



# Developing Real World Technologies for Mixed Reality Worlds

Phase modulating micro mirror  
array for real holographic  
mixed-reality displays

## Technology Lead

Hagen Stolle

SeeReal

## Project Coordinator

Klaus-Michael Koch

Technikon Forschungs- und  
Planungsgesellschaft mbH  
coordination@realholo.eu



## Budget

€ 6 Million  
100% EU-funded



## Consortium

8 Partners  
6 countries



## Duration

48 Months  
01/2021 - 12/2024

## Message from the coordinator

The intention of this Newsletter is to open a new communication channel to provide news on the project progress and to discuss ongoing topics relevant to REALHOLO. This newsletter is intended for internal and external project partners, stakeholders and all other interested bodies. For more detailed information about the project, we invite you to visit our project website, which is constantly updated with the latest project related news: [realholo.eu](http://realholo.eu). The project has successfully started with a virtual kick-off meeting in January 2021. The event was coordinated by TECHNIKON, with the main purpose of verifying plans and matching team members with first activities and to build the foundation for further collaborations. In July 2021, the REALHOLO consortium and the EC met virtually for an interim review and the first six months of the project were assessed by the Project Officer and independent experts. The initial evaluation feedback was very positive and the consortium is looking forward to further activities in this challenging and interesting topic.





## Past Events

### 1st Interim Review Meeting

13 July  
Held Online

### Technical Meeting

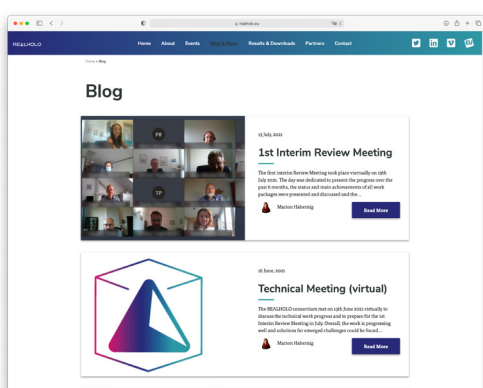
16 June, 2021  
Held Online

### Kickoff Meeting

29 January, 2021  
Held Online

# Main project info

The merging of real and virtual worlds to produce mixed reality (MR) environments is becoming a realistic component of future society. REALHOLO will pave the way for mainstream real holographic mixed reality environments to provide the best possible experience for the user without physiological side effects like eye fatigue, misjudgment, motion sickness and accommodation vergence conflict, which are known from alternative and intermediate technologies such as stereoscopic 3D. The required natural visual experience can only be achieved with real holographic displays which have been principally demonstrated on the basis of available display technologies - both for direct view (liquid-crystal based) and projection (reflective micro displays, liquid-crystal or micro-mirror based). Within REALHOLO, a new reflective spatial-light modulator (SLM) will be created that is optimized for holographic displays. More information about REALHOLO and its vision, motivation and objectives can be found in the [project folder](#).



For the latest information about REALHOLO, visit the [official website](#) often. Here you will find the most recent information about events, meetings, partner info as well as videos, podcasts and partner interviews. Our blog is regularly updated to bring you all pertinent details as the project progresses.



Technikon Forschungs- und Planungsgesellschaft mbH, Austria



OmniChip Sp. z o.o., Poland



Sencio BV, Netherlands



SeeReal Technologies GmbH, Germany



Fraunhofer – Institute for Photonic Microsystems, Germany



Valeo, France



nSilitation SRL, Belgium



X-FAB Silicon Foundries SE, France

The **REALHOLO** consortium consists of eight partners from six different countries. The consortium is a well-balanced group consisting of three industrial partners, four SMEs and one research organization. This constellation enables the project to undertake challenges with a comprehensive talent pool including researchers, developers and users. The consortium brings together the necessary expertise to achieve the project objectives.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101014977.



This project is an initiative of the Photonics Public Private Partnership.



## REALHOLO Project status after six months

The overall goal of REALHOLO is to develop a new type of reflective spatial light modulator (SLM). It will be based on an advanced, newly developed micro-electro-mechanical system (MEMS) technology that is used to form a micro mirror array (MMA) with a large number of pixels that can be individually modulated with a high precision. This pixel array will be driven by a CMOS backplane with a digital data interface on its input. The SLM is especially suited for real holographic MR displays but also for many other applications from high value to high volume. The SLM will be demonstrated in application settings. In order to achieve these goals the first months of the project were dedicated to

### Specification of target values and global concepts

The focus was on the verification of target hardware and use case objectives. A multitude of conceptual and design tasks were accompanied by simulations and validation of practical feasibility as well as compatibility of individual component and system aspects to manufacturing and use case implementation. Target specifications of key components and demonstration systems were compiled and finalized for use in practical design and manufacture.

### CMOS/MEMS feasibility and electrical interface

After the first few project months, the design and layout of the pixel is well under way. The architectural studies started in order to improve power efficiency and a dynamic compensation circuit has been developed and is now at the characterization stage. The consortium worked on the interface protocol between driving electronics and the CMOS backplane of the SLM and created behavioural simulations.

### MEMS fabrication process and actuator design

The actuator test chip design for a first passive test chip and the process development have been finished within the first few months of the project. The lithography masks are available

and wafer lots have been started. First results of MEMS process steps and modules for wafer fabrication look promising. Some tests were successful at first try; others have room for improvement in future tests. The basic concept for the non-trivial packaging of the SLM has been created.

### Application demonstration in real holographic MR head up display and active head lamp

The requirements on the SLM itself were optimized for MR holographic applications. For the application demonstrations, the basic concept for the holographic picture generation and the optical design has already been created. This involved the selection of the appropriate holographic optical architectures, selection of optical components, optical simulations of the systems and the choice of the basic starting concepts.

### CHALLENGES

Real holography allows the ultimate visual user experience - especially for MR applications where interaction by hand is desired while information is displayed across the whole field of view and the whole depth range up to infinity. The most promising types of MR displays are HUDs and HMDs, as soon as they are capable to generate virtual content properly placed in the real world. Both applications will benefit substantially from the real holographic approach in general and specifically from the SLM that will be developed. The advanced features of the next generation SLM will be mandatory for such applications.

The present consortium of REALHOLO represents a diverse talent pool with the skills and experience to tackle and solve these challenges with input from Industry (Advisory) Board members active in the target fields of applications. The focus of the REALHOLO project is the actual MMA MEMS development and use of these devices in specific applications is considered a benefit to future uptake of the new and greatly improved phase-modulating capabilities and corresponding manufacturing quantities.

### Upcoming Events

#### MEMS World Summit, Europe

September 7-8, 2021

@Munich, Germany

#### MikroSystemTechnik Kongress 2021

November 8-10, 2021

@Ludwigsburg, Germany

#### SPIE Photonics West 2022

January 22-27, 2022

@Ludwigsburg, Germany

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to tackle  
and solve these  
challenges  
with input from  
Industry.