On-line avatar control using prioritized inverse kinematics

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Summary

- Motivations
- Prioritized Inverse Kinematics Solver
- Previous work
- Marker setup/constraints
- Pros/Cons of the system
- Results
- Alter Body experience
- On-going work

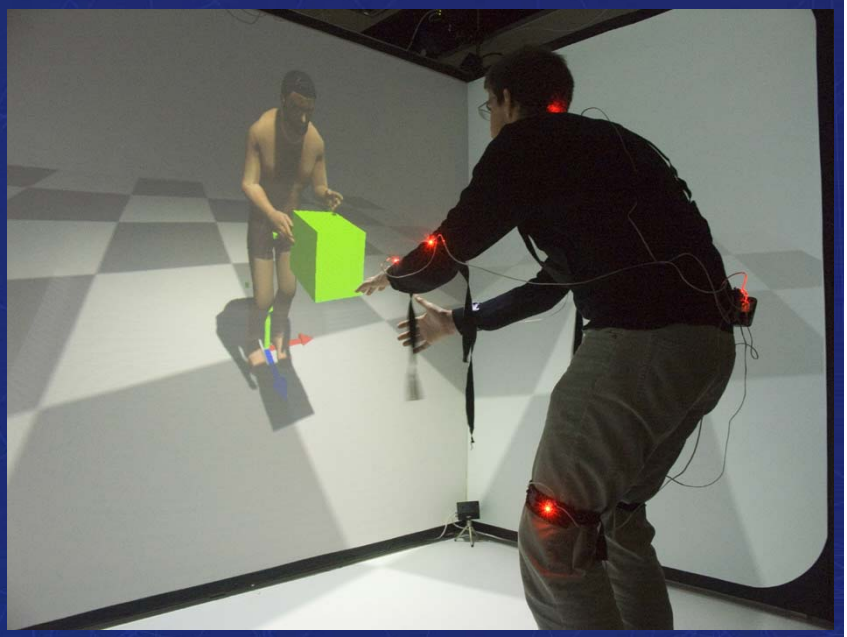
Virtual Reality Laboratory

Motivations (1/2)

- Easy control of virtual humans
- On-line
  -> Transparent interface for the user to specify the posture of a virtual human through full-body input
- Study the control of virtual humans with different height
- Applications:
  - Training gesture-based activities (learning, rehabilitation)
  - Evaluating complex virtual prototypes (ergonomics, maintainability)

Motivations (2/2)

- Use as few markers as possible
- [Chai & Hodgins 05]
- Exploit PIK



Prioritized Inverse Kinematics (PIK) (1/2)

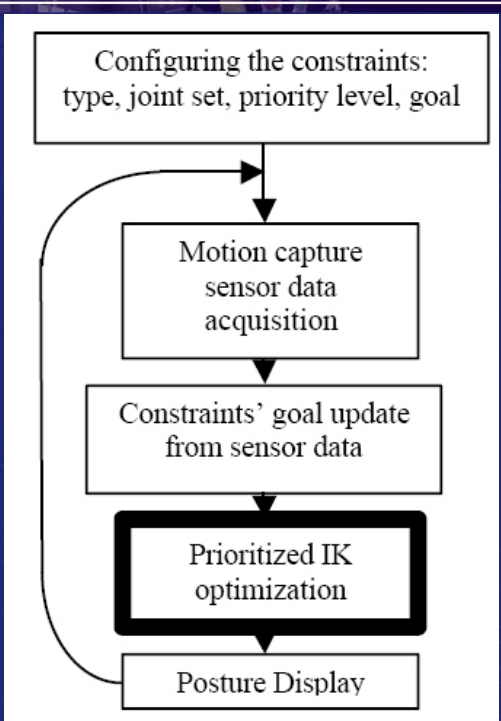
- Solves Cartesian constraints (i.e. effectors) with associated priorities [Baerlocher & Boulic 04]
- Iterative convergence
- Postural realism with:
  - Anatomical joint limits
  - Joint coupling at the spine [Raunhardt & Boulic 07]

  -> converge to a configuration satisfying the hierarchy of priorities

PIK (2/2)

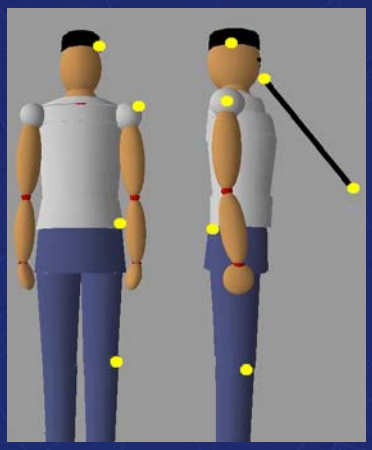
- In a mocap framework:

  markers act as goal for constraints

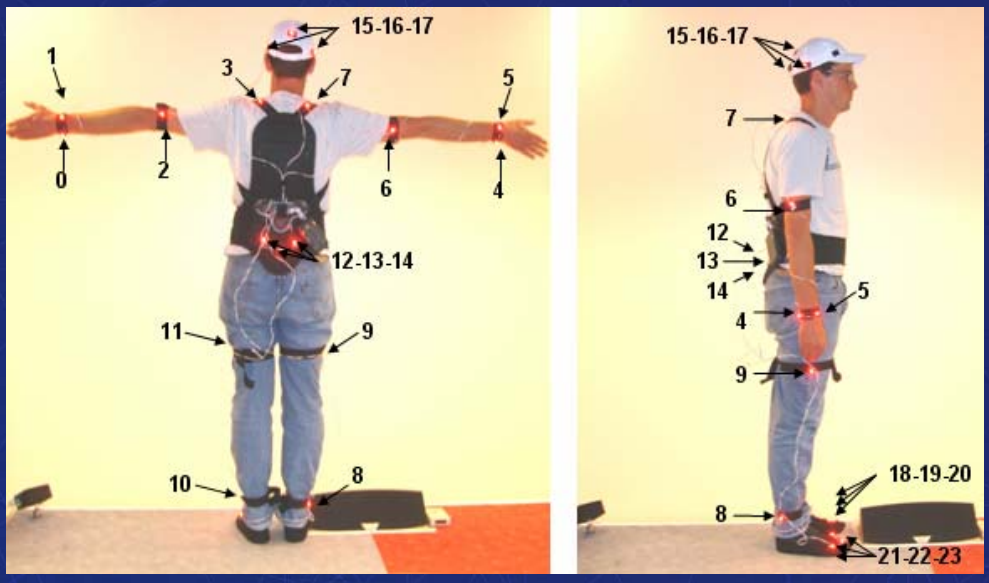


Previous Work

- The clarinetist case study [Wanderley 04]



Markers setup



Markers constraints

Foot leaves ground

Controlled body part	Constraint type
Toes	Position, orientation
Spine base	Position
Spine base	Orientation
Wrists	Position
Wrists	Orientation
Shoulders	Position
Clavicles	Position
Knees	Position
Ankles	Position
Head	Orientation

Pros

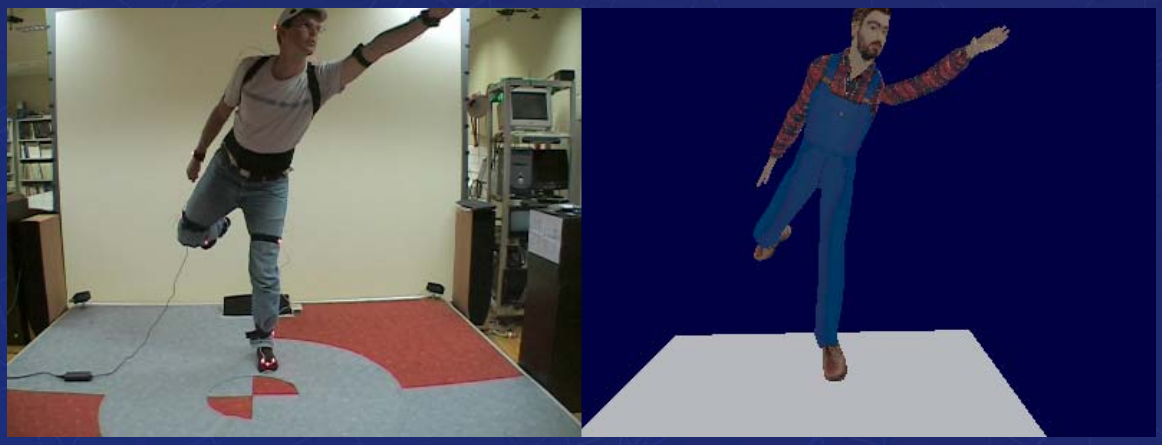
- Twice less markers than production mocap setup
- Easy calibration
- Rough placement of the markers

Cons

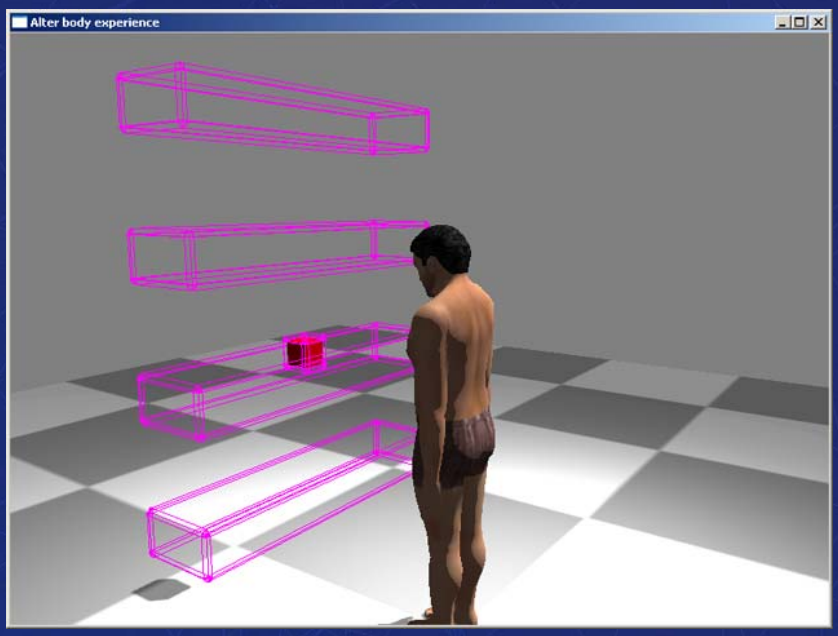
- Limitation in the frequency bandwidth of the movements
  - try to reduce controlled dimension -> instabilities

Virtual Reality Laboratory

Results



Alter Body Experience



On-going work

- Experimental measurements
  - With/without obstacles
  - Comparison with baseline reach
- Qualitative analysis by DIST
- Demo at “Touch the Future”

Thank You

- Questions?