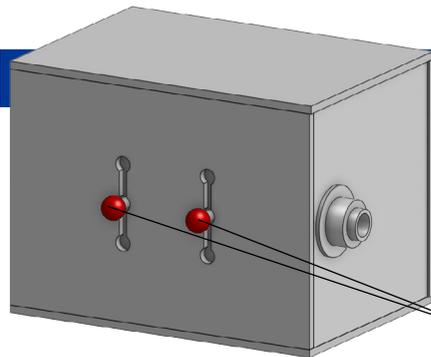
Multiple components make part of the OASIS Implant platform to allow the system to perform its many functions. Let's take a look at the individual components and their features:

RECONFIGURABLE ILLUMINATION PORTS

The two (2) illumination ports at the back of the OASIS Implant main chassis allows the introduction of multiple light sources, either via an epi-fluorescent illuminator that accepts a 3mm-core liquid lightguide input or by coupling Mightex's Polygon400 pattern illuminator for maximum illumination control. This flexibility allows researchers the ability to use the light sources and wavelengths that will suit their specific imaging and optogenetic applications.



BACK ILLUMINATION PORTS



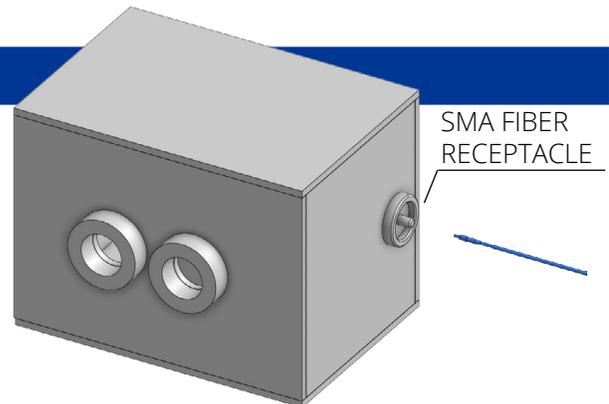
SWITCHABLE FILTER SETS

Each of the two (2) illumination ports on the OASIS Implant contains a filter holder that can hold up to three (3) filter sets, allowing researchers to easily switch between filters to meet their unique imaging and optogenetic stimulation needs.

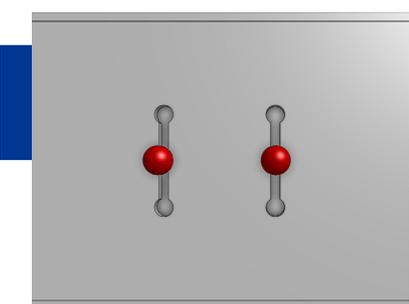
3-POSITION FILTER HOLDERS

INTERCHANGEABLE IMAGING FIBER

The OASIS Implant uses a flexible imaging fiber to transmit and collect light from the deep-brain or the cortex of a freely-behaving animal for imaging and optogenetics. A standard SMA multimode fiber is also compatible with the OASIS Implant for fiber photometry experiments.



SMA FIBER RECEPTACLE



C-MOUNT CAMERA PORT

COMPATIBLE WITH SCIENTIFIC-GRADE CAMERAS

Equipped with a standard C-mount camera port, the OASIS Implant system works with any low-noise, high-sensitivity, good-linearity and high-speed scientific camera, enabling high-quality image acquisition and high-precision quantitative data analysis. Multiple cameras can also be supported.



CELLULAR RESOLUTION OPTOGENETICS

The OASIS Implant makes use of a imaging fiber cable to not only carry the image collected from the brain to the OASIS Implant for calcium imaging but also transmit light from the OASIS Implant to the brain for optogenetic stimulation with low transmission loss. Individual pixels within the image can be individually addressed for patterned illumination with Mightex’s Polygon400 for cellular resolution optogenetic stimulation. Our imaging fiber cables are also highly durable and flexible, and can withstand the many forces involved in freely-behaving experiments.

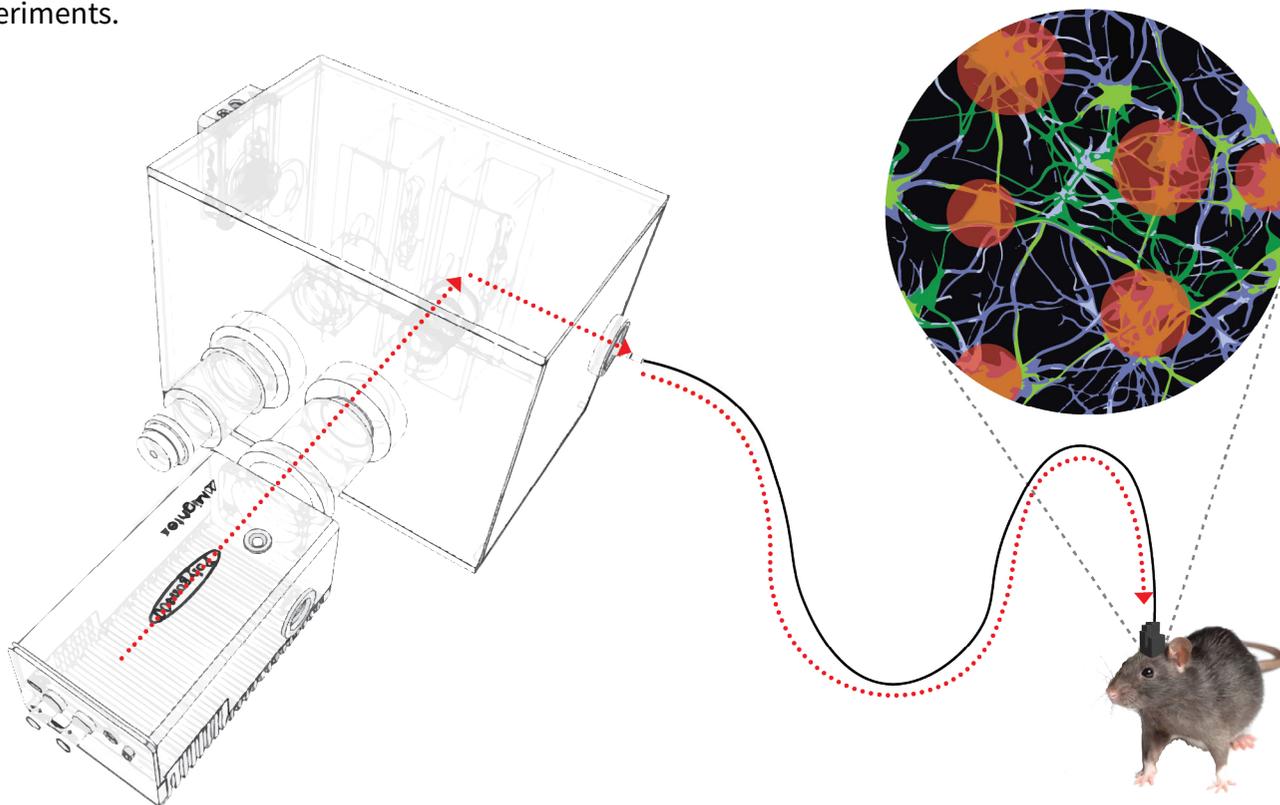


Figure 1. Patterned Illumination with the Polygon400 to create any shape for freely-behaving simultaneous multi-region targeted optogenetic stimulation.

HEADMOUNT

To access deep brain regions, the OASIS Implant headmount is designed to interface with implantable GRIN lenses to position and focus the fiber relative to the GRIN. The total weight of the setup is only **0.7g**, which minimizes stress especially in smaller animals and improves the quality and reliability of the data collected. Also, our headmounts come with focus and orientation locking mechanisms to ensure reproducibility of experiments over longer timelines. Our headmount is also compatible for cortical imaging and stimulation in freely-behaving animals.



**PLEASE CONTACT MIGHTEX FOR FURTHER
IMAGING FIBER CABLE AND HEADMOUNT OPTIONS**

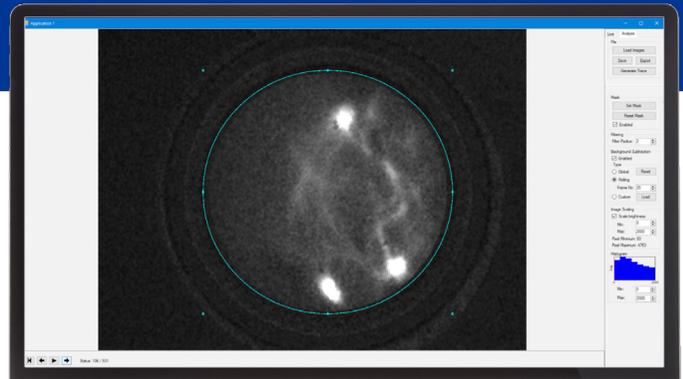


IMAGE ACQUISITION AND ANALYSIS SOFTWARE

Every OASIS Implant system comes with Mightex's Image Acquisition and Analysis software that allows users to collect large data sets of neural recordings from calcium imaging experiments and provides the key processing and analysis tools required to help users quickly convert these large data sets into results that can be clearly interpreted for analysis. The software module has been designed with the help of feedback provided by neuroscientists in the field to ensure that the platform is easy to use, integrates smoothly with typical behavioral experiments, while including the powerful advanced tools needed for studying large scale neural networks.

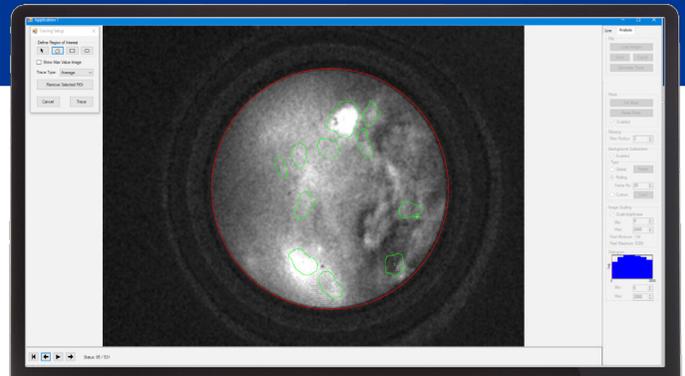
ACQUIRE IN VIVO CALCIUM RECORDINGS

The software provides a complete set of tools to allow researchers to visualize and capture calcium imaging recordings. The software includes features to synchronize the calcium recordings taken with the rest of the behavioral equipment and cameras used in the experiment.



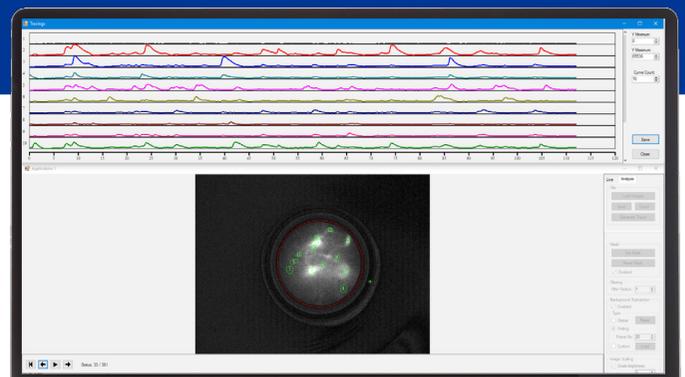
INSTANTANEOUSLY IDENTIFY CELLS

Once calcium recordings are acquired, researchers are able to instantaneously view and process the captured data. The cell identification tools allow for easy detection of cells and sub-cellular features with a high level of quality control to ensure reliable data is collected for analysis.



EXTRACT CELL $\Delta F/F_0$ TRACES AND IDENTIFY SPIKES

Traces of the calcium imaging data can be extracted for each cell that was identified by the researcher. Along with the cell traces collected in the software, all inputs and outputs to behavioural equipment/cameras will be contained in collected data sets to allow for easy matching of neural events with behavioral activity.

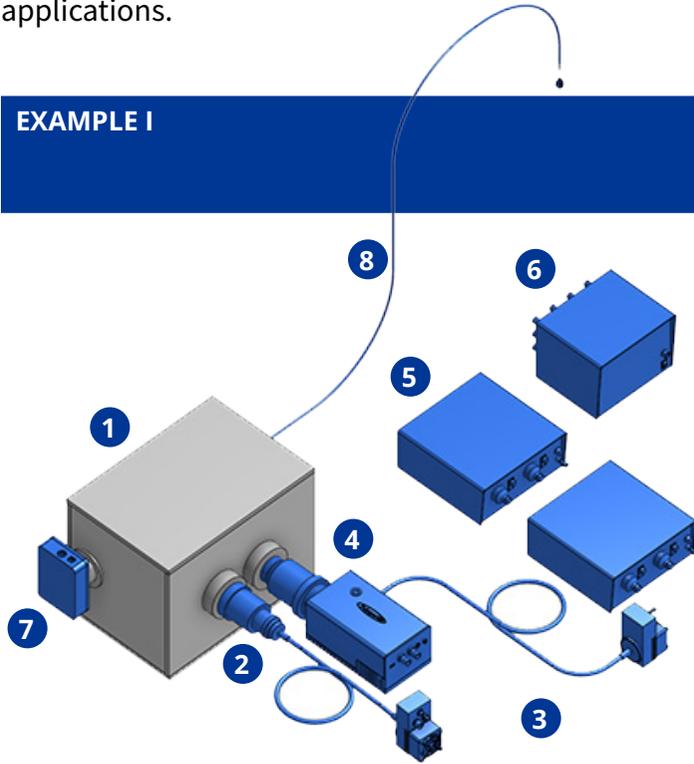


OASIS IMPLANT SYSTEM CONFIGURATIONS

The OASIS Implant is designed to be a futureproof platform that can be reconfigured by customers to suit their current and future optogenetics and imaging research on freely-behaving animals. Below, please see examples of configurations that provide customers with a starting point of how the system can be configured for certain applications.

EXAMPLE I

CALCIUM IMAGING & TARGETED OPTOGENETICS

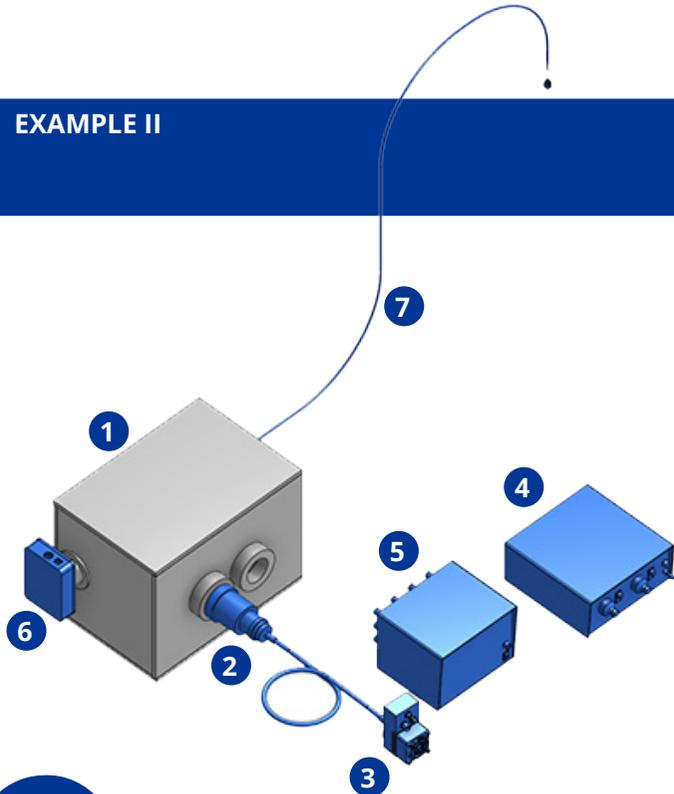


COMPONENTS

- OASIS IMPLANT PLATFORM **1**
- GCAMP (OR RCAMP) FILTER SET
90R/10T BEAM SPLITTERS
- EPI WIDE-FIELD ILLUMINATOR **2**
- BLS-SERIES LIGHT GUIDE COUPLED LED SOURCES **3**
- POLYGON400 PATTERN ILLUMINATOR **4**
- LED CONTROLLERS **5**
- BLS ANALOG & DIGITAL INPUT/OUTPUT MODULE **6**
- HIGH-SENSITIVITY CCD CAMERA **7**
- IMAGING FIBER CABLES **8**
- HEADMOUNT
GRIN LENS

EXAMPLE II

CALCIUM IMAGING CONFIGURATION



COMPONENTS

- OASIS IMPLANT PLATFORM **1**
- GCAMP (OR RCAMP) FILTER SET
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- EPI WIDE-FIELD ILLUMINATOR **2**
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- LED CONTROLLER **4**
- BLS ANALOG & DIGITAL INPUT/OUTPUT MODULE **5**
- HIGH-SENSITIVITY CCD CAMERA **6**
- IMAGING FIBER CABLES **7**
- HEADMOUNT
GRIN LENS



ORDER NOW

Our primary goal is to help you find the optimal solution for your research. We have a dedicated technical support and sales team committed to providing guidance on our OASIS Implant platform and other Mightex products.



Please visit www.mightexbio.com/contact
to submit an inquiry form today!

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