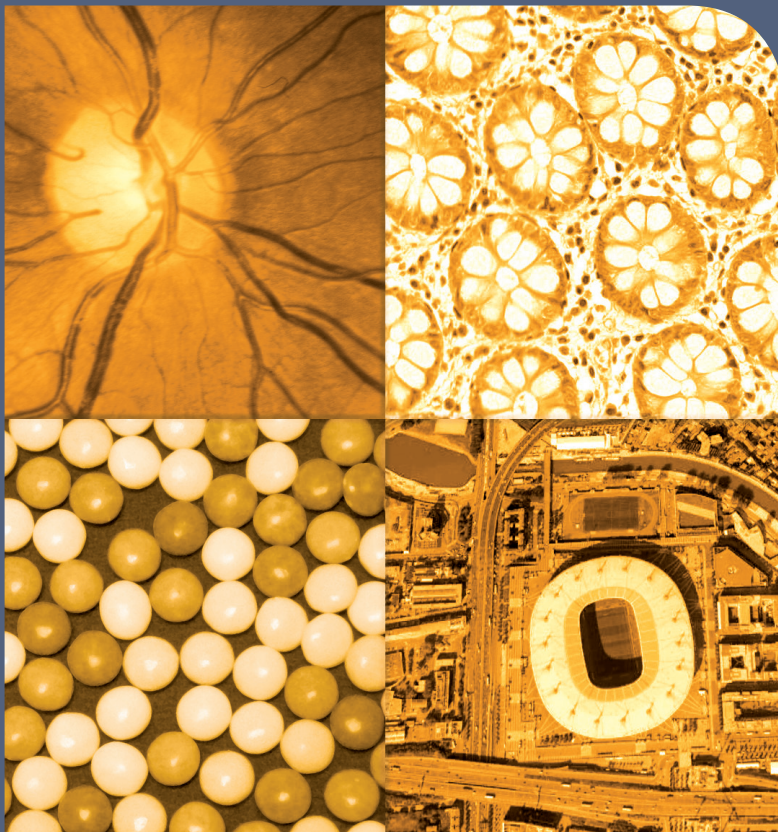# Aphelion Dev

IMAGE PROCESSING
AND IMAGE ANALYSIS SOFTWARE
TO FACE NEW CHALLENGES



BIOLOGY / COSMETICS / GEOLOGY
INSPECTION / MATERIALS SCIENCE
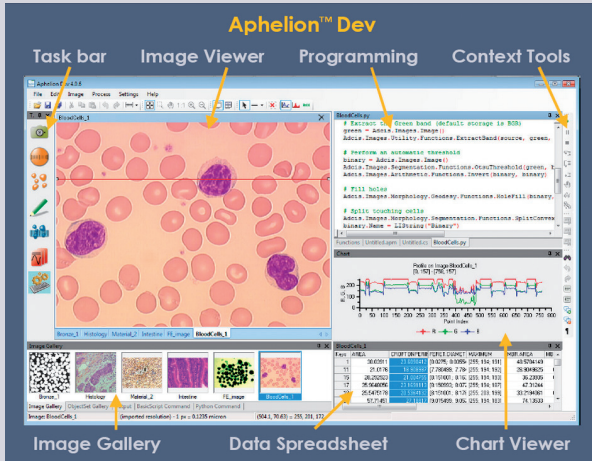
METROLOGY
OBJECT RECOGNITION

PHARMACOLOGY / QUALITY CONTROL
REMOTE SENSING / ROBOTICS

SECURITY / TRACKING

# Aphelion™ Dev to Quickly Prototype & Deploy Imaging Applications

We have been providing products to the image processing and analysis marketplace for more than 25 years. Our Aphelion™ software products and our customers benefit from that experience. While many competitor products have come and gone, Aphelion™ Dev remains the product of choice for those developing advanced image-based applications. Our Dev product has earned this position because we have continuously updated it to keep pace with imaging technology advances, and the evolution of Windows® environments and personal computer hardware technologies. At the same time we continued providing timely and professional customer support. Our keeping pace with rapidly changing imaging marketplace has substantially resulted from our partnering with international R&D labs and our successful track record developing advanced imaging applications.



**Aphelion™ Dev**

Task bar    Image Viewer    Programming    Context Tools

Image Gallery    Data Spreadsheet    Chart Viewer

Aphelion™ Dev's graphical user interface utilizes the best features of current Windows® technology, such as .Net™ components and software architecture tools. Its context-based tools guide a new user from image acquisition, through image processing and analysis, to report generation. Yet, Dev provides the more experienced user the tools to develop advanced and automated imaging processes that can quickly become deployed applications.

Aphelion™ Dev users benefit from its openness, made possible by support for multiple macro languages that can call functions from Dev's libraries as well as from 3rd party software products. Dev's libraries are available as native code and .Net™ components. This capability enables OEMs and VARs to create stand-alone imaging applications with customized GUIs in a timely manner.

Keeping up with rapidly changing technology, Aphelion™ Dev supports monochrome, color, multiband, 2D, and 3D[1] images; 32-bit and 64-bit architectures; and Windows® XP, Vista®, and 7 operating systems[2]. Aphelion™ Dev's design significantly enhances performance for both development work and for deployed systems. User productivity is also benefitted by an extensive Help library and video tutorials.
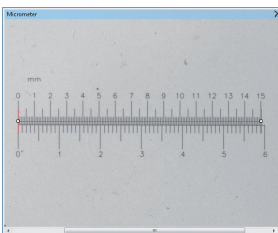
## Settings

Settings are those parameters that configure the Aphelion™ Dev software for control of the image acquisition system being used, calibration of measurements for real-world units, and storage location of user data files. Centralized control of these parameters facilitates the user making system changes.

More than 50 different measurements can be computed per object, and there are no limits on the number of objects per image or on image size. If a calibration profile has been selected, all measurements are then provided in real-world units.

### Calibration Settings



Aphelion™ Dev can be calibrated to report measurements accurately in real-world units. Using an object of known dimensions (e.g., micrometer) and Dev's on-screen measurement tools, a user can quickly create a calibration profile for a specific imager (e.g., camera) or a specific configuration of an imager. Dev does not limit the number of calibration profiles that can be saved, thereby enabling the generation of accurate, real-world measurements for any configuration of an imaging device that was calibrated with Aphelion™ Dev.

### Measurement Settings

Measurement settings enable a user to select from a large library of measurements (e.g., length, area, texture, intensity statistics) that are to be used in an image analysis project for each predefined object types (e.g., line, circle, bitmap).

## Image Acquisition

Aphelion™ Dev supports any imager compliant with the IIDC specification for an IEEE 1394 bus[3] (i.e., FireWire® compatible) as well as imagers using the DirectShow® interface protocol (e.g., webcams and Gigabit Ethernet® cameras supporting this protocol). Dev captures an imager's parameters via the FireWire® connection, and saves them as a profile for the imager.

Dev's image acquisition process is easy to use. Select the camera mode (i.e., image size and frame rate), define the exposure parameters, click the GUI's "Live" button to display a live image, focus the camera, apply a shading correction to get an even background, and then click the "Snap" button to capture the image. Images previously captured and stored on media can also be processed and analyzed with Dev. With the 64-bit version of Dev, very large images (e.g., from a scanner microscope or scanning electron microscope) can be acquired and processed, thus providing high throughput imaging.
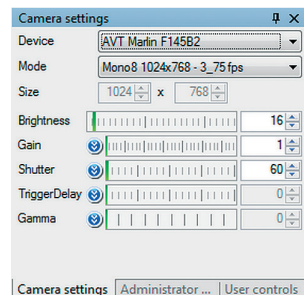
## Object Extraction

Aphelion™ Dev provides two methods to extract objects of interest from an image. One method uses the Developer task to extract objects from complex images or to fully automate the extraction process. Dev includes a large set of extraction functions, from basic to very advanced. The second method uses Dev's Object Extraction task, a semi-automated process that guides the user through three steps: color band selection, automatic or interactive thresholding, and object filtering to further refine the extraction.

## Object Editing

The Object Editing task provides tools for modifying the set of objects that were extracted. Altering or removing existing objects and drawing new objects can be easily performed using mouse operations. An undo function is always available to go back to the previous step of the editing process. The combination of the Object Extraction and Editing tasks enables a user to achieve an optimal segmentation of an image regardless of its complexity.
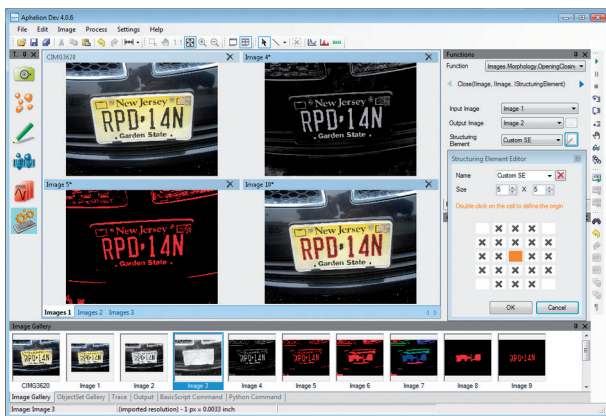


## Measurements

### Object Measurements

Aphelion™ Dev's processing of object measurements is very quick, and up to 50 measurements can be computed with just one mouse click. The computed measurements are displayed in a grid format for the objects automatically extracted and for those drawn with the Object Editing task. The GUI displays the grid, its associated image with its objects overlaid on the image, and an interactive chart displaying a histogram or scatter plot of object measurement values (i.e., values in a grid column). Any object can be highlighted simultaneously in both the image overlay and the grid by clicking on the object in either the overlay or the object's row in the grid. An export feature saves grid data in Microsoft® Excel® or CSV file format.

### Interactive Measurements

Interactive measurement tools are used to draw virtually any geometric shapes on the objects overlay in order to quickly and directly measure object features (e.g., length, circumference, area). This is especially useful when there are only a few objects to be measured or when ad hoc measurements are desired. Measurements for the shapes drawn are displayed in a grid format. As with the Object Measurements grid, the Interactive Measurements grid can be exported to Excel® or CSV formats. In addition, interactive histograms in a region of interest and intensity profiles are provided.

## Developer

The Developer task is Aphelion™ Dev's primary tool for developing and deploying sophisticated, image-based applications. It provides hundreds of image and ObjectSet functions to enhance, restore, and filter images; extract objects such as blobs, chains, and lines; and transform, group, analyze, and classify objects. These can be applied to an entire image or to multiple regions of interest of any size and shape. Developer's functions are all available from drop-down menus. When a function is selected, Dev provides a dialog box that enables easy entry and full control of the function's parameters. Specialized dialog boxes facilitate entry of complex parameters (e.g., kernels). Once its parameters are entered, the function can be executed with a mouse click and results immediately viewed.

To create and automate complex image processing and analysis applications, Dev's functions can be combined using a macro language accessible without leaving the Dev GUI. Four macro languages are supported: BasicScript®[4], an easy to use scripting language, Python®, Visual C#®, and Visual Basic®. Debugging tools and a macro recorder[5] are provided to aid in program development.

In addition to the comprehensive function libraries for image and object processing and measurement, programmers will appreciate the extensive set of utility functions included in Dev. These provide for image and data management, display controls, graphics handling, and support for many image formats. All Dev functions are fully documented with detailed descriptions of properties and methods, and with coding examples.

The Developer task has been designed for application development in virtually any image domain. It is especially well-suited for applications in the fields of biology, microscopy, materials science, quality control, and remote sensing.

## Report Generation

The final step of a typical image analysis project is to generate a report of the results obtained from the analysis. In the past, this was often done by using multiple software products, requiring multiple data exchange steps between the various products. With Aphelion™ Dev, generating a report can be done in only two steps: 1.) Specify the data needed (i.e., measurement grid and image with or without its objects overlay); and 2.) Specify an Excel® template to use for the report. The user can choose from any previously provided template or create a new one. Alternatively, the Report Generator can export the grid values to a text file in CSV format or export the image and overlay to the Windows® clipboard.

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## Upgrade Path for Advanced Capabilities

Aphelion™ Dev provides a comprehensive set of image functions that make possible the development of sophisticated image-based applications. Should your imaging project needs become more demanding, the Aphelion™ product family includes a large set of optional extensions that complement, enhance, and extend Dev's capabilities:

• VisionTutor™ - Learn computer vision using this self-paced course

• Neural Network Classifier - Perform high-level classification based on a neural network classifier

• Random Forest Classifier - Perform high-level classification based on a Random Forest classifier

• Virtual Image Capture & Virtual Image Stitcher - Capture and manage very large images acquired by high-throughput imaging devices or automated scanning electron microscopes

• MultiFocus Extension - Merge unfocused images into one single focused image

• Kriging Extension - Remove noise effects in images

• Color Segmentation Extension - Extract blobs using color space conversion (24 color spaces supported) and efficient segmentation tools

• Image Registration - Register two images and generate the transformation matrix

• 3D Image Processing, 3D Display, & 3D Skeletonization - Process, analyze, and display 3D images

• Hardware Interfaces - Control acquisition devices and microscope stages

• Stereology Analyzer - Quickly estimate the volume ratio of a region in a very large image

## Product Distribution

Aphelion™ Dev is compatible with Microsoft© Windows© XP, Vista©, 7, 8 and 10 operating systems[2], and cameras with FireWire© connectivity[3]. A version of its libraries, called Aphelion™ SDK, is also available for deployment including a basic image display capability.

## Licensing

Single User license (locked to a single computer system)
Site license
Multiple computer, non-concurrent use license (optional USB license key required)

## Standard package

Includes a DVD containing the Aphelion™ Dev installation program, the IEEE1394 software driver[3], multimedia demonstrations, and a User Guide hardcopy.

[1] Processing and display of 3D images require two optional modules.

[2] Applications developed with Aphelion™ Dev can be deployed using Aphelion™ SDK.

[3] Compliant with the IIDC 1394 Digital Camera Specification version 1.31 as published by the 1394 Trace Association.

[4] BasicScript® is only available in the 32-bit version of Aphelion™ Dev.

[5] Only available for BasicScript®

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