

**CAMERA SPECIFICATIONS
&
SOFTWARE APPLICATIONS**

AUGMENTIQS

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1 Product Overview

Augmentiqs offers two digital pathology grade cameras. Global or Rolling Shutter:

Camera Options:

	Global Shutter	Rolling Shutter
Interface	USB 3.0	USB 3.0
Pixel Bit Depth	10 or 12 bits	10 or 12 bits
Sensor Vendor	Sony	Sony
Sensor	IMX250	IMX183
Sensor Format	2/3	1"
Sensor Type	CMOS	CMOS
Resolution (HxV)	2448 px X 2048 px	5472 X 3648
Megapixels	5	20
Pixel Size (H x V)	3.45	2.4
Frame Rate	Up to 75 (app. Dependent)	18
Mono/Color	Color	Color

1.1 Minimum Operating Requirements

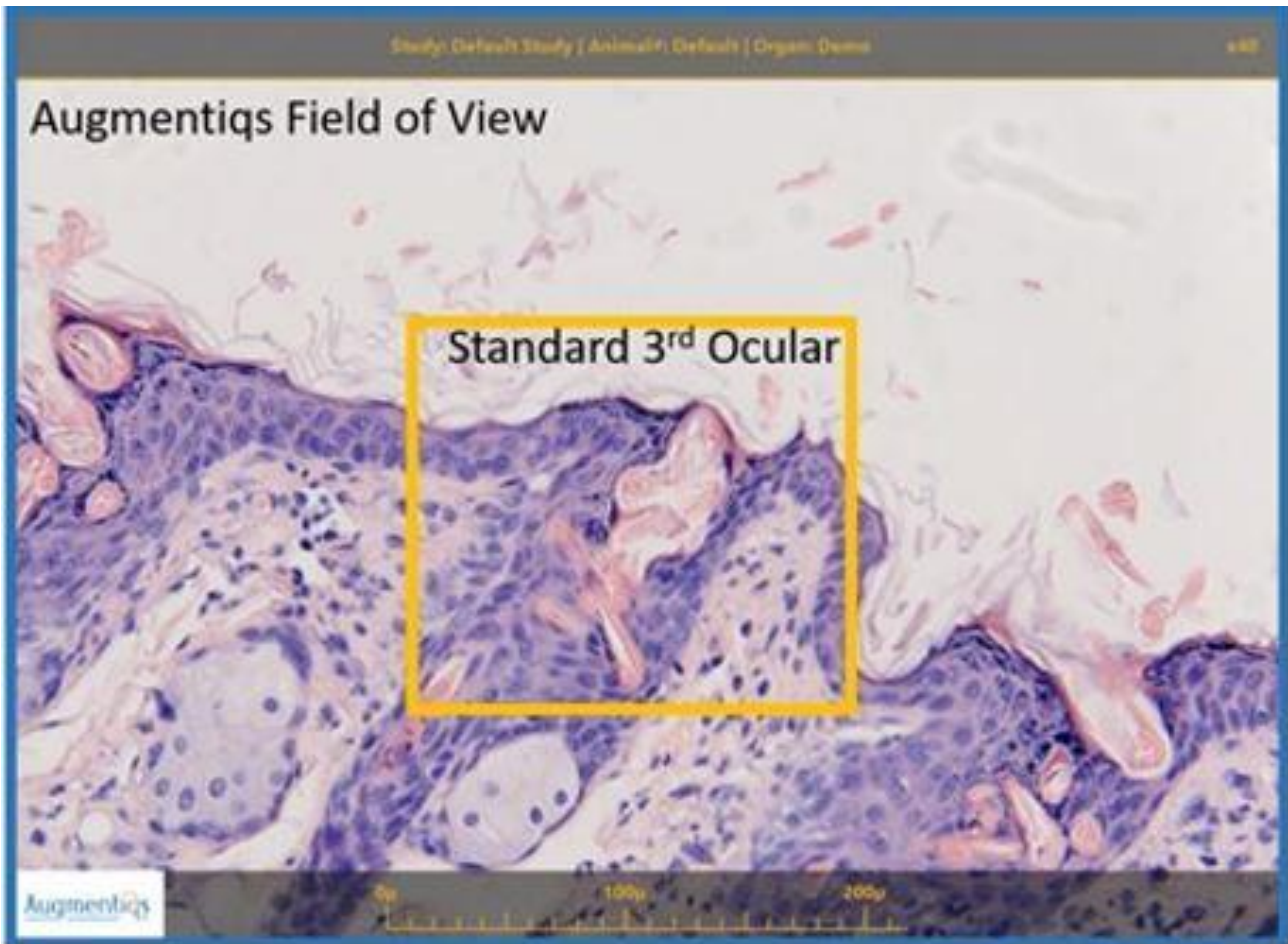
Augmentiqs software is deployed via the user's PC. Optimum performance of Augmentiqs Optical Module will be obtained by using certain computing capabilities as set forth below. Questions relating to PC requirements can be directed to Augmentiqs Technical Support.

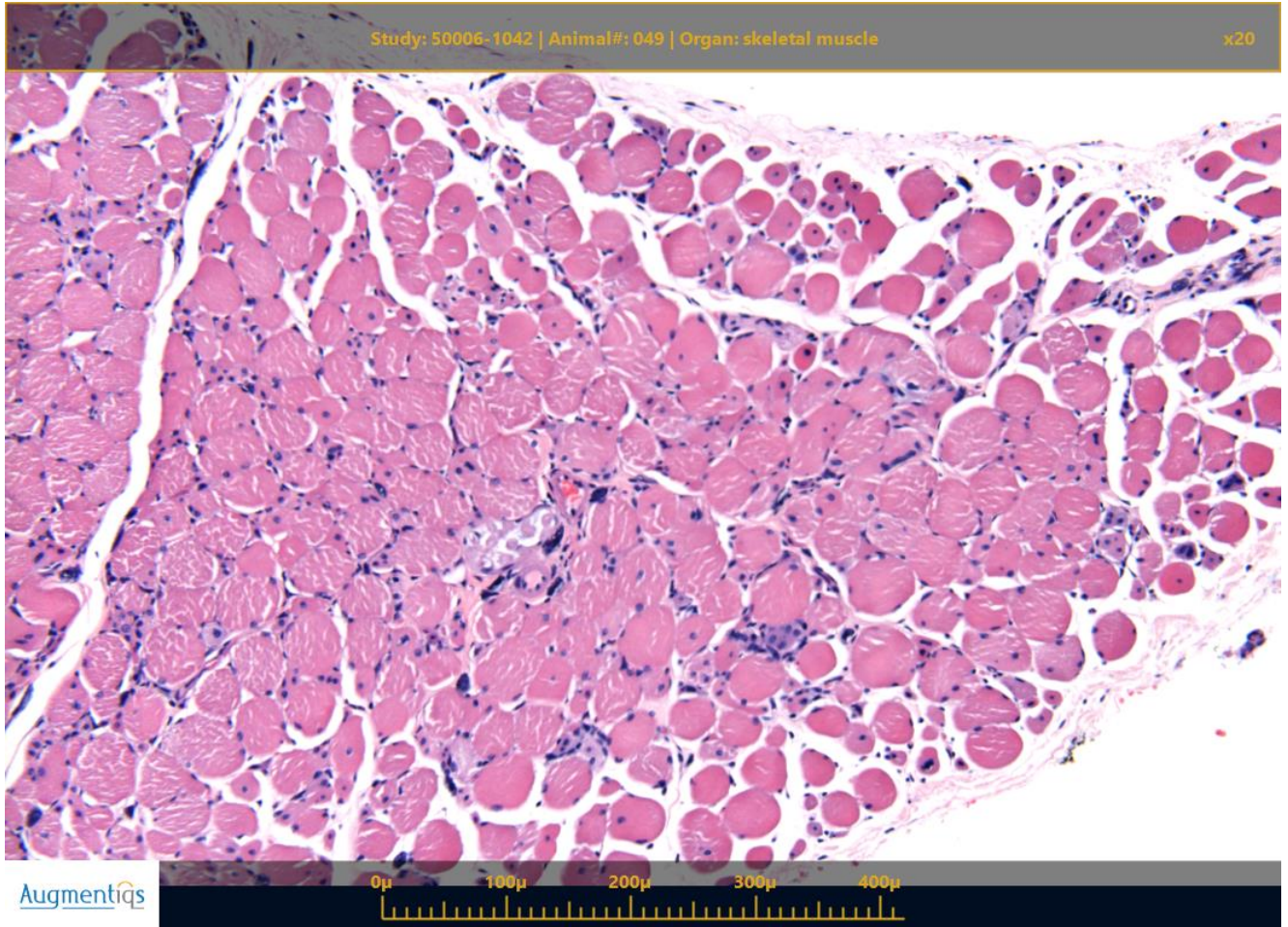
- A) OS: Windows 7 64-bit or newer
- B) CPU: i7-6770HQ or more capable (4 cores, 8 threads)
- C) RAM: 8 GB DDR3
- D) HDD: 10GB
- E) Display: Full HD (1920 by 1080-pixel resolution) display with IPS technology for proper color gamut support
- F) Ports: USB 3.0 (x1)
- G) Internet upload speed of at least 2MB/s. For telepathology sessions with more than 3 remote viewers, Internet upload speed of at least 5MB/s.
- H) Internet-facing firewall should allow inbound TCP ports 443 and 80 connections. For optional direct connectivity, internet-facing firewall shall allow outbound/inbound TCP port 5777

Augmentiqs provides solely the camera and USB cable. Augmentiqs does not provide the C-mount or other installation components. It is the sole responsibility of the Buyer to install the camera on the microscope's 3rd ocular port.

2 Image Quality

Augmentiqs combines a unique optical design to provide the highest possible quality image with the widest field of view.





PNG Image



TIFF Image

2021-08-10 14_19_49.tiff Properties

General Security Details Previous Versions

Type of file: TIFF File (.tiff)

Opens with: Windows Photo Viewer [Change...](#)

Location: C:\Augmentiqs\var\exports\Default Study\Default\

Size: 33.4 MB (35,062,534 bytes)

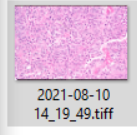
Size on disk: 33.4 MB (35,065,856 bytes)

Created: Tuesday, August 10, 2021, 2:21:08 PM

Modified: Tuesday, August 10, 2021, 2:21:10 PM

Accessed: Today, August 24, 2021, 2:23:08 PM

Attributes: Read-only Hidden [Advanced...](#)



2021-08-10 14_19_49.tiff Properties

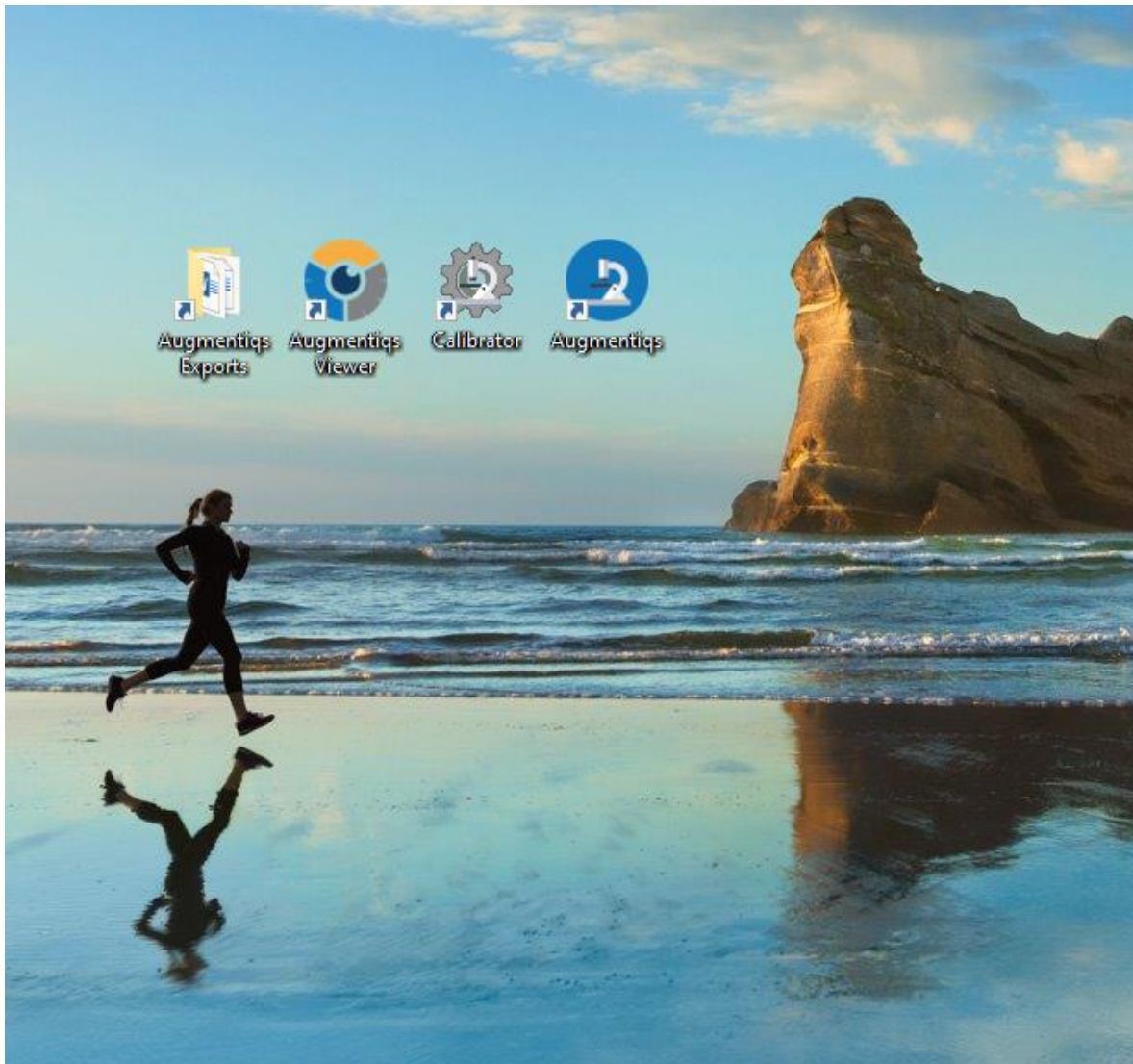
General Security Details Previous Versions

Property	Value
Authors	
Date taken	
Program name	
Date acquired	
Copyright	
Image	
Image ID	
Dimensions	5496 x 3672
Width	5496 pixels
Height	3672 pixels
Horizontal resolution	139486 dpi
Vertical resolution	139486 dpi
Bit depth	24
Compression	LZW
Resolution unit	2
Color representation	
Compressed bits/pixel	
Camera	

3 Augmentiqs Software

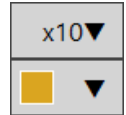
Augmentiqs software is accessed via the user's PC. Software capabilities include:

- Software Calibration
- Live Image & Image Capture
- Morphometric and annotation toolsets (distance, area, pointers)
- Database tools
- Telepathology
- Still Image Sharing
- Image analysis/Artificial Intelligence
- Whole slide scanning
- Automatic Image Capture
- Automatic Reporting
- Algorithm Integration Open API



3.1 Software Calibration

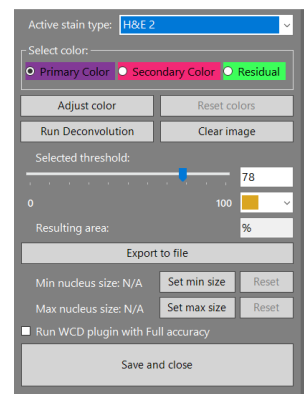
Prior to use, Augmentiqs is calibrated to recognize morphometrics and white balance per objective magnification. After the initial calibration, Augmentiqs will remember the settings of each objective magnification, and make calibration as simple as choosing the current objective magnification from a dropdown box.



Calibration tools include:

- White balance
- Pixel distance
- Gain, Function and other camera settings
- Arrow direction
- Font size
- Scale factor
- Automated image capture speed
- Text shadow shape

For image analysis tools, Augmentiqs allows users to easily calibrate sensitivities. A single calibration setup will become the default, making all algorithm deployment a single-click activity.

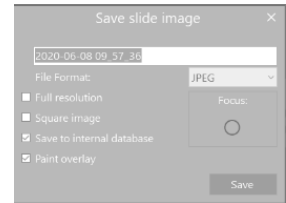


3.2 Image Capture

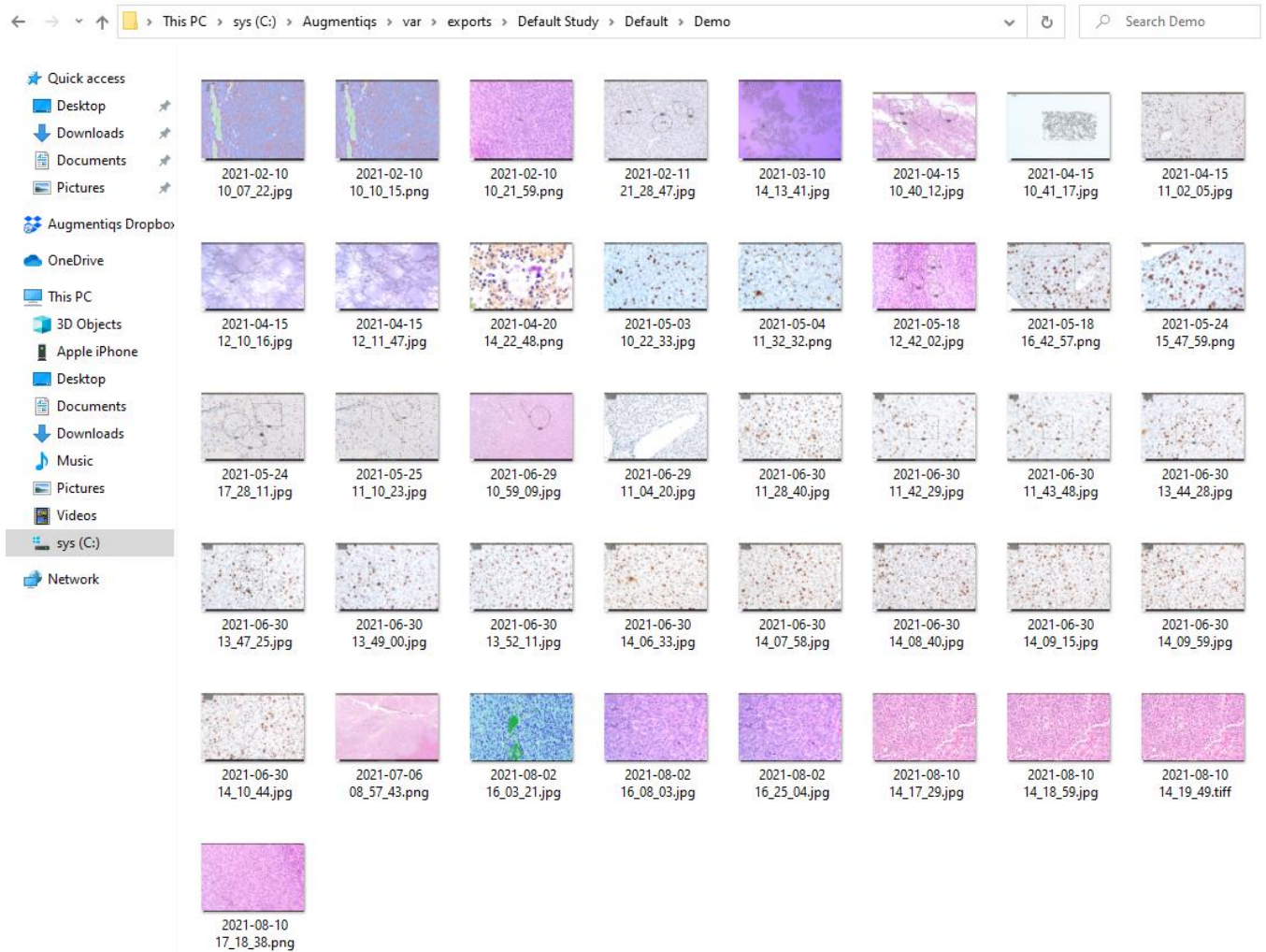
Augmentiqs camera allows users to view and work the live image without prior image capture. When choosing to save an image, Augmentiqs enables saving annotated images with magnification, calibrated ruler, image analysis, morphometric annotations and case data superimposed.

High resolution images can be saved to the user's PC as a PNG, TIFF, JPG or other open-format file, and are easily accessed via Windows Explorer on the user's PC.

Upon pressing the **Image Capture** button, a pop up will open which will enable editing of the image name, choosing the format of the image, and providing a measurement of image focus.



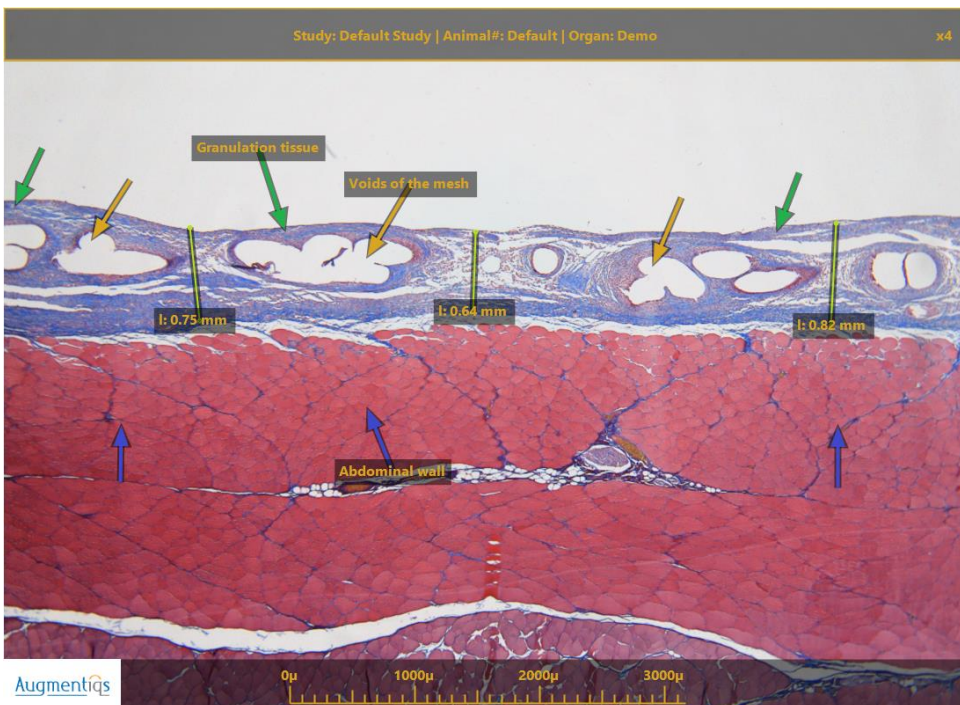
In addition to saving images to the PC, images can be saved to the Augmentiqs **Internal Database**.



3.3 Morphometric & Annotations Toolsets

Augmentiqs allows for a wide range of morphometric and text annotations on the live image.

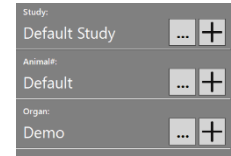
- **Arrow Annotation.** Allows to draw a straight arrow with optional label.
- **Freehand Annotation.** Enables to draw any shape. Enables immediate annotation with no shape.
- **Measurement Line.** Allows to draw a straight line with automatic label attached, which states line length according to current mag set.
- **Measurement Rectangle** Allows to draw a rectangle to define area of interest and/or perform measurement /image analysis algorithm of specified rectangular area. The label shows rectangle width, height and area.
- **Measurement Ellipse** Allows to draw an ellipse to define area of interest and/or to perform measurement of specified elliptic area. The label shows rectangle width, height and area. In event ellipse is close to circle in its proportions, width and height are substituted by circle diameter.
- **Measurement Polygon** Allows to draw a polygonal area to define area of interest or for precise measurement of arbitrary area. The polygon consists of points, which are placed by left-clicking the mouse.
- **Pan.** This mode allows to resize/move selected shapes, including previously saved slide image. For convenience, **image browser** automatically tracks the shape that overlaps with mouse position:
- **Resize:** A set of blue-dot grippers will be displayed on the edges/corners of the shape which can be dragged.
- **Remove Last Shape.** Removes last added/modified shape.
- **Gridlines** appear as overlay on top of image, and can be turned on/off.
- **Labels** overlay on top of morphometric shapes can be turned on/off.
- **Ruler** located on the bottom of the display can be turned on/off.



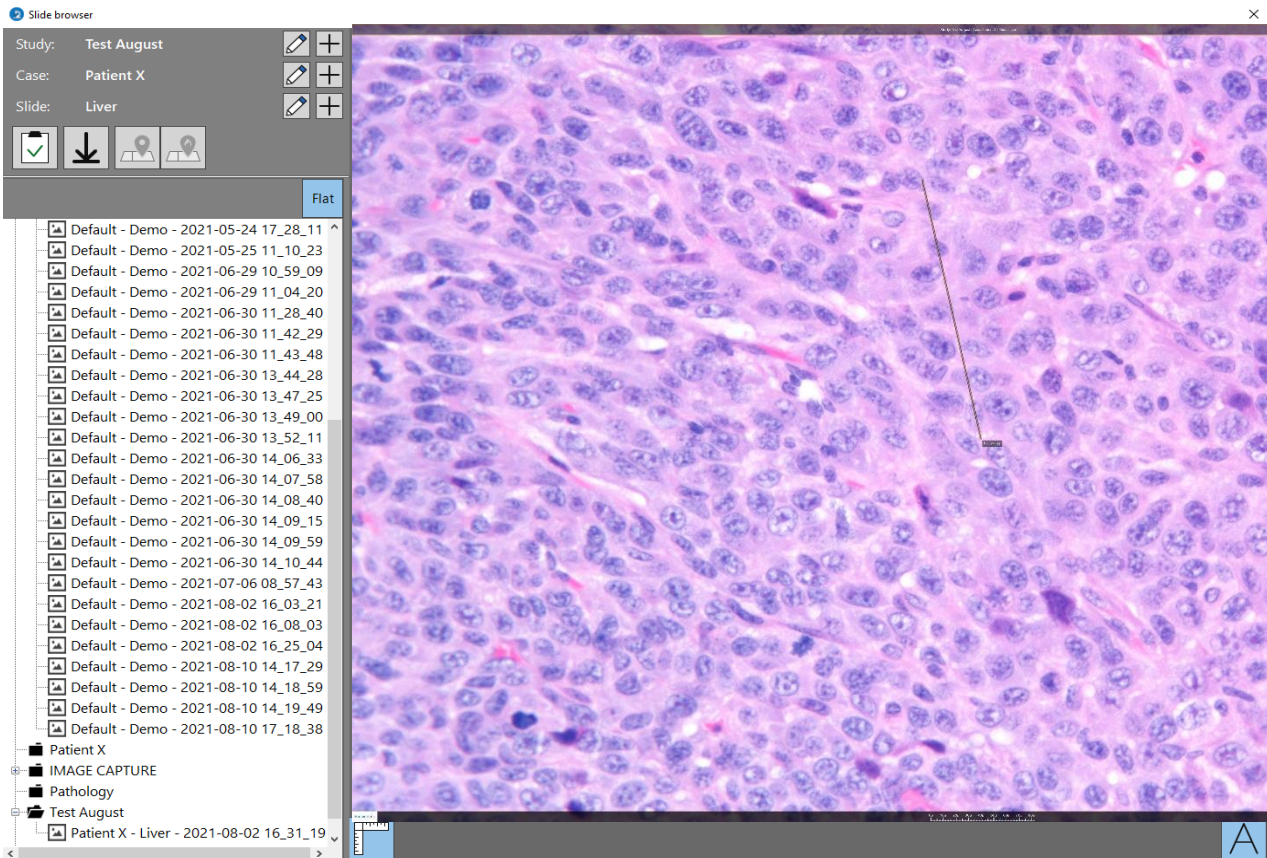
3.4 Database Tools

Augmentiqs Internal Database feature enables every slide to be categorized in database according to (Toxicology) Study, Animal, and Organ. (Clinical Pathology) Patient, Organ, Slide

Augmentiqs software enables saving images to the PC, as well as categorizing slides according to different parameters. (i.e., study, patient/animal, organ etc..).

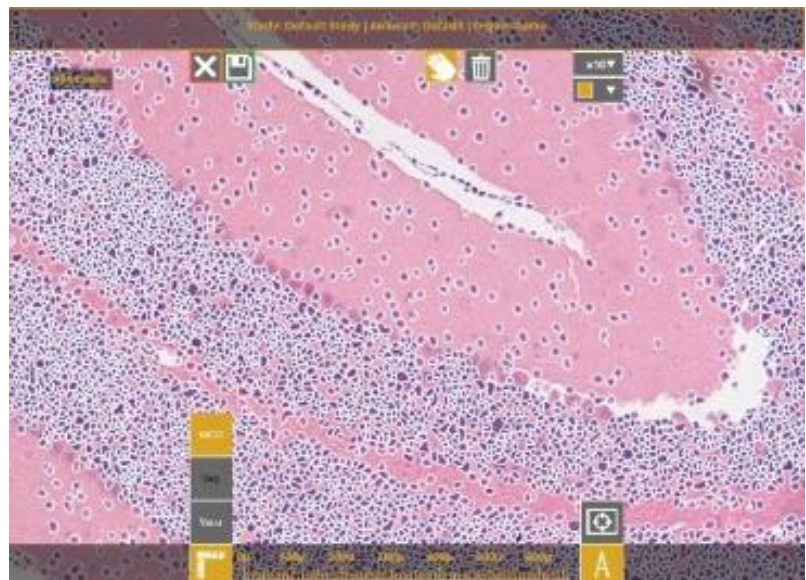


The **Augmentiqs Internal Database** functionality is an optional tool, such that hospitals/labs can set the use of the Augmentiqs software and protocol according to their SOPs for HIPAA/GLP/CLIA compliance.



Editing and Looking up Cases in the Internal Database

- After cases have been set up in the database, it is possible to edit or look up details by clicking on the **Browser** button on the top of the left menu.
- The database structure will open, allowing user to access images saved.
- User may also utilize morphometric toolbar to make annotations and measurements of images saved in database.
- User may press '**Diskette**' button to save images from internal database to Explorer folder that is accessible from PC.




3.5 Telepathology

Augmentiqs enables real-time telepathology for an unlimited number of remote viewers.

What makes Augmentiqs telepathology real-time:

- System maintains full resolution image of the current field of view of the microscope for all remote viewers, regardless of Internet speed
- Lossless compression (no pixel loss during compression).
- All viewers may make annotations and measurements. All measurements and annotations are immediately viewed by all users.
- Each viewer is represented on the screen as a unique color and user initials.
- Remote viewers may save images directly to their PC.

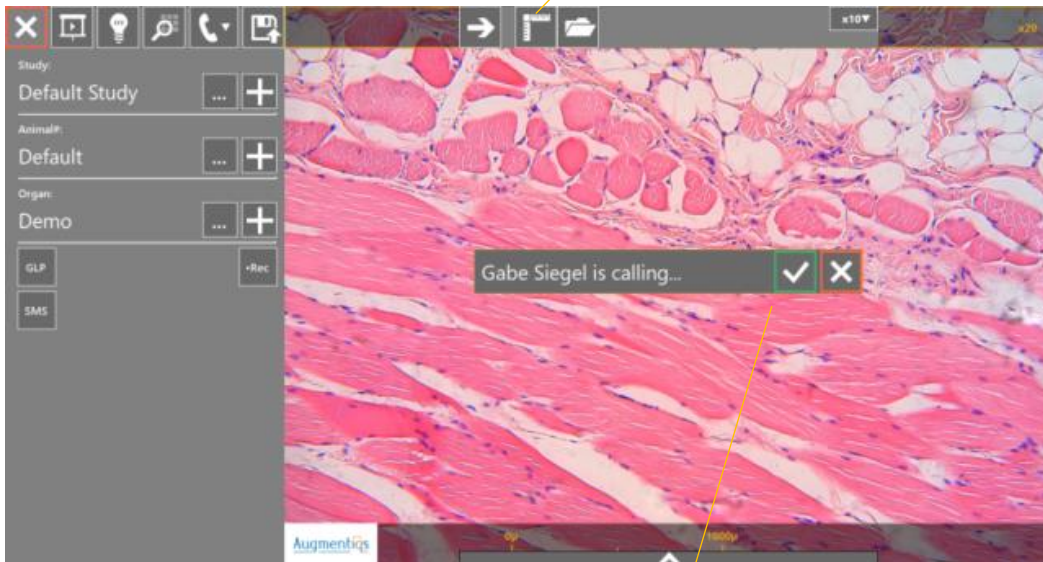
- The Augmentiqs software is ready to accept incoming calls when application is open, license key is verified, and PC is connected to Internet.
- Notification of an incoming call is a pop-up box in the Augmentiqs user interface with the name of the caller.
- User may accept call by clicking on the **'check'** button.
- Remote viewers can view the morphometric toolbar and image information on the Augmentiqs software user interface.
- Remote viewers download telepathology client software to their PC or can connect via web browser. The Augmentiqs software client for the remote viewer will generally provide a higher quality telepathology experience than the web browser.



You're just minutes away from a new era in pathology collaboration

[Download Here >>](#)

Toolbar command button



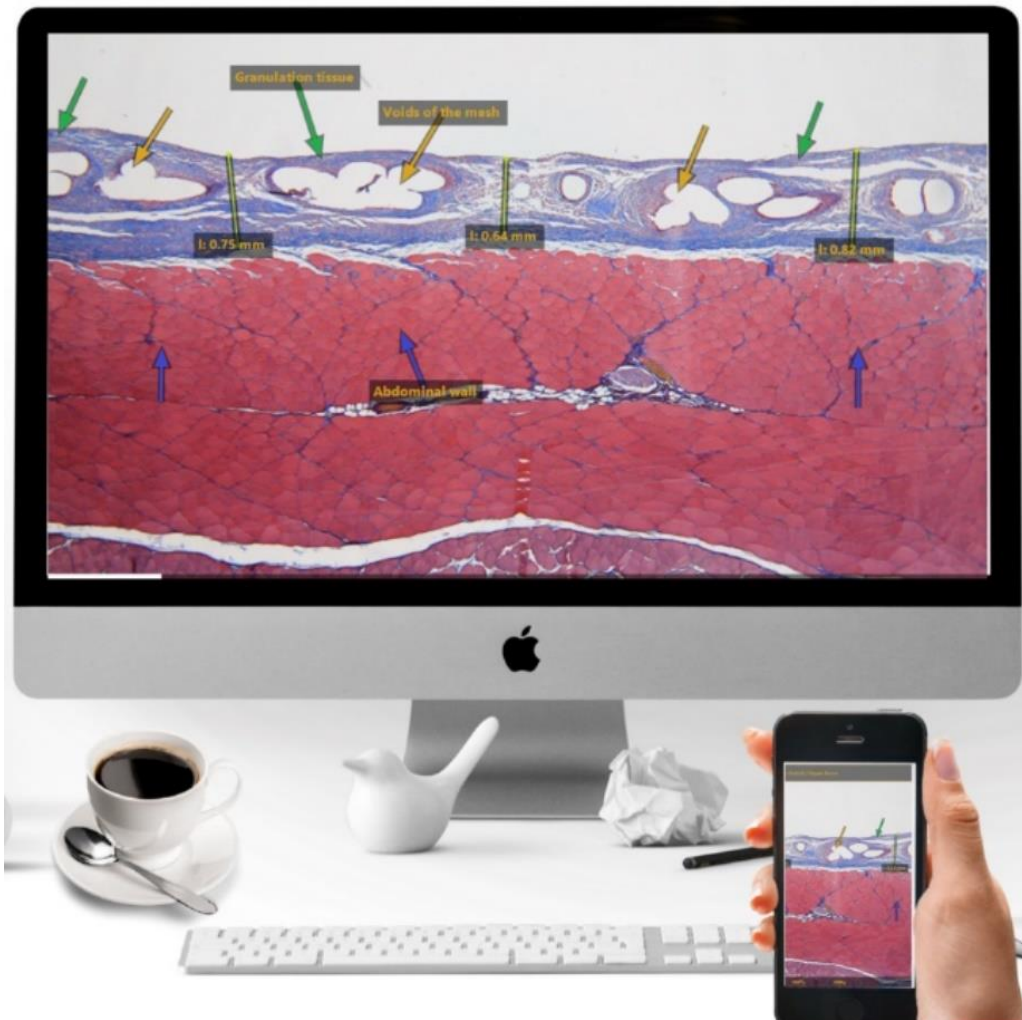
Press 'Check' button to accept call

3.6 Still Image Sharing

In addition to live telepathology, Augmentiqs enables instantaneous sharing of annotated images with optional text from the microscope via SMS or email.

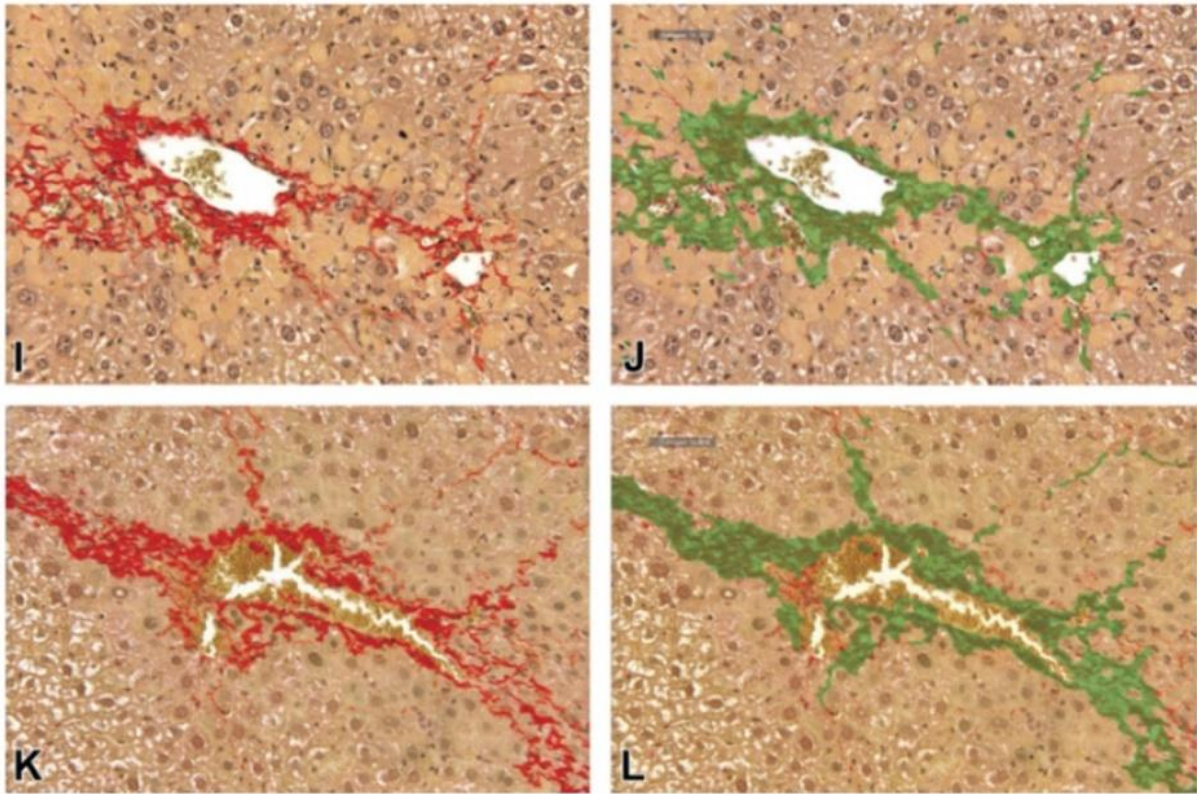
Contact list can be added with **Plus** button, by sending to an individual, or automatically entered with corporate telepathology accounts.

- Add contact mobile phone number preceded by country calling code and/or contact email address.
- Press **Send** button
- Pop up will notify that message has been sent.
Depending on cell phone, images may not be of same pixel quality as telepathology.
SMS functions in most countries.



3.7 Image Analysis

Augmentiqs enables real-time image analysis and Artificial Intelligence algorithms to be deployed on the live image. Similar to the concept of smart phone and app store, any algorithm could be easily integrated within Augmentiqs via an Open API.

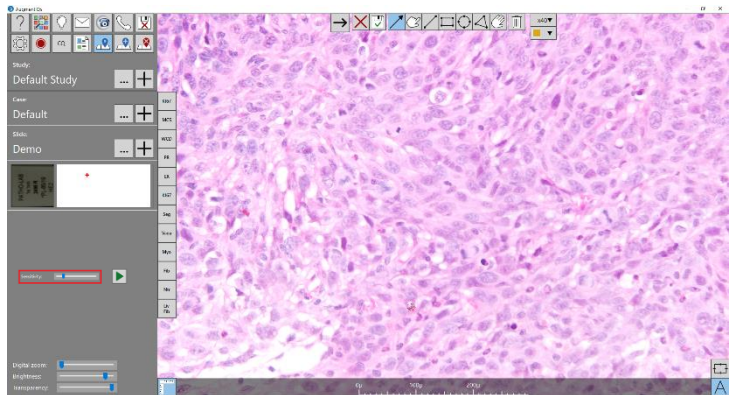


LIVER FIBROSIS IN MICE
DEEP LEARNING AI ALGORITHM BY AIRA MATRIX

- KI67
- MCS
- WCD
- PR
- ER
- KI67
- Seg
- Vacu
- Myo
- Fib
- Ntr
- Liv Fib

The left side of the main image view may have a dropdown of different image analysis algorithms. Depending on the user's license.

The current list includes AI algorithms from the companies MindPeak GmbH, and Aira Matrix, as well as open source QuPath.



The Sensitivity slider allows you to adjust the sensitivity of the algorithm and rerun, while the digital overlay control bar allows for adjustment of overlay transparency.

3.8 Whole Slide Scanning

Augmentiqs enables manual slide scanning directly from the microscope with integrated Microvisioneer software. With manual scanning, Augmentiqs completes all possible digital pathology needs, providing a complete one-stop solution for pathologists.

Scanned images are saved as open-source SVS files, and can be accessed via Microvisioneer's software or free QuPath applications.



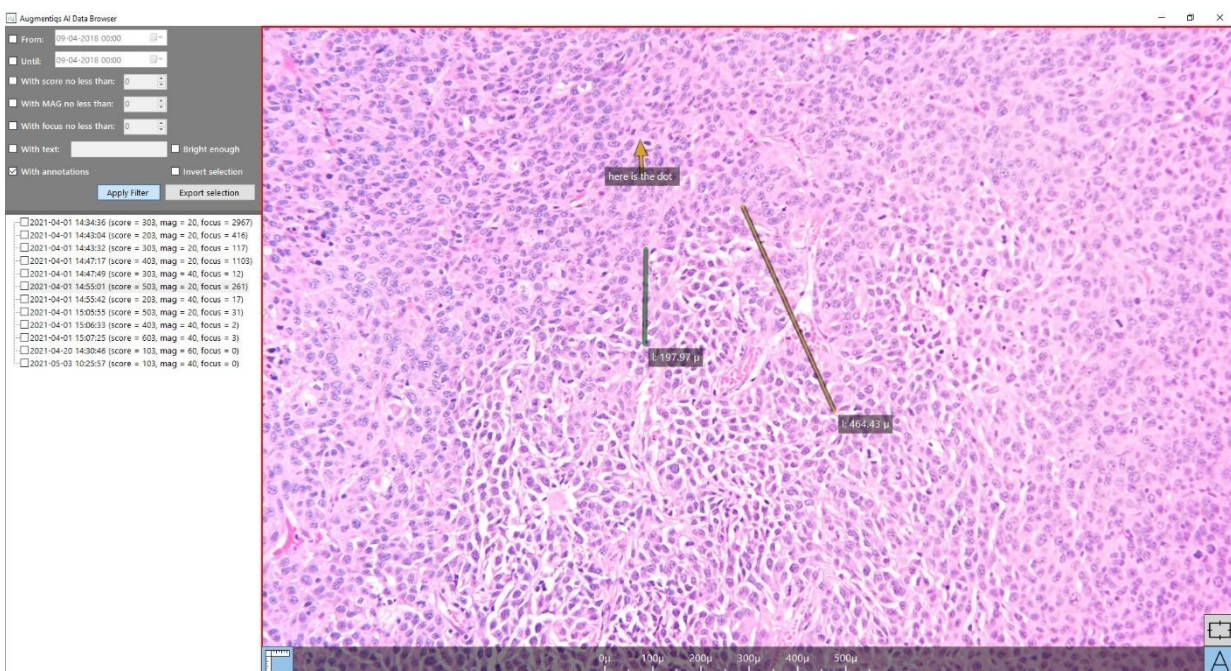
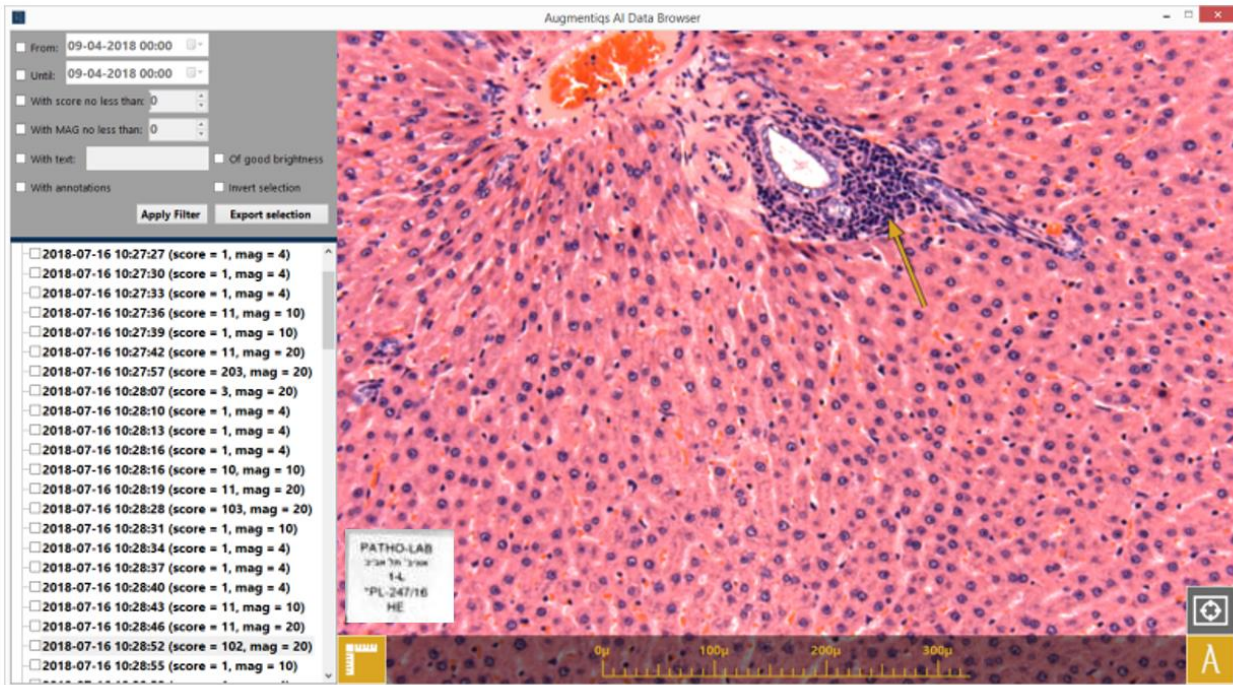
3.9 Automatic Image Capture

Augmentiqs acts as the ideal platform for automated data capture, which can then be used for Big Data applications and machine learning.

- Images are captured and scored according to predetermined action of the pathologist.
- Actions may be stopping the stage, changing magnification, saving image, etc.

All images are automatically stored in a database on the user's PC.

An easy to use image search tool (AI Data Browser) can be used to search images based on different parameters including date, score, magnification, annotations, image resolution, etc.




3.10 Automatic Case Report

The Automatic Pathology Case Report software module allows images, annotations, image analysis overlay and other patient data to be automatically inserted into a case report template in Word format. Build the template according to your labs branding.

Automatically add to your case reports the following case information:

- Image as JPG, PNG or TIFF
- Objective magnification
- Slide label
- Slide identity information
- Annotations & other image analysis overlay
- Date
- Time

	<h2 style="margin: 0;">Anatomic Pathology Report</h2> <p style="margin: 0;">Dr. Jonathan Smith, Laboratory Director</p>	Lab Address 1 Lab Address 2 City, State, Zip Phone Email: Fax: Website:
---	---	---

PATIENT DETAILS

First Name: _____

Sex: _____

Referring Lab: _____

Date Specimen Received: _____

Specimen Type: _____

Last Name: _____

DOB: _____

Referring Doctor: _____

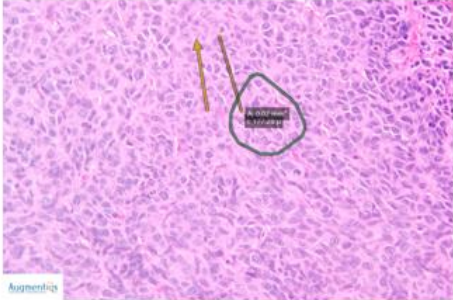
Date of Report: _____

Serial Number: _____

Pathology Report

Diagnosis

Figure 1 **Default.** Section of Demo.
Goldenrod arrows – *<insert group description>*.



Physician Name: Dr. Jonathan Smith

Signature: _____

3.11 Proprietary Software & Open API

Augmentiqs consists of a hardware optical module that is installed in the microscope and a software client that runs on dedicated PC connected to the optical module via USB interface. The Optical Module contains various devices (multiple cameras, controllers as well as projection system), that are controlled by the software application.

Augmentiqs application provides core functionality such as morphometrics analysis (selection and measurement via rectangle, ellipse, polygonal shapes that user may freely define), telepathology and more. Beside that functionality, Augmentiqs application interacts with 3rd party plugins via standard interface in order to extend its functionality and provide solution for specific diagnostic needs.

The main idea of the interface is that any image processing algorithm, be it classical or ML-based, needs to obtain raster image with some additional metadata that can be conveniently encoded in JSON format. The output of the algorithm may vary, but ultimately can be presented as a whole image overlay in raster format as well as textual vector data that may encode some regions needed to be highlighted, statistical data etc. The flexibility of JSON format enables to encode any sort of data and exact format of JSON structure needs to be negotiated per each plugin separately.

Augmentiqs software takes responsibility to obtain input from the user via its UI, pass the input along with capture still image from the main camera to the 3rd party algorithm, wait till its processing is complete and present the output to the user.

The diagram below shows a typical integration topology with the 3rd party algorithm provided as a dynamically linked library.

