top-notch team: 30+ years cumulative startup experience

Frédéric SERRE
- Experienced CEO, created multiple startups since 2001 with IPO
- Vision & strategy
- EU fundraising
- Hiring & firing

Paul GREVE
- CMO, from CEA, startup experience, B2B & B2C international marketing expert, 5 languages, 7 countries
- Sales & marketing
- International OPS
- CEO of motion recall USA

Cyril CONDEMINÉ
- CTO, from CEA, multidisciplinary project management and R&D management experience
- Hardware development
- Software development research (software)

Guillaume POLLIN
- CPO, startup and industrialization experience: manufacturing, supply chain, tech support
- Industrialization
- Manufacturing
- Product lifecycle management
CEA Tech* spin off
21 patents
+10 years of research
total headcount of 20

* CEA, the world's most innovative government funded research institution according to Reuters
the experts of **natural interactivity** for Virtual & Augmented Reality

**uVR | room**

- indoor leisure
- industrial & training
- sales & retail

patented by motion recall – Midi Minatec – Juillet 2017
the experts of natural interactivity for Virtual & Augmented Reality

uVR arena

- live sports
- events
- concerts

patented by
What to expect over the next 5 – 10 years
2015: Work on motion recall project:
- Team
- Technologies
- Finance & BP/BM

2016: January: creation
- CEA incubation
- Paul / LETI & Cyril / LIST
- R&D project with CEA

2016, March: First funding
- First funding:
  1M€ equity (BA)
  1M€ soft money

2016, November: uVRiRoom PoC
- 2 players
- 50m²

2018, June: launch
- 20 rooms
- 8 players
- 50-75m²
Technical point of view
VR Panorama

VR controllers & wearables

Room-scale VR systems

VR headsets

360° VR content
With a VR headset, we are absorbed in another world, and we seem to have lost foot with reality

Interactions with our environment such as persons or real objects are impossible
User interactions in VR: state of the art

@home usage
- 1 user/room
- interactions through controllers
- virtual interactions only

VR arcade booths
- 1 user/room
- several users/game
- interactions through controllers
- virtual interactions only

VR arcade rooms
- up to 6 users/room
- interactions through dedicated controllers
- virtual interactions only
- gameplay adapted to technical limitations

→ No natural interactions with reality, other users and tangible objects
Implementing natural interactions

- high number of users (at least 8)
- our body will be the basic way to interact
- I will see other users through their avatars
- I can touch and interact with other users
- I can catch, swap objects with other users
8+ users Virtual Reality experience

Natural interactivity & full-body MoCap

Affordable & high ROI

Easy-to-use & versatile
1. User Localization

**head localization**
- HMD tracking
- low latency (<30ms)
- high resolution (mm range)

2. Full Body MoCap

**motion capture**
- RT full body mocap (body, hands and fingers)
- occlusions management
- sub centimeter resolution

3. Object Tracking

**object localization**
- occlusion management
- w/o fusion and object crossing
- sub centimeter resolution
Inside-out localization

Motion capture

objects tracking

outside-in tracking

standardized element: totem
User localization: Simultaneous Localisation and Mapping

**Embedded (inside-out)**
- Orientation (IMU, high data rate)
- Video (camera, middle data rate)

**Infrastructure (outside-in)**
- Position (triangulation, low data rate)

**Head position & orientation**
Motion Capture (MoCap) basics

**Acquisition (sensors)**

- **IR Optical systems**
  - high precision
  - large infrastructure
  - high costs
  - position and orientation

- **IMU body suits**
  - low to middle precision
  - no infrastructure
  - low to middle cost
  - relative orientation

**Animation (models)**

- **Animation**
  - minimum 12 nodes
  - biomechanical model (squeleton)
  - avatar animation

→ Not suited for a profitable operation
(complexity, HW implementation time for players, costs)
In order to reduce the number of nodes to 5 maximum, we use a biodynamic digital human:

- biomechanics laws
- balance management
- foot-ground contact forces management
- adaptable to different morphologies
How to capture 5 keypoints without markers:

- using CNN approach
- extraction on 2D videos
- extraction on 3D point clouds
Thank you!

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