



# Istraživanja iz Microsoft Research-a na području proširene stvarnosti

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Redmond, WA



# “Moji” Microsoft touch proizvodi



Microsoft Surface (old)

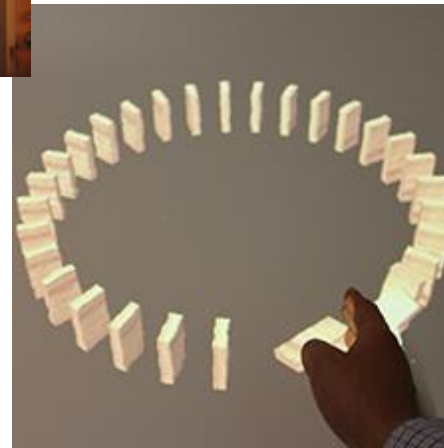
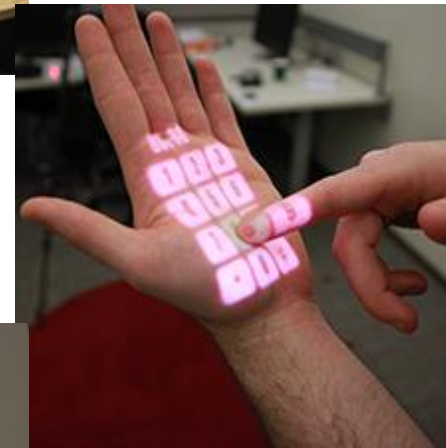
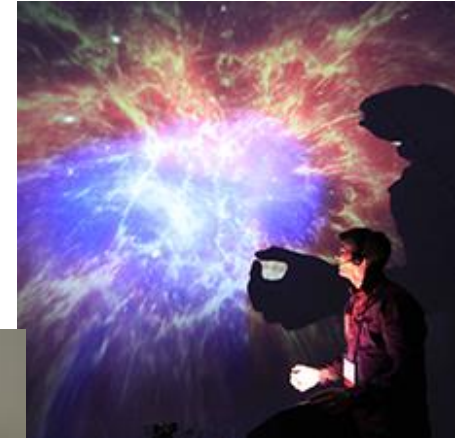


Microsoft Touch Mouse



Microsoft Surface (new)

# Novi oblici interakcije s računalima



Što radi Microsoft Research?

# Microsoft Research

Osnovan u 1991

~850 PhD istraživača

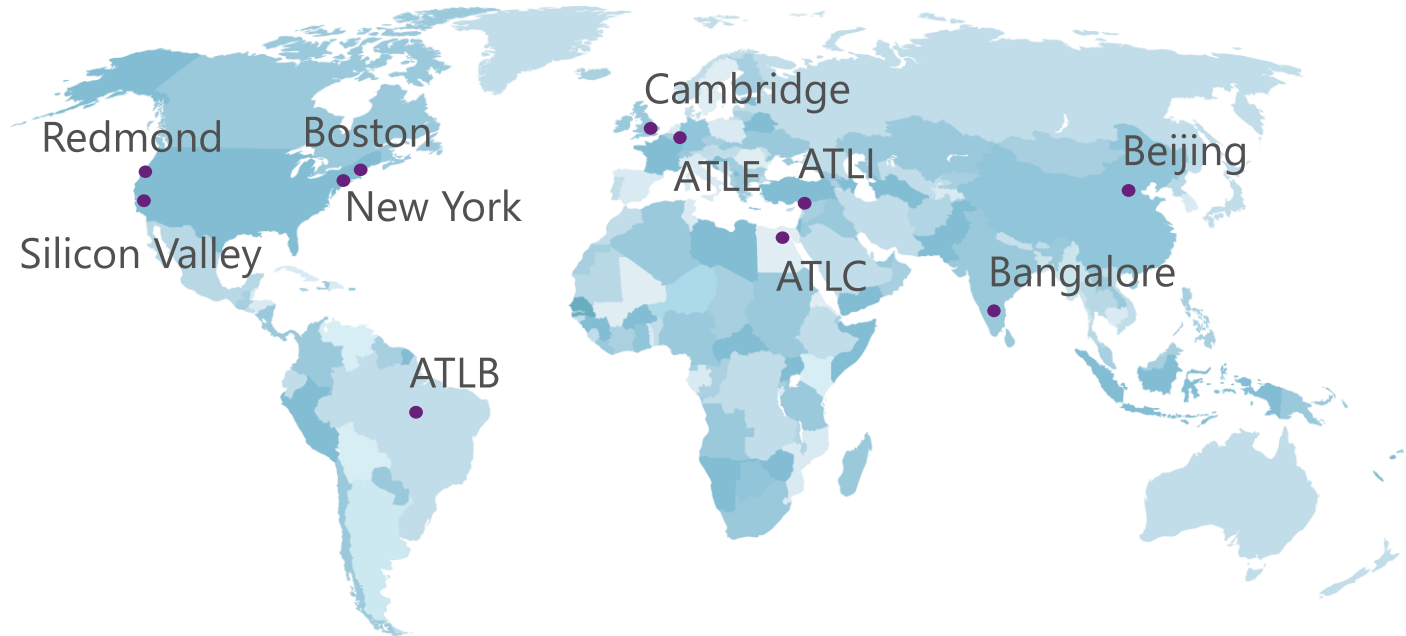
11 laboratorija po svijetu

Flat/lean organizacija

Top industrijske nagrade:

- 3 ACM Turing Awards
- Fields Medal
- Oscar

Microsoft godišnje uloži ~\$9B na R&D

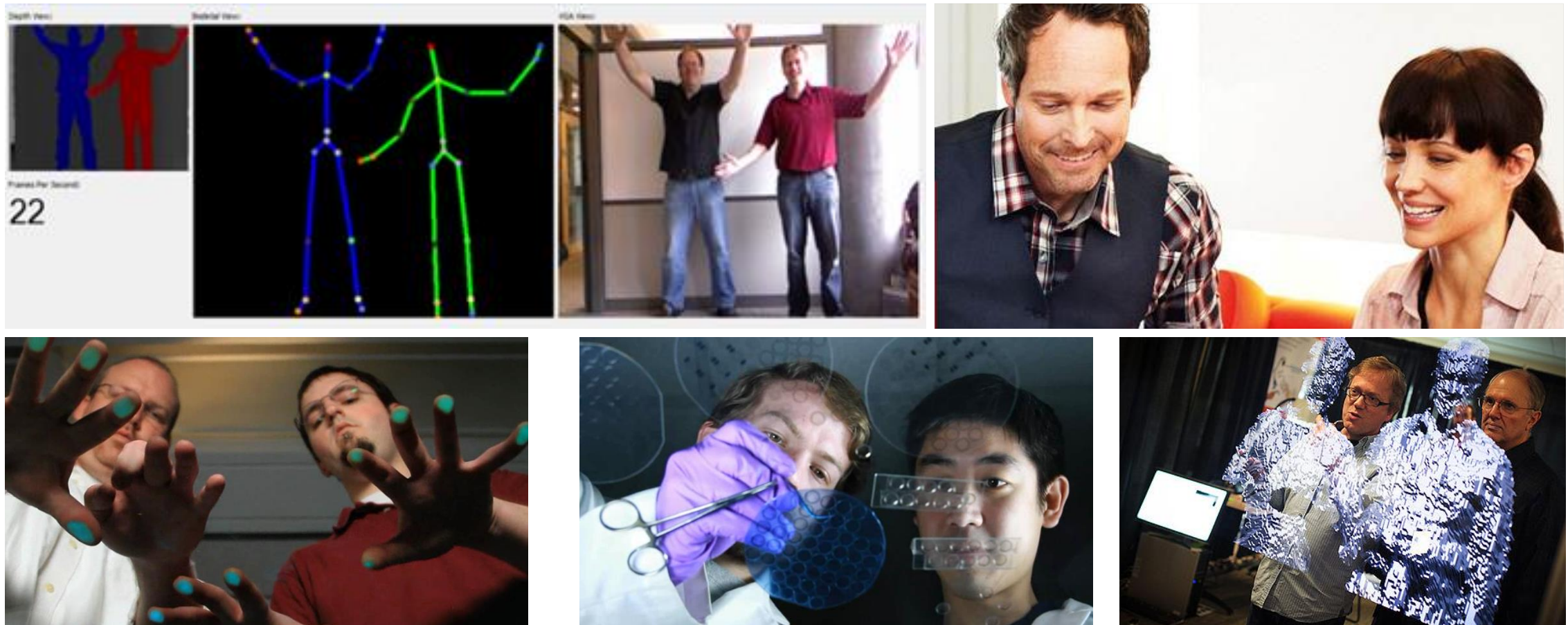


Za usporedbu... hrvatski GDP je oko ~\$65B

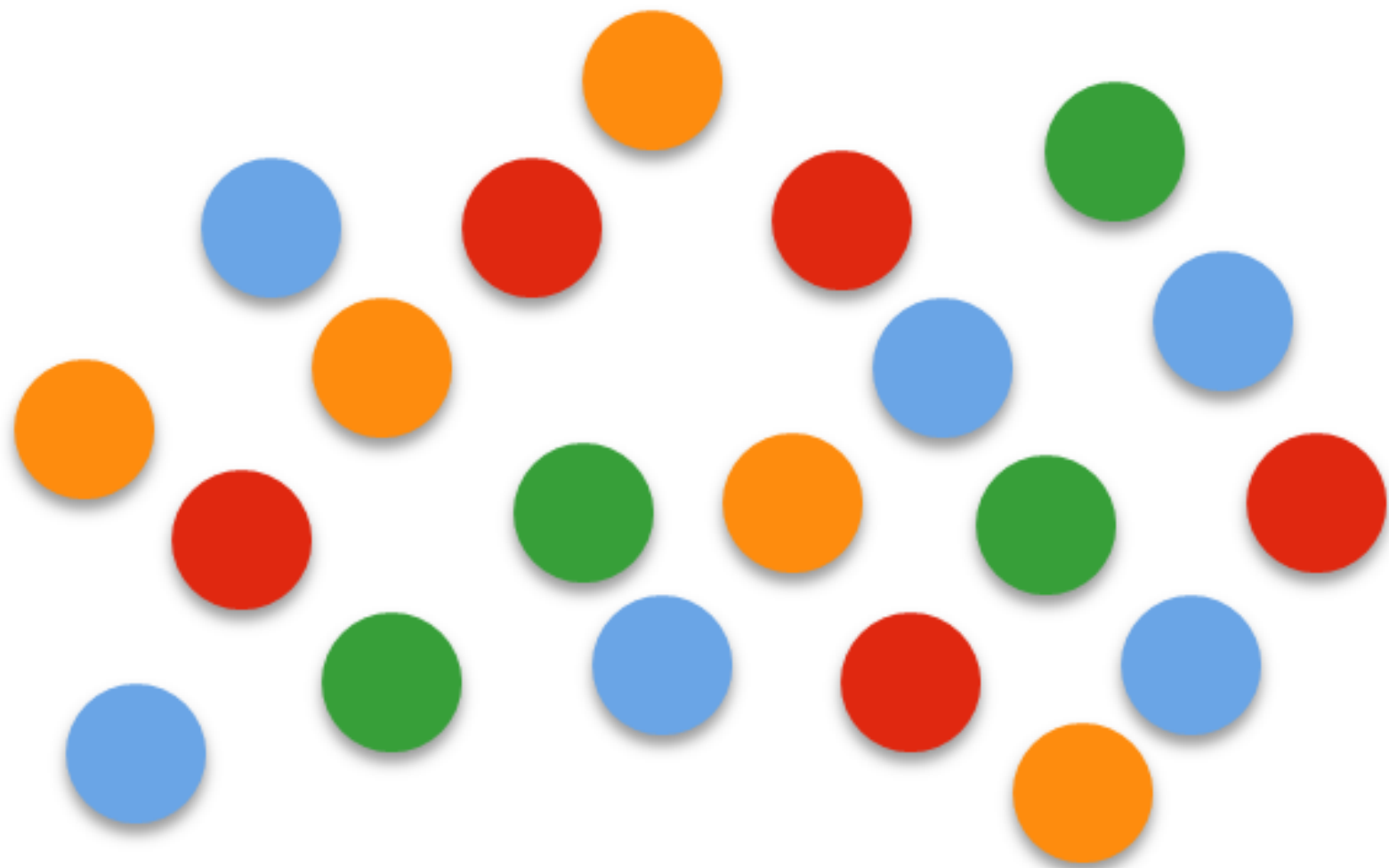
Razvijati znanje u  
svim granama  
informatičkih  
znanosti

Rapidno ugraditi  
nove tehnologije  
u Microsoft  
proizvode

Osigurati da  
Microsoft  
proizvodi imaju  
budućnost



Jednostavan kviz...



Gotovo!

Koliko je bilo plavih točka?



Gotovo svaki proizvod Microsofta uključuje tehnologiju iz Microsoft Researcha.



# Trendovi u istraživanjima

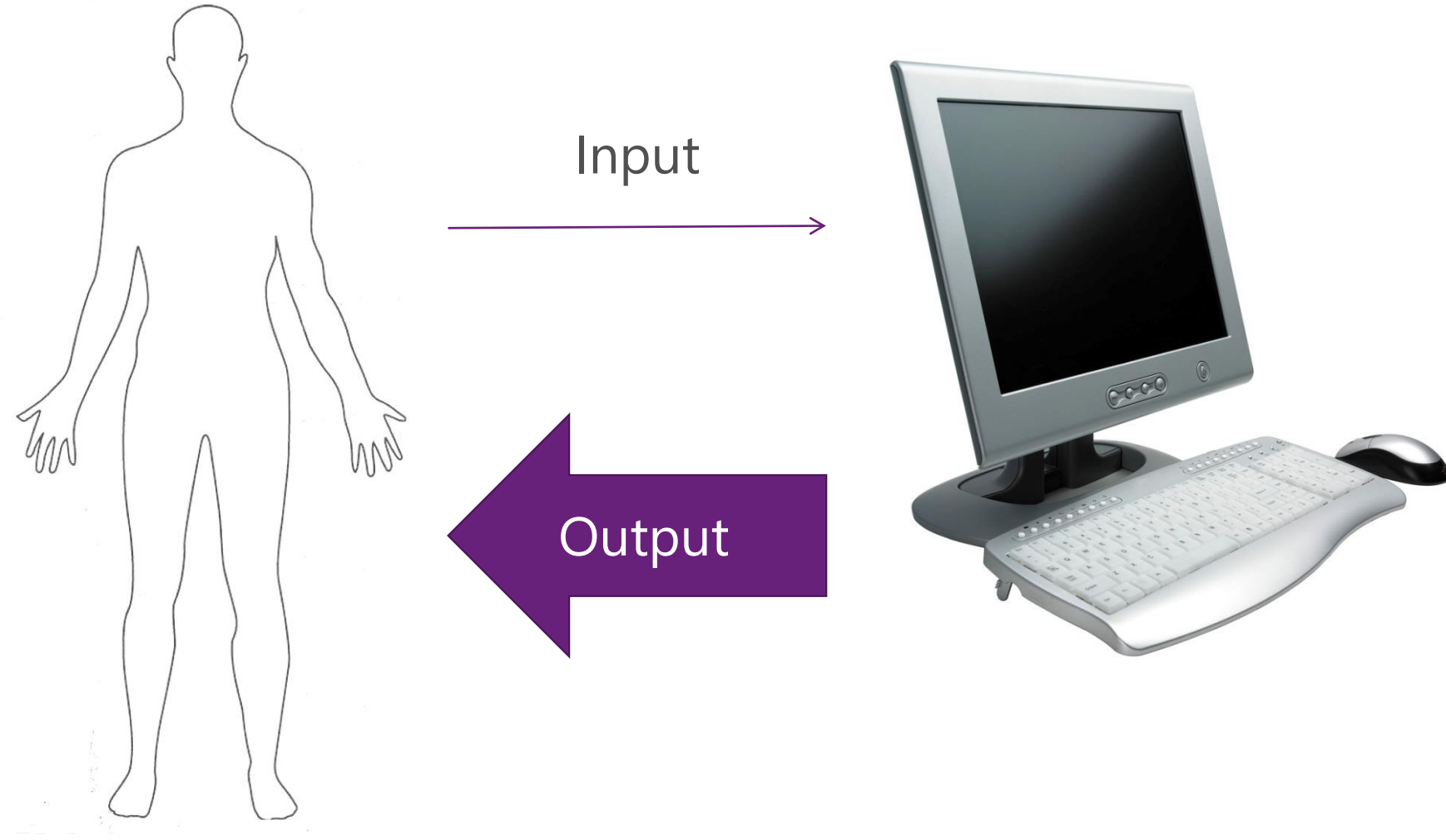
Cloud Computing

Big Data

Wearable and Ubiquitous Computing

Natural User Interface (NUI)

# Interakcije ljudi i računala



Vizualno bogati



Call of Duty Modern Warfare 2

# Vizualno bogati



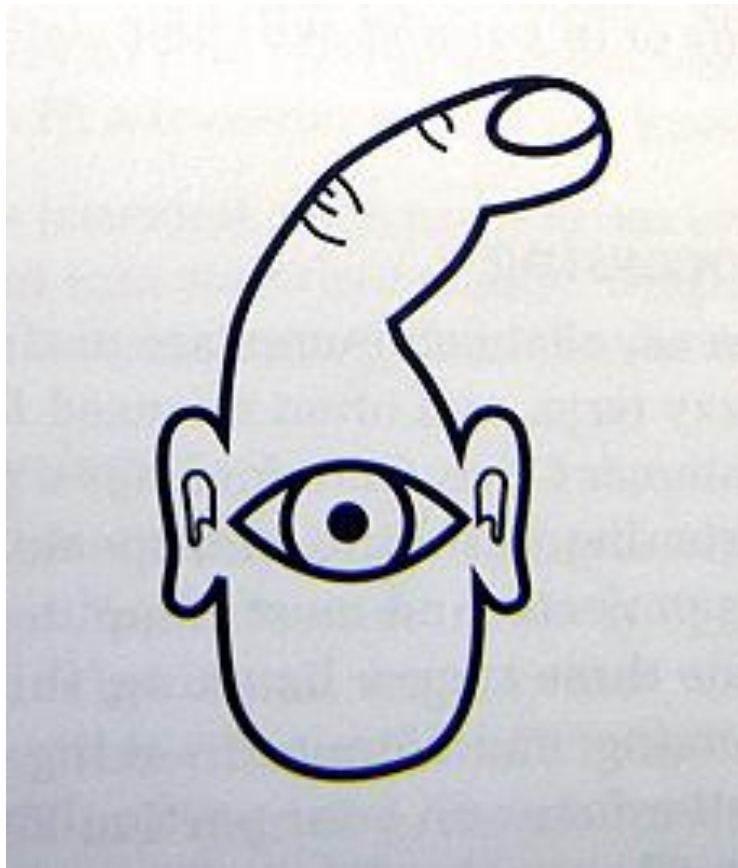
FORZA MOTORSPORT 3



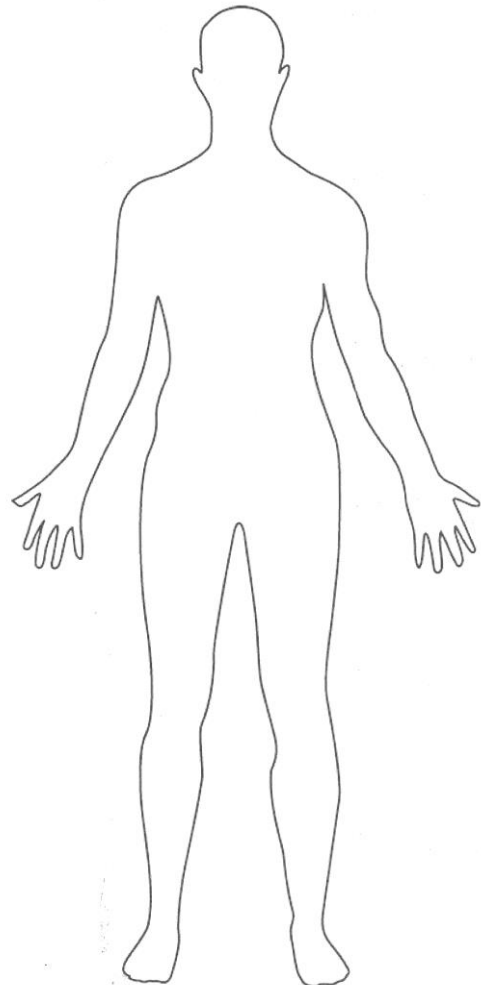
# Interaktivno siromašni



# Kako mi izgledamo računalu?



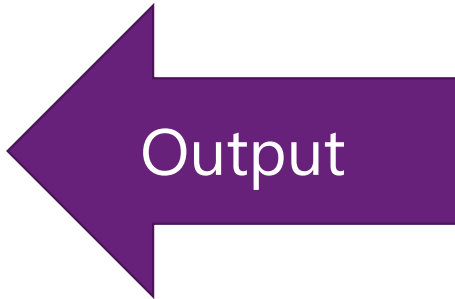
Tom Igoe and Dan O'Sullivan - *Physical Computing*.

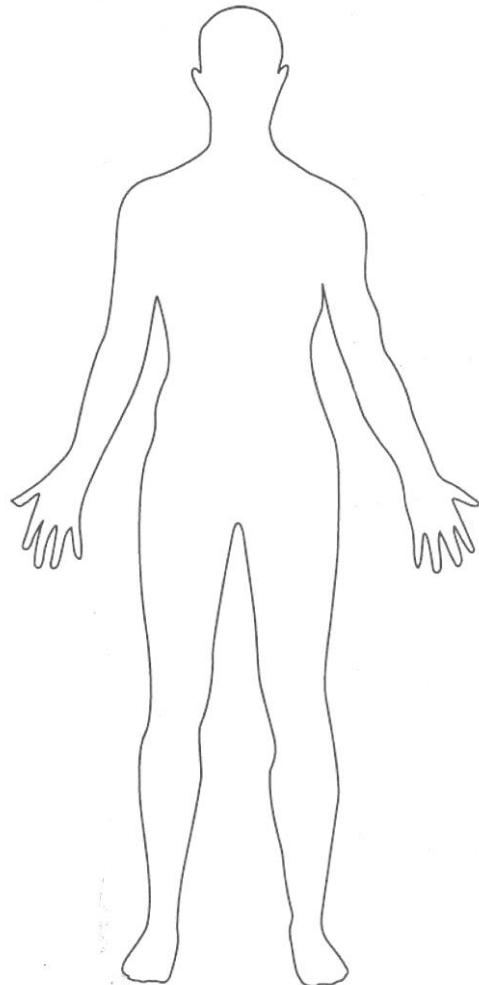


Input

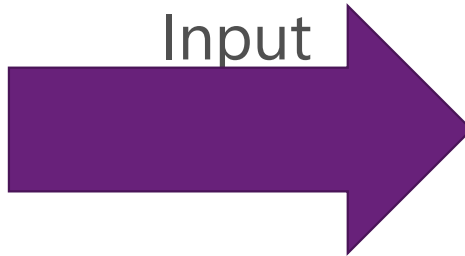


Output

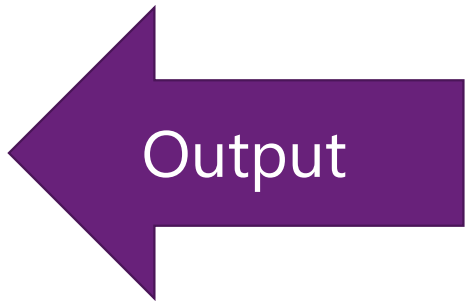




Input



Output



# Kinect: Od ideje do proizvoda



# Microsoft Kinect

**NO CONTROLLER REQUIRED**



# Konkurencija

Xbox (Septembar 2008):

“Treba nam slijednik (tracker) pokreta za...”



- ✓ sve pokrete
- ✓ različite ljude (muškarci, žene, djeca)
- ✓ različite pozicije (stajanje/sjedenje)
- ✓ u stvarnom vremenu
- ✓ za nekoliko igrača simultano

# Od čega se sastoji Kinect?



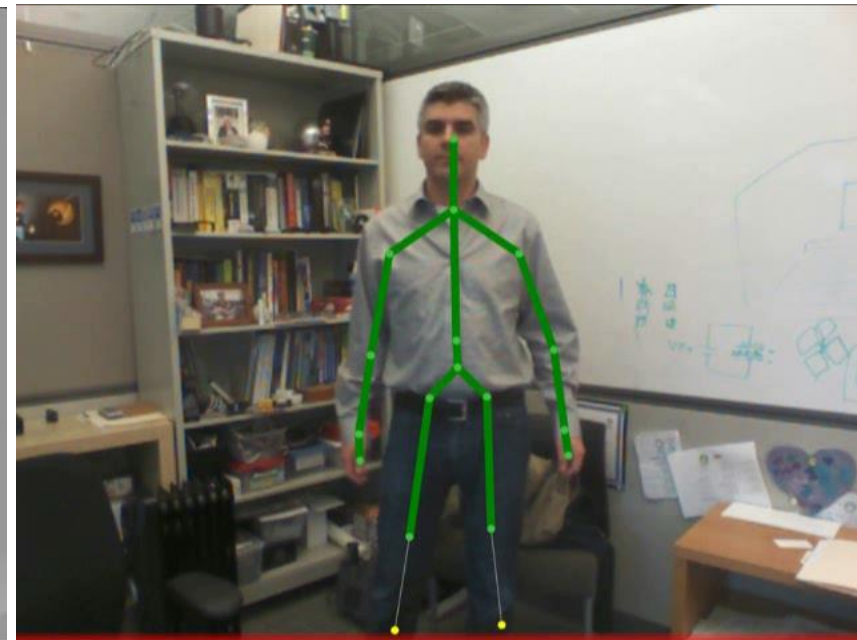
Boja  
(RGB)



Dubina  
(Z)



3D Kostur





# Kinect tehnologije iz Microsoft Researcha

## Segmentacija predmeta

C. Rothen, V. Kolmogorov, A. Blake, ACM Siggraph 2004

## Prepoznavanje i praćenje predmeta

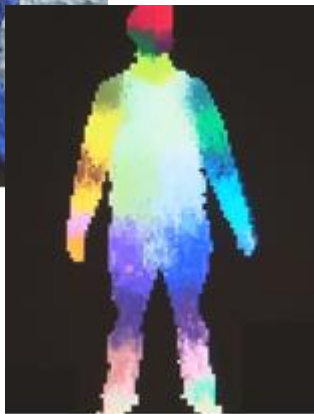
J. Shotton, J. Winn, C. Rother, A. Criminisi ECCV 2006

J. Shotton, M. Johnson, R. Cipolla CVPR 2008

## Microphone Array

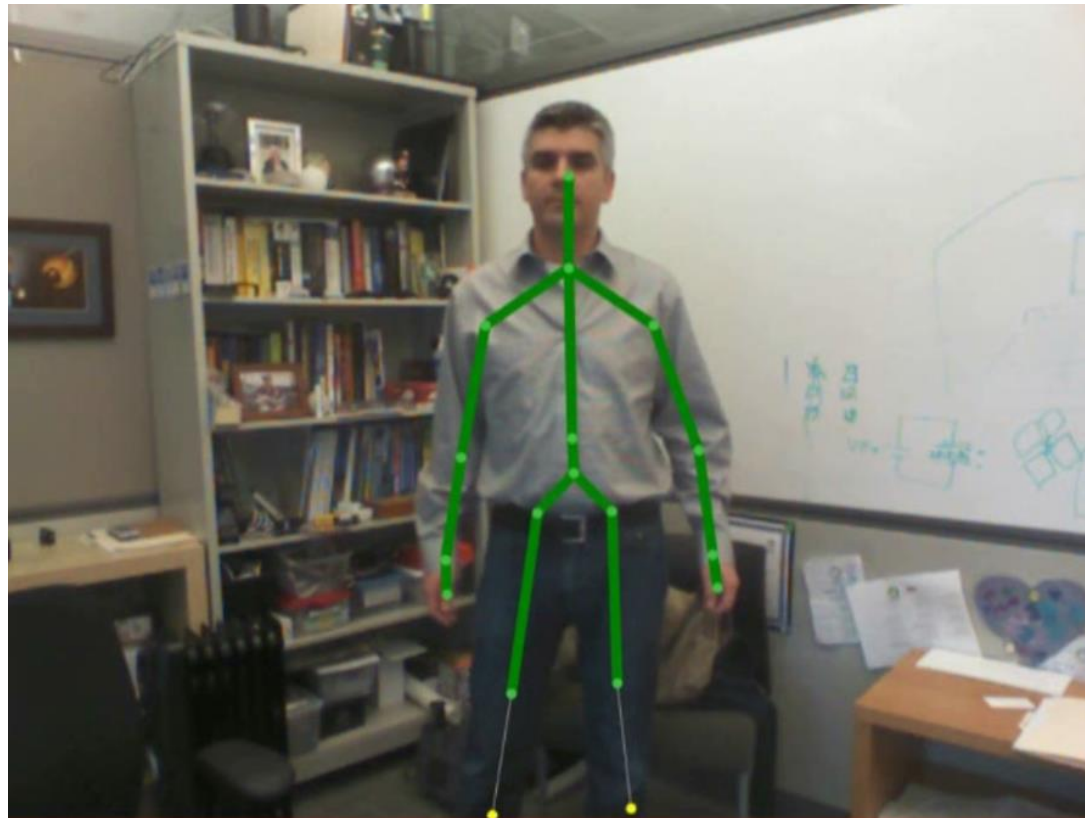
I. Tashev et al. 2004

... i mnoge druge!



# Kinect je samo početak

Još uvijek reduciramo interakcije na 23 točke u prostoru.



# “Touch” je samo početak

Još uvijek reduciramo interakcije na 1-2 točke na površini.



Još uvijek su interakcije limitirane na ekran



Od Kinecta do interaktivnih prostora

# Nove generacije korisničkih sučelja omogućuju...

.... interakciju na bilo kojoj površini.

... spajanje stvarnog (fizičalnog) svijeta i digitalnog (virtualnog) svijeta.

# Proširena stvarnost (Augmented reality)



# Proširena stvarnost (Augmented reality)

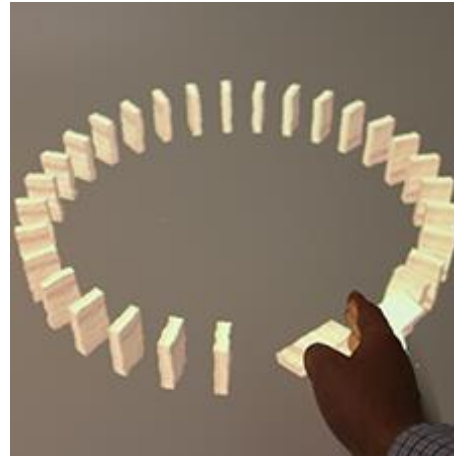
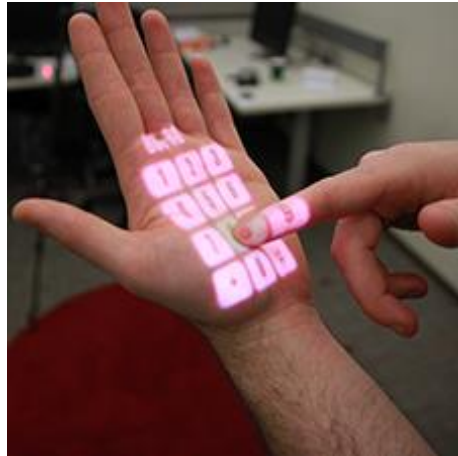
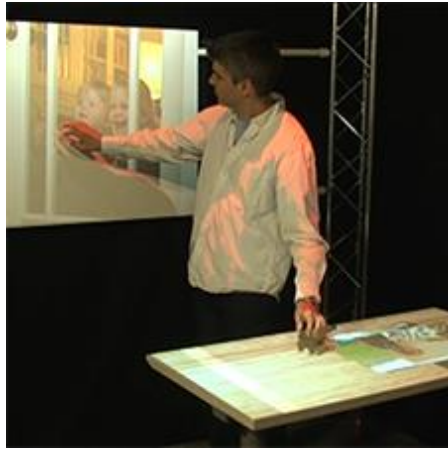
U prostoru

Bez nošenih uređaja

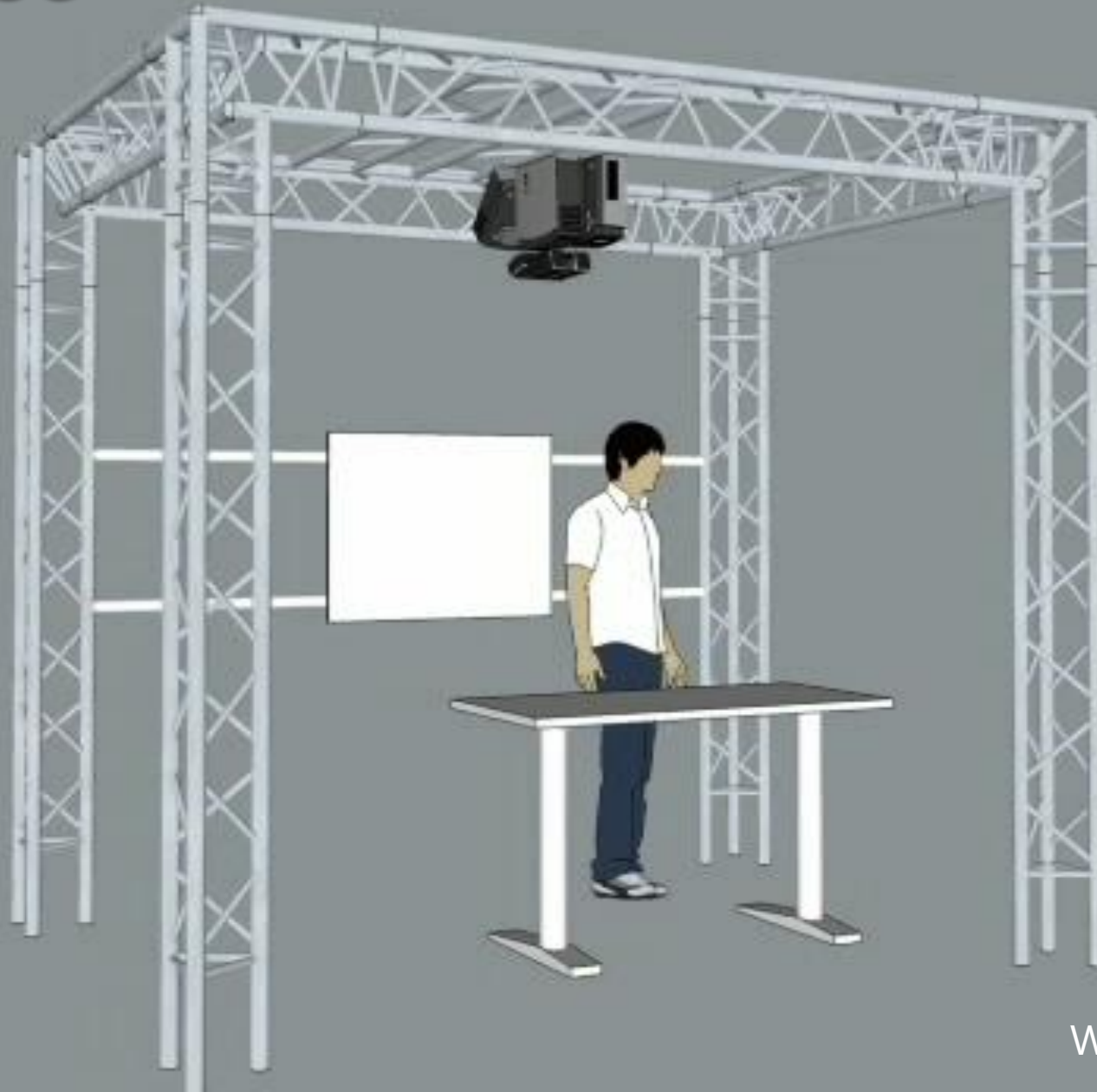
Interakcije analogne prirode



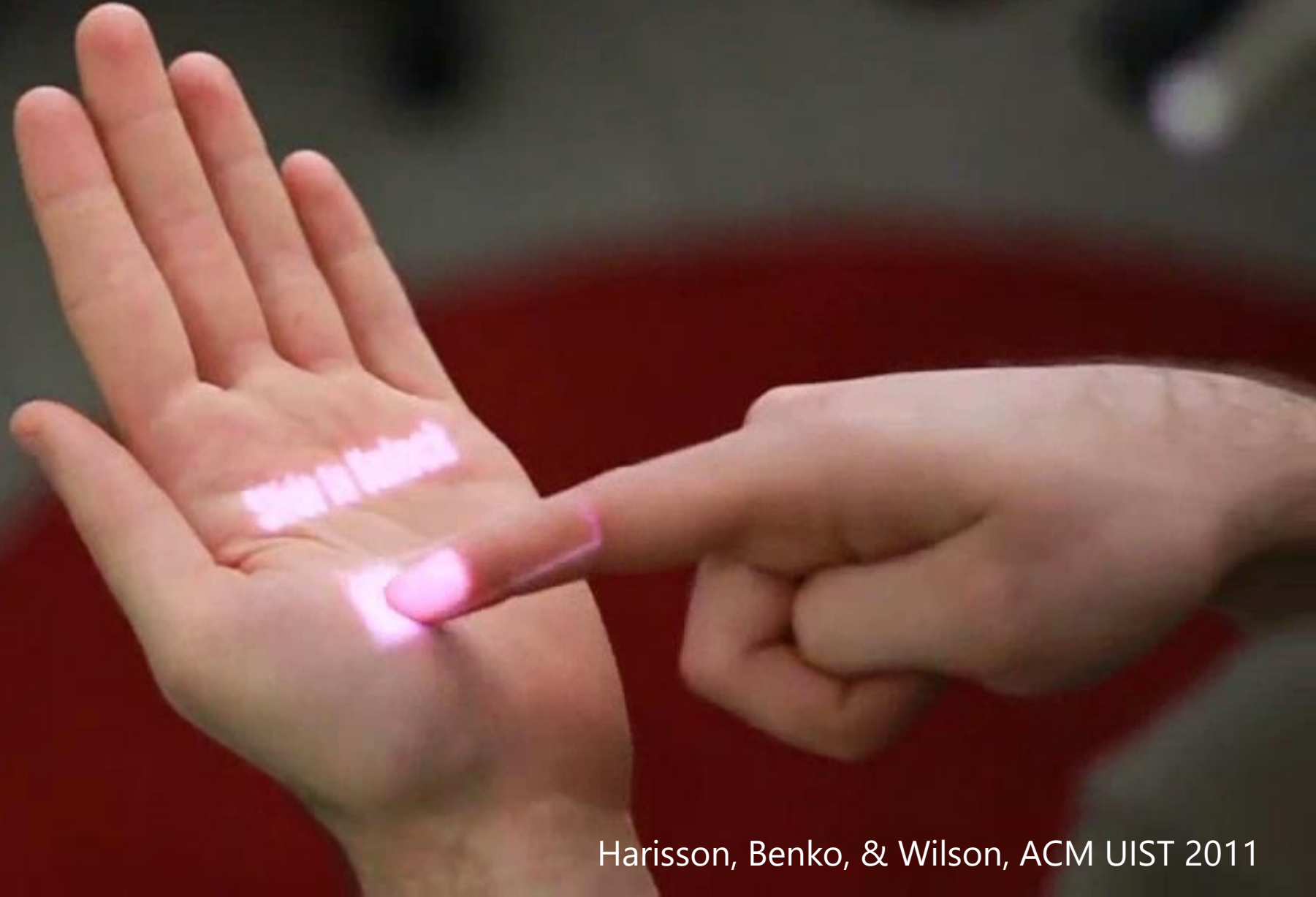
# Kako omogućiti interaktivnost bilo gdje?



# LightSpace



# Wearable MultiTouch Projector (OmniTouch)



# MirageTable



# Beamatron

The image shows a complex mechanical assembly. A black, rectangular device with a prominent lens and a control panel is mounted on a metal frame. The device is labeled 'Beamatron' in the top left corner. The frame is made of metal bars and has various cables and components attached to it. The device has a control panel with several buttons and a small display. The lens is a large, circular, silver-colored component. The overall appearance is that of a scientific or industrial instrument.

Wilson, Benko, Izadi and Hilliges, ACM UIST 2012



Kinect



Igre i  
televizija

Ljudi i  
sobe



IllumiRoom



# IllumiRoom

# Hvala mojim suradnicima

Andy Wilson (MSR)

Chris Harrison (Carnegie Mellon University)

Ricardo Jota (University of Toronto)

Shahram Izadi (MSR)

Otmar Hilliges (ETH Zurich)

Brett Jones (University of Illinois)

Eyal Ofek (MSR)

Hrvoje Benko

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<http://research.microsoft.com/~benko>

A close-up photograph of a person's hand, wearing a light-colored, ribbed sweater, holding a small, glowing red sphere. A large white question mark is superimposed over the sphere. The background is dark and out of focus, showing some indistinct shapes and colors.

?



# Microsoft