Immersive Interaction research Group

Ronan Boulic
iig.epfl.ch

Research Group
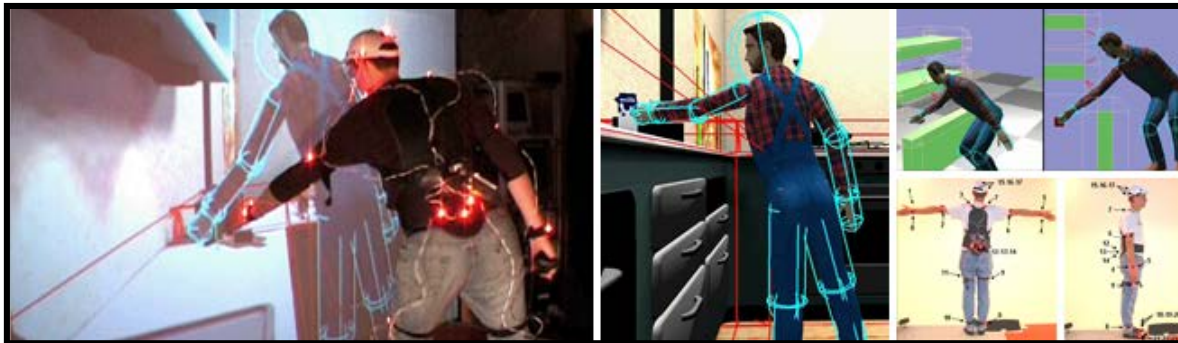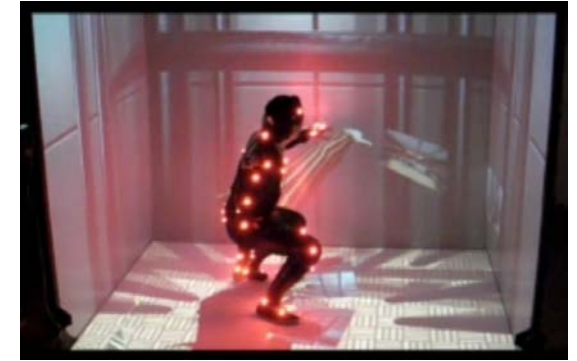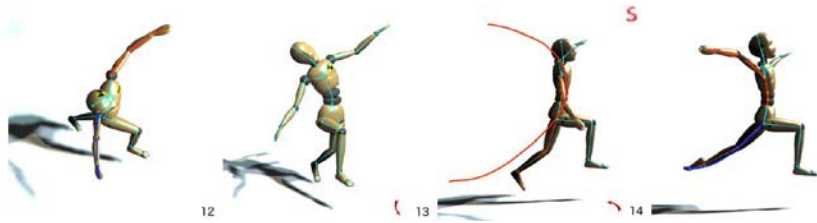
R. Boulic

EPFL-LIG & VRlab (1989-2010)
Senior Scientist since 2009
EPFL-IIG research group leader since 2011
 IIG is part of the IC Visual Computing group

PhD student

- T. Porssut (with EPFL-LNCO): since 09/16

Scientific collaborator

- S. Bovet (2017): Hasler Project

Postdocs

- P. Harish (since 2014): CTI Project
- M. Mahmudi (since 2014): CTI Project

Designer

- M. Julliard (since 2016): CTI Project

Recently graduated PhD students

- E. Molla (Sept 15): Rockstar North
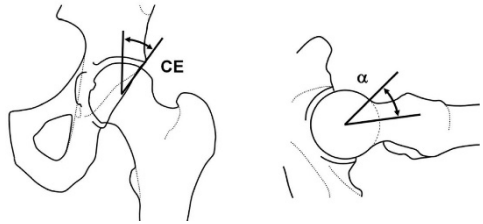- H. Galvan Debarba (August 2016): EPFL-IIG & Artamin Fundation

Research topics (*fields*) [publications]

Human modeling

(*Biomechanics & Robotics*)

[J. Comp. & Graphics, IEEE TVCG,
J. Biomechanics, J. Orthop. Res.]

Real-time 3D interactions

(*HCI, Ergonomics, Rehabilitation*)

[VRST, 3DUI, J. Interacting with Computer]

Real-time posture control
& Autonomous Virtual Human

**Mocap, Posture Control, Collision avoidance,
Semantic mapping, Embodiment studies...**

(*Comp. Anim., Robotics, Cognitive Neuroscience*)

[Vis. Computer, CAVW, IEEE CGA, Graphical Models]

Vision

Embodied interaction is a critical component
for achieving intuitively new classes of tasks

Embodied interaction turns action into meanings *[Dourish01]*

Leverage on the ways we experience the everyday world

Practically engaged, non-rationalizing bodily activity

vs planned, rational abstraction of most HCI designs.

exploit our coordinated skills to achieve complex tasks

Paul Dourish, Where The Action Is: The Foundations of Embodied Interaction, MIT Press, October 2001

Research(1)

Performed Posture → Captured Motion

Performer Body Representation → Egocentric Coordinates → Allocentric Denormalization
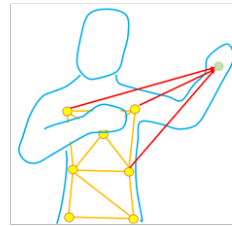
Avatar Posture ← Hands Position / Orientation
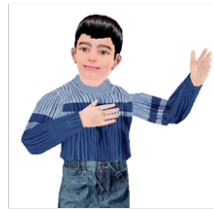
IIG

SNF Project 2011-2015
Eray Molla

Precise performance animation with semantic mapping

Versatile embodiment of target population, e.g. for the evaluation of a complex virtual prototype or for the embodied production of animations
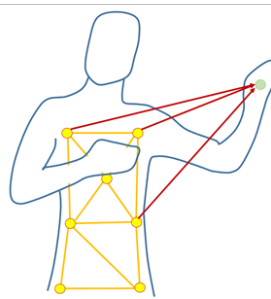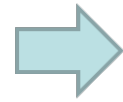(published in open access in IEEE TVCG in 2017)

Research(2)

SNF Project 2012-2018
(Collaboration with EPFL-LNCO)

Henrique Galvan-Debarba
Thibault Porssut

Human Embodiment Sensitivity to the Choice of Viewpoint (1PP-3PP) and to Posture Distortion

Long term study aiming at providing efficient movement training/rehabilitation prototocols
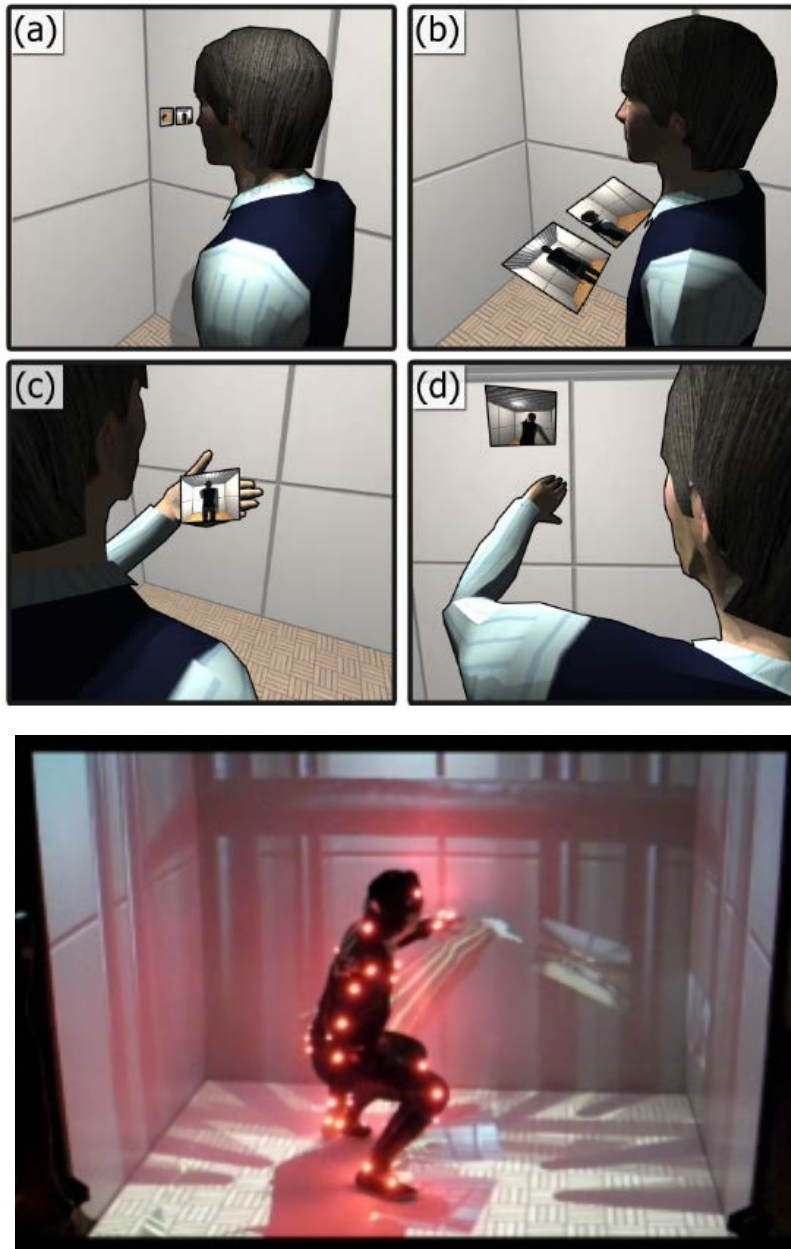
Experimental assessment of the viewpoint influence

- Comparison of the first person Viewpoint (1PP) with one third person viewpoint (3PP)
- Include a threat to assess ownership (Virtual Pit setup from Meehan)

Experimental assessment of the posture distortion

Experiment from Sidney Bovet on full proximal body space distortion (above: amplification)

Experimental setup from Henrique Galvan-Debarba to study point to point distortion

Results:

- The movement displayed on the user avatar can be either facilitated or hindered

- Broad tolerance to distortion with perceptual asymmetry: subjects appear to be much more tolerant to facilitating distortion than to hindering distortion

- Next evaluations will target full-body actions and interaction with the environment (collision)

Innovation

IIG

CTI Projects:
WALT 2014-2015
WALT-Mocap 2015-2017

Intuitive 3D character
animation system
for 2D graphic artists

M. Mahmudi, P. Harish, B. Le Callennec, and R. Boulic "Artist-Oriented 3D Character Posing from 2D Strokes", **Computer & Graphics**, Vol 57, p.81-91, June 2016, Elsevier, http://dx.doi.org/10.1016/j.cag.2016.03.008 under *Creative Commons Licence*

P. Harish, M. Mahmudi, B.Le Callennec, and R. Boulic. 2016. "Parallel Inverse Kinematics for Multithreaded Architectures". **ACM Trans. Graph**. 35, 2, Article 19 (02/2016), 13 p., *presented at SIGGRAPH16*, free access from http://iig.epfl.ch/page-131659.html

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Teaching

Since 2011-12

Virtual Reality (Visual Computing track)

- Msc, 2nd sem., ~40 students
- Background in Human Perception-Action
- VR methods and recent products evaluation
- Hands-on TP and mini-project

Manipulation with 2 Move controllers

3D scan data

Tracked Occulus HMD with Move controller

Since 2013-14

Programming I: 3 ECTS, Bsc 1st sem.

ICC (Information-Calcul-Communication): 3 ECTS, Bsc 1st sem.

Programming II : 2 ECTS, Bsc 2nd sem

- ICC presents foundations of Computation, Communication and Systems
- ICC is combined with PROG I & II to stimulate *Computational Thinking*
- Service courses to the Microtechnique & Electricity Sections
- Combined with 24 short video modules on wandida.com (more than 125'000 views)
- 250-300 students