3D face tracking for augmented reality apps and digital characters control

SentiMask SDK
SentiMask is designed for development of augmented reality applications, which use real-time 3D face tracking technologies for motion capture and controlling 3D digital character's facial expressions or mapping animated avatars on user's face. The technology works with regular cameras and common PC or smartphones.

Available as a software development kit that provides for the development of 3D face tracking systems for Microsoft Windows, Android, iOS, macOS and Linux.

- Real-time face detection and tracking.
- Facial pose, landmarks, shape and expression estimation.
- 3D facial mesh generation.
- Gender and age estimation.
- Glasses, beard, mustache and hat detection.
- Works with regular webcams and smartphone cameras.
- Integration with other software like 3D modelling software or game engines.
- Reasonable prices, flexible licensing and free customer support.

See demo video: http://youtu.be/z_2Ra6S9eV0
Features and Capabilities

SentiMask provides real-time 3D face tracking and facial expression estimation using video from a regular webcam or smartphone camera. The possible applications of the SentiMask technology include:

- **Motion capture** for 3D characters’ face animation in entertainment applications, like computer games, communication apps etc.;
- **Augmented reality** applications, like virtual makeup, appearance changes evaluation, etc.
- **Facial features analytics** for interactive applications, which provide user experience based on person’s gender, age and/or facial expression.

The SentiMask 2.0 technology has these capabilities for 3D face tracking applications:

- **Real time performance.** SentiMask technology performs facial features detection and tracking from live video in real time. The technology provides fast performance on a regular PC or smartphone.
- **Facial features estimation.** SentiMask algorithm is able to recognize facial pose, landmarks, shape and expression from a video.
- **3D facial mesh generation.** The algorithm reconstructs a 3D facial mesh (wireframe model) from a facial image. A custom texture can be applied to the mesh, or the mesh points can be used as a reference for changing the appearance of an animated character. The advanced facial expression analysis performs 23 different estimations, like checking if left or right eye is closed, left or right eyebrow up or down, jaw moving left or right, etc.
- **Gender and age estimation.** SentiMask 2.0 algorithm can estimate person’s age or gender from the face image.
- **Facial attributes detection.** SentiMask 2.0 algorithm can detect if a person has beard, mustache, glasses or hat.
- **Common camera required.** A video for the 3D face model reconstructions can be captured with an off-the-shelf camera or a smartphone. No depth sensors or other advanced hardware needed. The recommendations and specifications contain more detailed information about camera setup.
- **Integration with other software.** SentiMask generates 3D point cloud, facial rotation angles (roll, pitch, yaw) and estimations of facial expression. This data can be used in a custom application or passed to a 3D modelling software like Blender, as well as game engines.
SentiMask SDK components

SentiMask 2.0 SDK is intended for developers who want to use 3D face tracking for motion capture and digital character or avatar control in their applications or projects. The SDK allows rapid development of augmented reality applications using functions from the SentiMask library for Microsoft Windows, Android, iOS, macOS and Linux platforms. Developers provide video streams from cameras as data input, and have complete control over the output data; therefore SentiMask SDK functions can be used with any user interface or third-party software, like 3D modelling packages or game engines.

SentiMask 2.0 SDK distribution package contains these components:

- SentiMask 2.0 component installation license for PC (1 single computer license for Microsoft Windows, macOS or Linux)
- Mobile SentiMask 2.0 component installation license (1 single computer license for Android or iOS)
- Device manager library
- C++ programming samples for Microsoft Windows, macOS and Linux platforms
- Java programming samples for Android platform
- Objective C programming samples for iOS platform
- SentiMask 2.0 SDK documentation
System requirements

There are specific requirements for each platform which will run SentiMask-based applications.

Microsoft Windows platform requirements

- PC or laptop with x86-64 (64-bit) compatible processors.
  - At least 2 GHz processor is required. 3 GHz or faster CPU is recommended for performing real-time face tracking in applications, which also require lots of CPU resources (i.e. computer games).
  - AVX2 support is required for real-time face tracking. Most modern processors support this instruction set, but please check if a particular processor model supports it.
- At least 512 MB of free RAM should be available for a SentiMask-based application.
- Any webcam or camera, which is accessible using DirectShow, Windows Media or Media Foundation interfaces, is supported by SentiMask on Microsoft Windows platform.
- Microsoft .NET framework 4.5 or newer (for .NET components usage).
- Microsoft Visual Studio 2012 or newer (for application development under C/C++, C#, Visual Basic .Net)

Android platform requirements

- A smartphone or tablet that is running Android 4.4 (API level 19) OS or newer.
  - If you have a custom Android-based device or development board, contact us to find out if it is supported.
- ARM-based 1.5 GHz processor recommended for real-time face processing.
- At least 256 MB of free RAM should be available for the application.
- Any smartphone’s or tablet’s built-in camera which is supported by Android OS. The camera should have at least 0.3 MegaPixel (640 x 480 pixels) resolution.
- PC-side development environment requirements:
  - API Java SE JDK 7 (or higher)
  - API Eclipse Oxygen (1a) IDE
  - API Android development environment (at least API level 19 required)
  - Gradle 4.6 build automation system or newer
  - Internet connection for activating SentiMask component licenses

iOS and macOS platforms on the next page
iOS platform requirements

- One of the following devices, running iOS 11.0 or newer:
  - iPhone 5S or newer iPhone.
  - iPad Air or newer iPad models.
- At least 256 MB of free RAM should be available for the application. Additional RAM is required for applications that perform 1-to-many identification, as all biometric templates need to be stored in RAM for matching.
- Development environment requirements:
  - a Mac running macOS 10.12.6 or newer.
  - Xcode 9.x or newer.

macOS platform requirements

- A Mac running macOS 10.12.6 or newer. 2 GHz or better processor is recommended.
- At least 512 MB of free RAM should be available for the application.
- Any webcam or camera which is accessible using GStreamer interface, is supported by SentiMask on macOS platform.
- Specific requirements for application development:
  - XCode 6.x or newer
  - GStreamer 1.10.x or newer with gst-plugin-base and gst-plugin-good is required for face capture using camera/webcam or rtsp video.
  - wxWidgets 3.0.0 or newer libs and dev packages (to build and run SDK samples and applications based on them)
  - GNU Make 3.81 or newer (to build samples and tutorials development)
Linux x86-64 platform requirements

- Linux 3.10 kernel or newer is required.
- PC or laptop with x86-64 (64-bit) compatible processors.
  - At least 2 GHz processor is required. 3 GHz or faster CPU is recommended for performing real-time face tracking in applications, which also require lots of CPU resources (i.e. computer games).
  - AVX2 support is required for real-time face tracking. Most modern processors support this instruction set, but please check if a particular processor model supports it.
- At least 512 MB of free RAM should be available for the application.
- Any webcam or camera which is accessible using GStreamer interface, is supported by SentiMask on Linux platform.
- glibc 2.17 library or newer
- GStreamer 1.10.x or newer with gst-plugin-base and gst-plugin-good is required for face capture using camera/webcam or rtsp video.
- Specific requirements for application development:
  - wxWidgets 3.0.0 or newer libs and dev packages (to build and run SDK samples and applications based on them)
  - gcc 4.8 or newer
  - GNU Make 3.81 or newer (to build samples and tutorials development)
Specifications and Usage Recommendations

- **Only one face in a frame is processed.** If there are more than one face in a frame, the largest one is processed.

- **32 pixels is the recommended minimal distance between eyes** for a face on image or video stream to perform face detection reliably. **64 pixels or more** recommended for better face detection results. Note that this distance should be native, not achieved by resizing an image.

- The SentiMask engine has certain tolerance to face posture:
  - head **roll** (tilt) – ±180 degrees.
  - head **pitch** (nod) – ±25 degrees from frontal position.
  - head **yaw** (bobble) – ±35 degrees from frontal position.

- Face detection and facial features estimation in a video frame is performed in **8 milliseconds** on a PC with Intel **Core i7-4790** processor running at **3.6 GHz** clock rate.

SentiMask SDK Trial and Related Products

SentiMask **30-day SDK Trial** is available for downloading at [www.neurotechnology.com/download.html](http://www.neurotechnology.com/download.html).

These products are related to SentiMask SDK:

- **VeriLook SDK** – for person identification using facial biometrics. Also includes algorithms for detecting person’s gender, emotions and facial expressions.

- **NVeiler Video Filter** – a plug-in for VirtualDub video processing application that is able to detect and hide faces in videos.
Licensing SentiMask SDK

Product Development
An integrator should obtain SentiMask 2.0 SDK (EUR 339) to develop an end-user product based on SentiMask technology. The SDK needs to be purchased just once and may be used for all projects and by all the developers within the integrator’s company.

See the “SentiMask SDK components” chapter (page 4) for the list of component licenses included with the SentiMask SDK.

Integrators can obtain additional component licenses if more component licenses are required for the development process.

Product Deployment
To deploy their developed products, an integrator needs to obtain licenses of components for every computer or device, where component will be installed together with integrator’s product. Integrators can purchase additional SentiMask component licenses if required at anytime.

License activation options
The components are copy-protected. The following license activation options are available:

- **Serial numbers** are used to activate licenses for particular SentiMask components on particular computer or device. The activation is done via the Internet or by email. After activation the network connection is not required for single computer license usage.
  
  Note: activation by serial number is **not suitable for virtual environments**.

- **Internet activation.** A special license file is stored on a computer or a mobile or embedded device; the license file allows to run particular SentiMask components on that computer or device after checking the license over the Internet. **Internet connection** should be available periodically for a short amount of time. A single computer license can be transferred to another computer or device by moving the license file there and waiting until the previous activation expires.

- **Volume License Manager.** Licenses may be stored in a volume license manager dongle. License activation using volume license manager may be performed without connection to the Internet and is suitable for virtual environments. Volume license manager is **used on site by integrators or end users** to manage licenses for SentiMask components in the following ways:
  
  1. **Activating single computer licenses** – An installation license for a SentiMask component will be activated for use on a particular computer. The number of available licenses in the license manager will be decreased by the number of activated licenses.
  2. **Managing single computer licenses via a LAN or the Internet** – The license manager allows the management of installation licenses for SentiMask components across multiple computers or mobile/embedded devices in a LAN or over the Internet. The number of managed licenses is limited by the number of licenses in the license manager. No license activation is required and the license quantity is not decreased. Once issued, the license is assigned to a specific computer or device on the network.
  3. **Using license manager as a dongle** – A volume license manager containing at least one license for a SentiMask component may be used as a dongle, allowing the SentiMask component to run on the particular computer where the dongle is attached.

Continued on the next page
Licenses Validity
All SDK and component licenses are perpetual and do not have expiration. There are no annual fee or any other fees except license purchasing fee. It is possible to move licenses from one computer or device to another. Neurotechnology provides a way to renew the license if the computer undergoes changes due to technical maintenance.

Licensing Agreement

Note that you unambiguously accept this agreement by placing an order using Neurotechnology online ordering service or by email or other means of communications. Please read the agreement before making an order.

Other licensing options

- **VAR License.** The above described licensing model is intended for end-user product developers. Integrators who want to develop and sell a SentiMask-based development tool (with API, programming possibilities, programming samples, etc.), must obtain permission from Neurotechnology and sign a special VAR agreement. For more information please contact us.

- **Enterprise License.** The SentiMask 2.0 enterprise license allows an unlimited use of SentiMask 2.0 components in end-user products for a specific territory, market segment or project. Specific restrictions would be included in the licensing agreement. The enterprise license price depends on the application size and the number of potential users of the application within the designated territory, market segment or project. For more information please contact us.
Prices for SentiMask SDK

- The prices are effective May 22, 2019. The prices may change in the future, so please download and review the latest version of the brochure before making an order.
- Quantity discounts do not accumulate over time.
- Prices do not include local import duties or taxes.
- Product shipping costs depend on delivery country
- Customers with Solution Partner status are eligible for product discounts.

SentiMask SDK

| SentiMask 2.0 SDK | € 339.00 |

Component installation licenses (prices per single computer license)

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License management

| Volume license manager | € 16.00 |

SentiMask SDK enterprise license

| SentiMask 2.0 SDK enterprise license | Please contact us for more information |

SentiMask SDK and related products can be ordered:
- online, at www.neurotechnology.com/cgi-bin/order.cgi
- via a local Neurotechnology distributor; the list of distributors is available at www.neurotechnology.com/distributors.html