SkillWorx Assisted Worker

_Hands-free real-time guidance powered by Azure and spatial tracking

SkillWorx Assisted Worker applies **spatial intelligence** to low-powered and head-mounted wearables to assist frontline workers with vital up-to-date information what to do, where and how to complete work. Thanks to its **real-time video analysis algorithms**, the solution **recognizes** and **tracks physical location** of the worker and **overlay spatial annotations** during an audio/video session between a worker in the field and an experienced **remote mentor**

_How it works?

SkillWorx Assisted Worker needs following elements to give a worker superpowers in real-time

- wearable/mobile device equipped with a regular camera and display
- Internet/intranet connectivity to establish audio/video session
- edge/cloud server analyzing incoming video stream and producing outgoing video stream augmented with spatial annotations

No additional sensors are needed as every incoming frame is analyzed to understand where person is located and what/where the surrounding objects are.

_Key Features

- Annotations stuck to real objects even on low-power devices
- Hardware agnostic
- Edge-based & cloud-based
- Low battery usage
- POV recording with AR overlays for knowledge capturing/sharing
- Live IoT data overlaid on physical assets
- Marker persistence

psc_ TRANSITION TECHNOLOGIES

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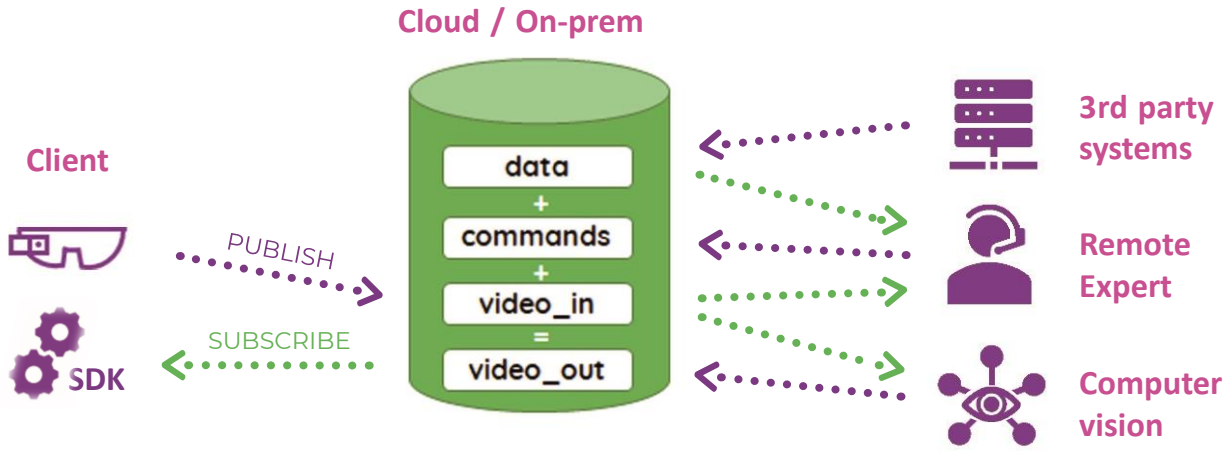
_What are Spatial Annotations?

Spatial annotations are knowledge markers that can hold IoT data, work orders, voice memos, audio/video recordings, text, images, alerts, notifications or other media that, thanks to computer vision algorithms, can be attached to physical locations on a persistent or on an ad-hoc basis to guide workers in the field while they perform their job.

_ Architecture



_Benefits

- Increase safety
- Improve work quality
- Raise productivity
- Document work done and surpass performance tracking
- Reduce human errors
- Simplify communication
- Augment your solution

_ Why computer vision?

GPS or radio triangulation systems can be easily affected at industrial sites by plant infrastructure interfering with the signal. Alternative, marker-based approaches are difficult to maintain. This is why we propose a positioning system that is 100% based on a computer vision technology which gets the visual input from the physical world to construct a 3D map of points to make the surrounding understandable for machines.

No matter if you are an end-user or solution vendor – our technology recognizes location of workers via visual input from their cameras or from streams or collections of frames from your SDK.

_Other spatially-aware use-cases

Digital work instructions | **Quality checks** | **Plant & equipment inspections**

Facility management | **Maintenance** | **Shift changeovers** | **LOTO**

Production line retooling | **Pick by vision** | **On-the-job knowledge capture**

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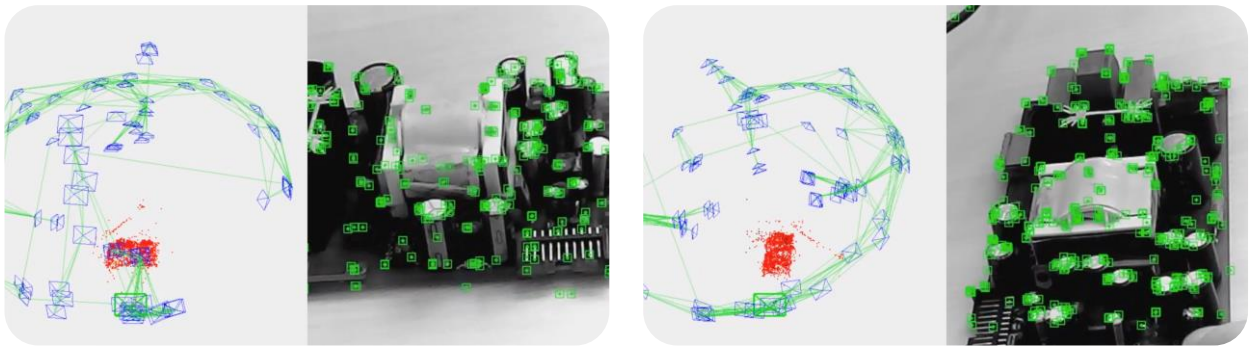
_Data processing

SkillWorx leverages real-time video analysis algorithms for Simultaneous Localization And Mapping (SLAM) purposes. These SLAM algorithms are executed on a cloud or edge server to offload the computing power from head-mounted device. The purpose of having SLAM is to understand worker physical location by converting what device camera is capturing into a cloud of points that describe worker surroundings. That analysis and conversion takes place continuously and in real-time in order to provide visual tracking of camera position and rotation so the workers can be provided with AR overlays that are superimposed on physical elements in the field of view of device camera.

Every video frame coming to the cloud/edge server is process by SLAM algorithms and transformed to a cloud point as shown on the pictures below which include a pair of cloud-points and frame for selected two frames of incoming videos. No video content is being stored on the server unless users want explicitly to record the session.



_Connectivity

SkillWorx uses TLS 1.2 secure encrypted connections to exchange all data (video stream, audio stream, AR markers, their coordinates, camera trajectory, files etc.). No unencrypted connection is used.

_Data access

SkillWorx allows users to create rooms secured by the password. Only users who know this password can access conference room. Accessing a room gives also access to the assets that persisted during the remote assistance session – video recordings, documents and pictures taken by head-mounted wearables device connected to this room during remote assistance. SkillWorx supports multimedia (.mp4, .jpg, .png), documents (.pdf) and graphical markers (augmentations with their metadata such as text instructions for text markers or file name for the attachments mentioned above along with their position in the 3D world)

_Data storage

A head-mounted wearables device stores files uploaded created/uploaded during the session in internal app storage. Files are not encrypted as device units are treated as trusted devices being a part of worker equipment.

Cloud server stores the files uploaded by users and on-demand session recordings (requested explicitly by the Mentor during the call). They are all available from Mentors webpage in a conference room. They are stored unencrypted, however, all the content stored on a server is available only via secure web page and available only to authenticated users. User must be logged in to a proper room to be able to download or view the resources.

Authenticated users acting as Mentors can save data downloaded from the conference room in a

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