



CD-ETA
Interreg Europe



European Union
European Regional
Development Fund

IC Technology for Cultural Heritage

Alberto del Bimbo

Professor

Università di Firenze

Firenze | 8 May 2017

Museums, Cultural Heritage sites.....

Museums, Cultural Heritage sites exist to expand our knowledge, stimulate our senses, expose us to new experiences and engage our participation, as we explore our shared history and the natural world

IC technology has expanded the dimensions of Museums and Cultural Heritage sites.
Turning visitors from passive observers to actively engaged participants
Inspiring stakeholders to supplement static display techniques with dynamic, responsive, participatory environments

From *object-centric* to *human-centric* IC technology
Delivering a user-centered personalized dialog between the site and its visitors

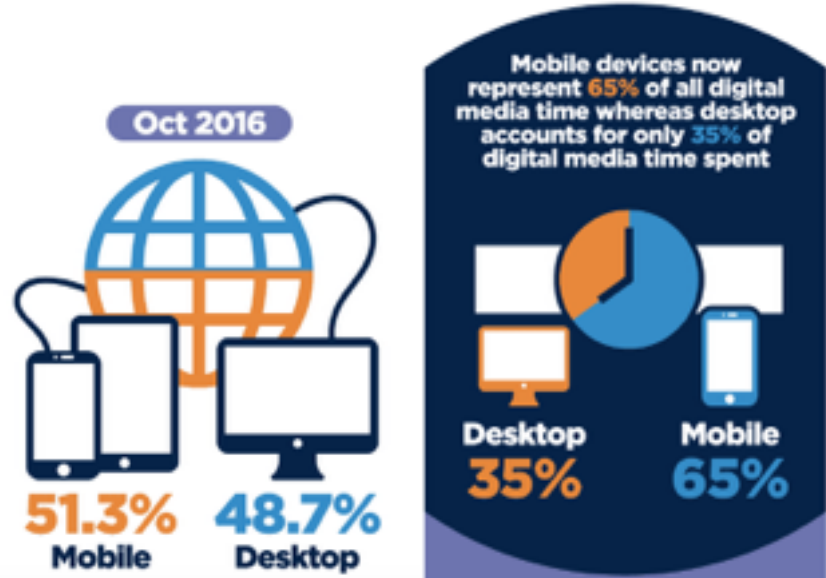
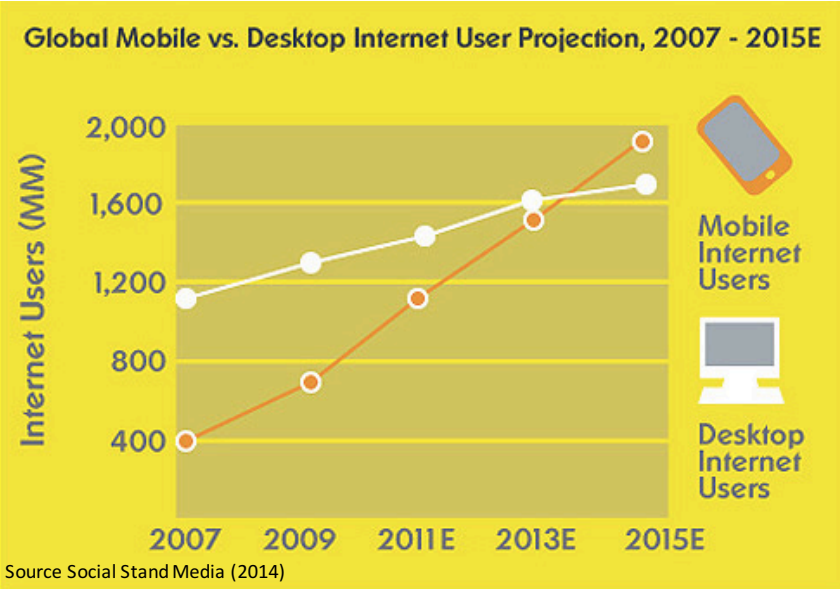
Cultural heritage sites as *intelligent information spaces* that engage visitors while being aware of their age, genre, behavior and personal interests...

Consider technological trends

Mobile technology

Going mobile

Mobile is the principal media of access to the internet



Consider technological trends Social data analysis

Cloud Computing and Big Data Analytics

Increasing convergence of innovative technologies Mobile, Social, Cloud, Big Data, Internet of Things..... into applications and services centered on the user experience

The analysis from social data typically discovers macro-interests that represent habits of people



Consider technological trends

Seamlessly flowing experience

Continuous and Ambient User Experience

Mobile apps will remain important but there will be a shift on providing an experience that exploits different devices, including IoT sensors, common objects...

The experience will seamlessly flow across a shifting set of devices and interaction channels blending physical and virtual environments.

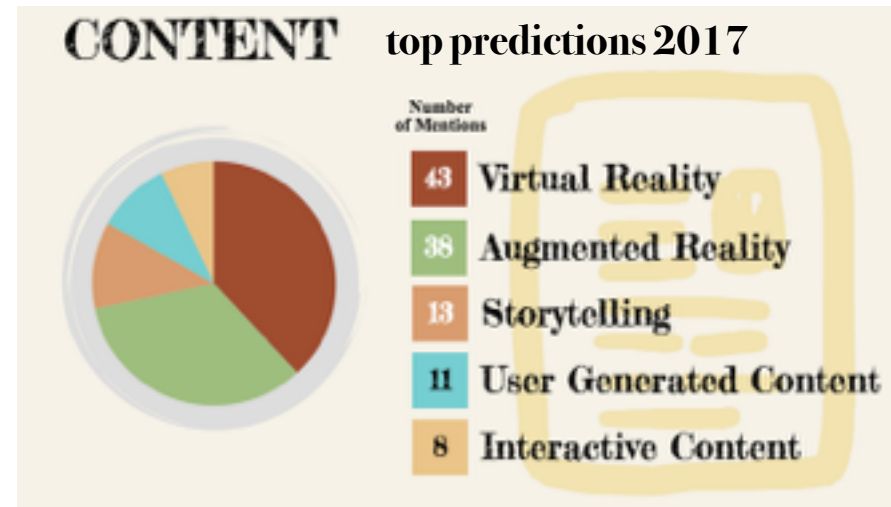
Look for augmented reality to thrive in unexpected places....



eBeacon technology

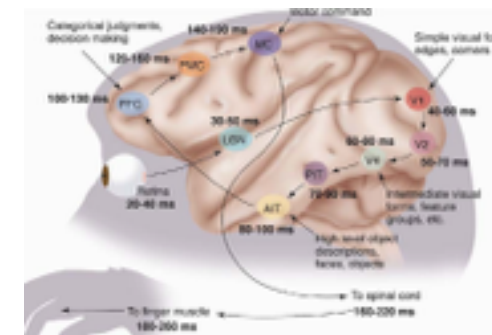


Oculus Rift technology



M. Mansfield Dec. 2016

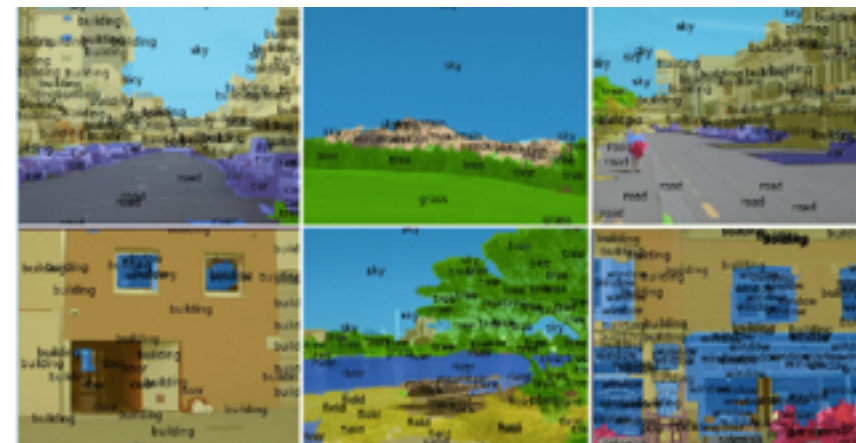
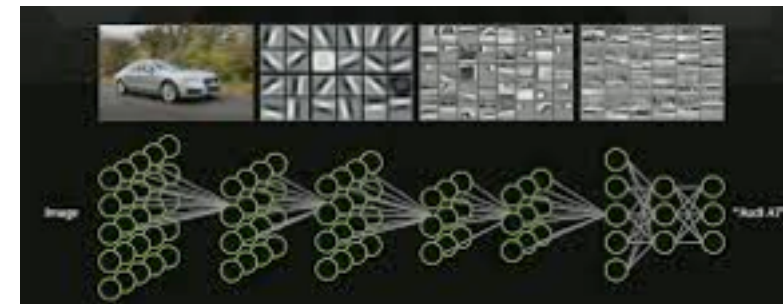
Consider technological trends “Intelligence” in machines



Machine Learning, Deep Neural Networks

Move beyond classic computing to create biologically inspired systems that can autonomously learn to perceive the world on their own

They ground on the availability of large masses of data to address key challenges in *automatic visual understanding, automatic speech and audio recognition, natural language processing,.....*



Consider technological terms Computer vision enabling

Computer Vision

A powerful artificial sense to extract information from images: about places, objects, people....

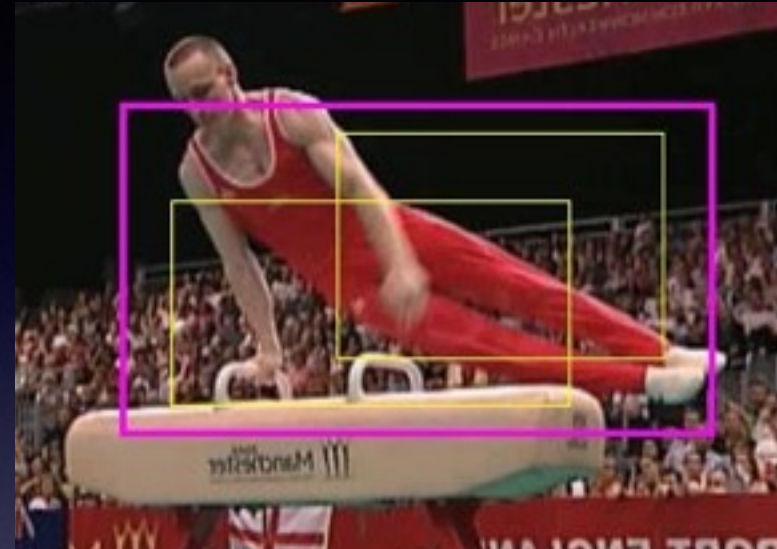
Capable of:





performing recognition of objects, people irrespective of difference in appearance, contexts....

answering visual questions...

understanding behaviors and situational conditions of people....

Either from fixed or mobile cameras



	<p><u>Answers</u> (1) brown white (2) brown white (3) brown white (4) brown white (5) brown white (6) brown white (7) brown white (8) brown white (9) brown white (10) brown white</p>		<p><u>Answers</u> (1) arabic (2) unanswerable (3) unanswerable (4) unanswerable (5) unanswerable (6) german (7) unanswerable (8) unanswerable (9) unanswerable (10) euro</p>
	<p><u>Answers</u> (1) pizza (2) pizza (3) pizza (4) pizza (5) pizza (6) pizza (7) pizza (8) pizza (9) pizza (10) pizza</p>		<p><u>Answers</u> (1) 22 (2) 24 (3) 24 (4) 22 (5) 20 (6) 24 (7) 19 (8) 23 (9) 25 (10) 20</p>

NEMECH New Media for Cultural Heritage

Competence Center Univ Firenze - Tuscany Regional Gov

NEMECH@unifi.it

Established on 30/06/2011

Approval 2779 Tuscany Regional Government



The screenshot shows the homepage of the NEMECH website. At the top left is the NEMECH logo, which consists of the word "NEMECH" in white on a green and yellow background, with "NEW MEDIA FOR CULTURAL HERITAGE" in white on a blue background below it. To the right of the logo are the logos for "micc" and the "UNIVERSITA' DEGLI STUDI FIRENZE" (University of Florence), which includes the university's seal and the acronym "UNIFI". Below the logos is a green navigation bar with the following menu items: "NEMECH", "PROGETTI DI RICERCA", "FORMAZIONE", "LABORATORI E STRUMENTI", "NEWS", and "SEDI E CONTATTI". The main content area features a large photograph of a busy street scene in Florence at night, with people walking and outdoor cafe seating. Below the photograph is a dark blue section with three columns of text, each preceded by a circular icon: a location pin for "NEMECH", a brain for "PROGETTI DI RICERCA", and a lightbulb for "SEMINARI E CORSI". Each column ends with a "Scopri di più" link and a right-pointing arrow. A small white envelope icon is visible in the bottom right corner of the page.

NEMECH
NEW MEDIA FOR CULTURAL HERITAGE

micc

UNIVERSITA' DEGLI STUDI FIRENZE
UNIFI
UNIVERSITÀ PER L'INFORMAZIONE

NEMECH | PROGETTI DI RICERCA | FORMAZIONE | LABORATORI E STRUMENTI | NEWS | SEDI E CONTATTI

NEMECH
NEMECH New Media for Cultural Heritage è un Centro di Competenza su beni culturali istituito da Regione Toscana e attivato da MICC-Università di Firenze.
[Scopri di più](#)












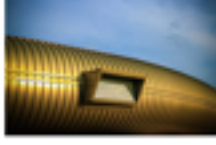



PROGETTI DI RICERCA
NEMECH sviluppa progetti di ricerca e soluzioni innovative su tecnologie digitali applicate ai beni culturali con imprese, enti e istituzioni nazionali e internazionali.
[Scopri di più](#)

SEMINARI E CORSI
NEMECH organizza il programma di formazione New Media for Art and Cultural Heritage sui nuovi media e le tecnologie digitali per i beni culturali in un contesto di smart communities.
[Scopri di più](#)

NEMECH New Media for Cultural Heritage

Competence Center Univ Firenze - Tuscany Regional Gov

Educational activity

 <p>30/3</p>	<p>Percorso: MuseiEmotivi 3</p>	 <p>MUSEI EMOTIVI TERZA EDIZIONE</p> <p>Read more</p>	 <p>NEMO 23RD ANNUAL CONFERENCE – 5-7 NOVEMBER 2015 IN PILSEN</p> <p>Read more</p>
 <p>13/10</p>	<p>Percorso: MuseiEmotivi 2</p>	 <p>WHY INTERDISCIPLINARITY</p>	 <p>WORKSHOP EUROPEANA E I MUSEI ITALIANI – BOLOGNA</p> <p>Read more</p>
 <p>25/2</p>	<p>Percorso: Musei Emotivi</p>	 <p>ADVANCED COMMUNICATION</p> <p>CONVEGNO ADVANCED COMMUNICATION</p> <p>Read more</p>	 <p>8 October 2015 THE CREATIVE MUSEUM International Conference</p> <p>8 OCTOBER 2015, INTERNATIONAL CONFERENCE "THE CREATIVE MUSEUM"</p> <p>Read more</p>
 <p>01/7</p>	<p>Free Workshop: 2,5 D MOTION GRAPHIC</p>	 <p>STORIE DI UNA BALENA MUSEIEMOTIVI_LA B</p> <p>Read more</p>	 <p>25-27 SETTEMBRE 2015 FORUM ARTE CONTEMPORANEA ITALIANA</p> <p>Read more</p>
 <p>22/7</p>	<p>Evento: Avvio alle attività del Centro di Competenza NEMECH</p>	 <p>WEBINARS NEMO /NEMECH-MICC</p> <p>Read more</p>	 <p>ARTLAB 2015</p> <p>ARTLAB 2015</p>

NEMECH New Media for Cultural Heritage

Competence Center Univ Firenze - Tuscany Regional Gov

Research and research transfer activity

The Hero project

Academia Museum, Florence, 2015

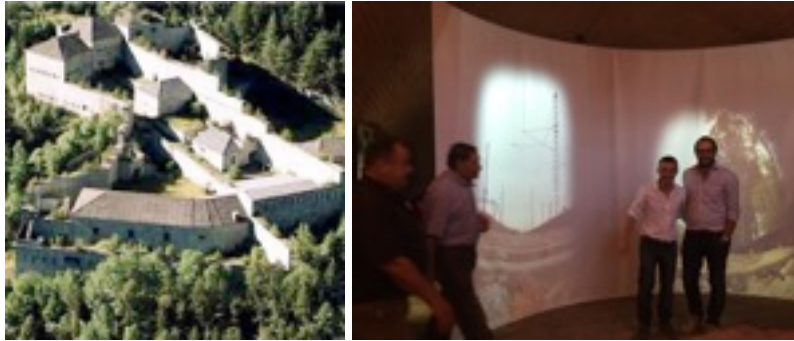


NEMECH New Media for Cultural Heritage

Competence Center Univ Firenze - Tuscany Regional Gov

The Bahnlandschaften project

di Fortezza, Bolzano, 2015-2016

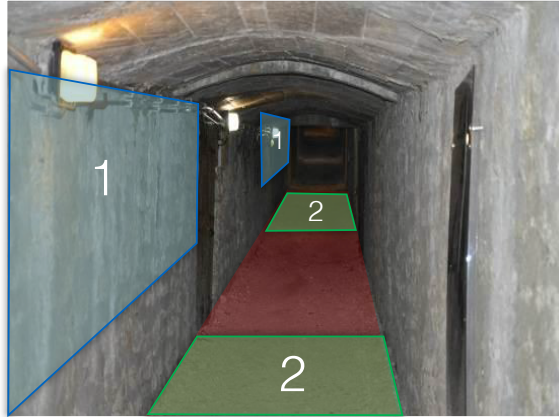


MSKinect depth sensor



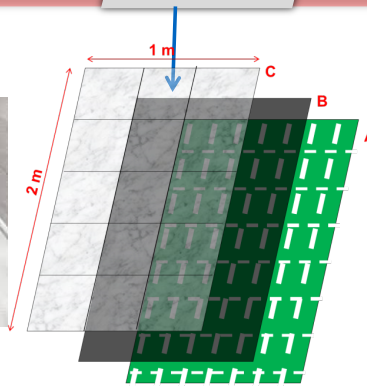
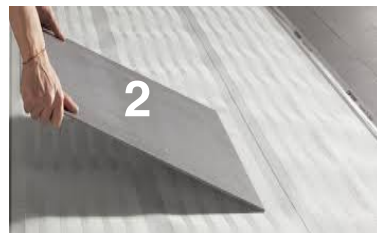
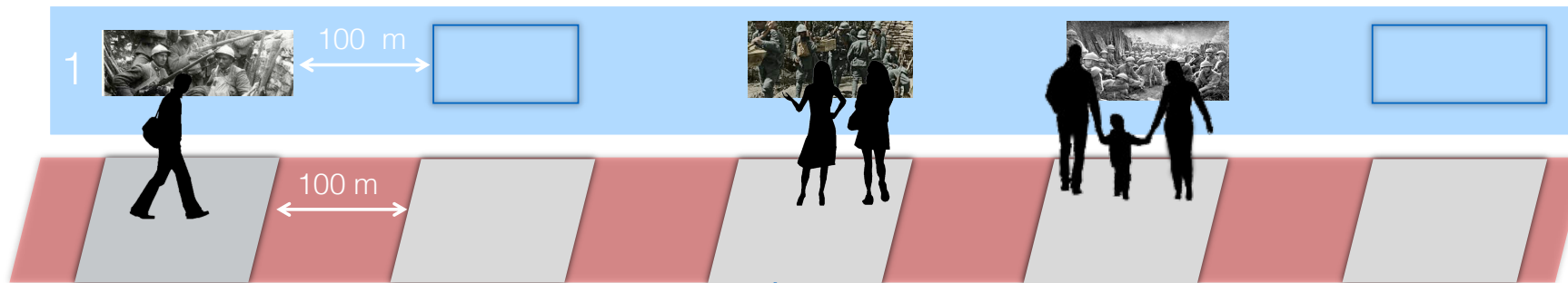
NEMECH New Media for Cultural Heritage

Competence Center Univ Firenze - Tuscany Regional Gov



The Galleria Vittorio Emanuele project

Military monument Cima del Grappa, Udine, 2016
(not realized)



Sensorized ceramic floor
4.5 mm thickness
1 sensor every 12 cm²

Expanded reality

Italian Architecture Society meeting

Leopolda Station, Florence, 2016



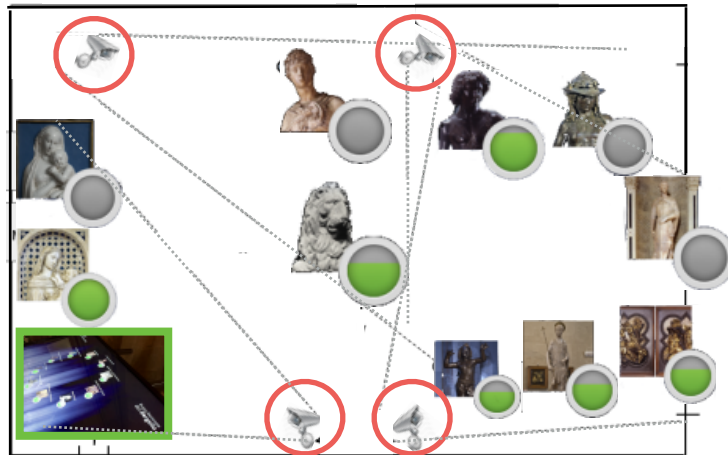
Heliodisplay holographic technology

NEMECH New Media for Cultural Heritage

Competence Center Univ Firenze - Tuscany Regional Gov

The MNEMOSYNE project
Museum, Florence, 2013 - 2016

Bargello



- 1 interactive table 
- 4 cameras 
- 5 computers: 1 MASTER, 4 Computer Vision SLAVES

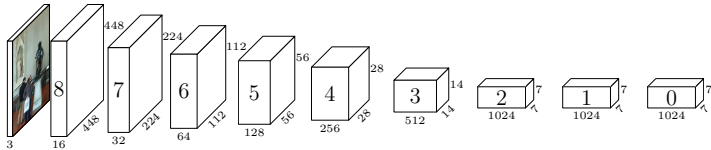


NEMECH New Media for Cultural Heritage

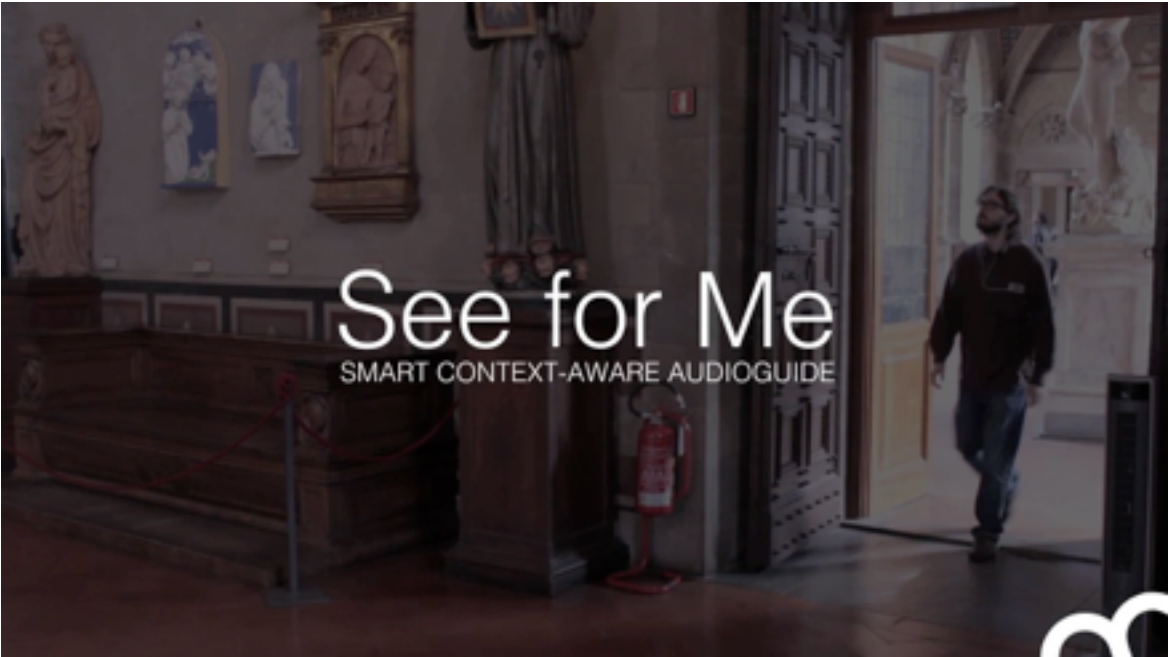
Competence Center Univ Firenze - Tuscany Regional Gov

The “intelligent audio guide” project

Wearable Computer Vision technology, 2016-2017



Deep Network-based computer vision on NVIDIA Jetson Tegra K1 system-on-chip wearable processing board

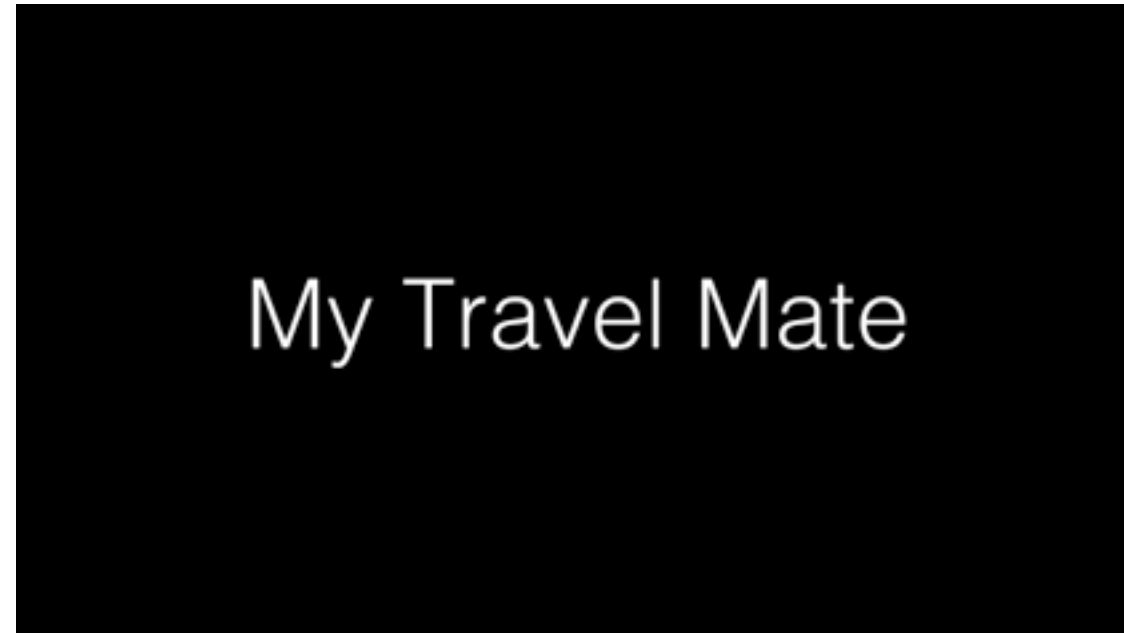
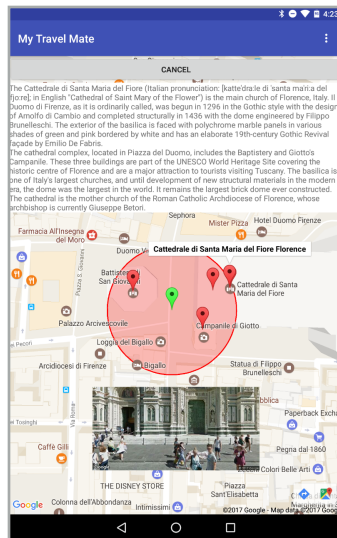


NEMECH New Media for Cultural Heritage

Competence Center Univ Firenze - Tuscany Regional Gov

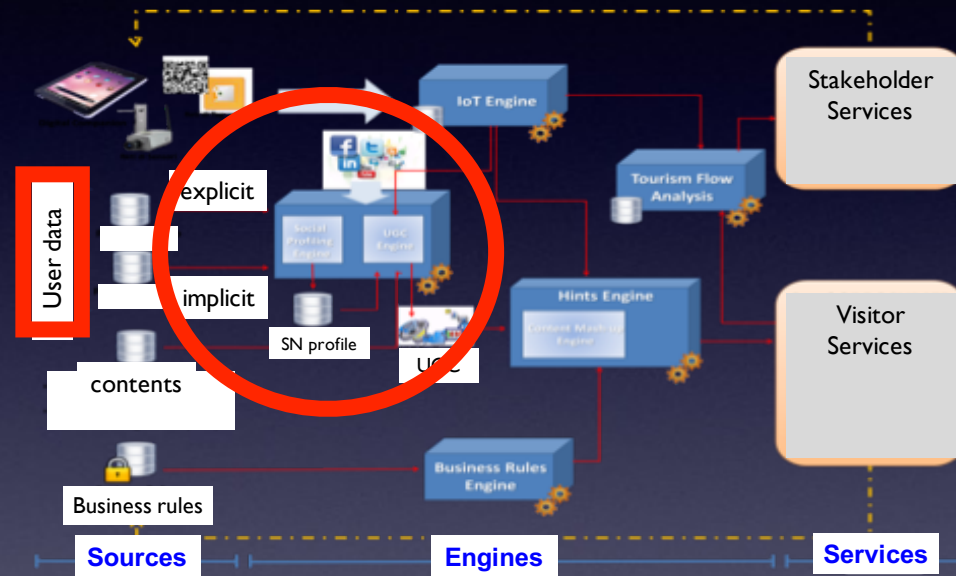
The “intelligent audio guide” project

Wearable Computer Vision technology, 2016-2017



SIFT-based computer vision
on NVIDIA Jetson Tegra K1
system-on-chip wearable processing board

The SOCIAL MUSEUM AND SMART TOURISM project
MIUR National Cluster project 2016-2018



Arsenale - Venice

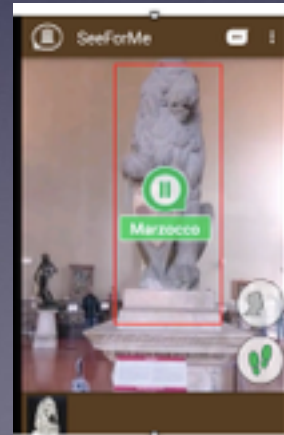


Old Town Centre - Florence



Ansa Barocca - Rome






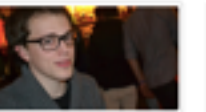















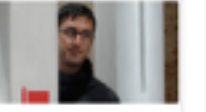





Project partners
UNIVERSITA' di FIRENZE,
UNIVERSITA di ROMA LA SAPIENZA,
IUAV
ENGINEERING SpA,
VITROCISSET SpA,
RAI SpA,
SMI CONSORTIUM



People at MICC UNIFI

PEOPLE

Director Professors Researchers

 <p>ALBERTO DEL BIMBO DIRECTOR Multimedia and Computer Vision</p>	 <p>ANDREW D. BAGDANOV PROFESSOR Computer Vision and Machine Learning</p>	 <p>STEFANO BERRETTI PROFESSOR 3D Computer Vision</p>	 <p>MARCO BERTINI PROFESSOR Digital Libraries and Multimedia</p>	 <p>CLAUDIO SACCO RESEARCHER Social Media Tagging</p>	 <p>FEDERICO BECATTINI RESEARCHER Image Analysis</p>	 <p>TIBERIO URICCHIO RESEARCHER Image and Video Understanding</p>	 <p>RUDY BECARELLI RESEARCHER Watermarking and Image Forensics</p>
 <p>PIETRO PALA PROFESSOR Database Sys and Image / Video Analysis</p>	 <p>ROBERTO CALDELLI RESEARCHER Multimedia Forensics and Security</p>	 <p>FEDERICO PERNICI RESEARCHER Visual Tracking</p>	 <p>LEA LANDUCCI RESEARCHER Natural and Human Computer Interaction</p>	 <p>MATTEO CAGNI RESEARCHER Media Security and Mobile</p>	 <p>CLAUDIO FERRARI RESEARCHER 2D/3D Face Recognition</p>	 <p>GIUSEPPE LIGANTI RESEARCHER Person Detection and Tracking</p>	 <p>LORRENZO SEDDONAR RESEARCHER Action and Object Recognition</p>
 <p>ANDREA DEL MASTO RESEARCHER Multimedia Forensic and Cultural Heritage</p>	 <p>ANDREA FERRACANI RESEARCHER Collective Intelligence and HCI</p>	 <p>GIUSEPPE BECCU RESEARCHER Web and Multimedia</p>	 <p>RENÉ AMERINI RESEARCHER Security and Multimedia</p>	 <p>SIMONE ERCOLI RESEARCHER Data Structures and Adaptive Interfaces</p>	 <p>PAOLO MAZZANTI RESEARCHER New Media for Cultural Heritage</p>	 <p>FRANCESCO TURCHINI RESEARCHER Action Recognition</p>	 <p>LEONARDO GALTERI RESEARCHER Adaptive Video Compression</p>
				 <p>FEDERICO BARTOLI RESEARCHER Pedestrian Detection and Re-identification</p>	 <p>ANDREA SALVI RESEARCHER Computer Vision</p>	 <p>LAMBERTO BALLAN RESEARCHER Computer Vision and Multimedia</p>	