Martial Physics

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Martial Physics

Project Features

- Mass-Spring model

- Real time capabilities

- Applying real physical forces

- Image warping

- Fun and game-like character

Martial Physics

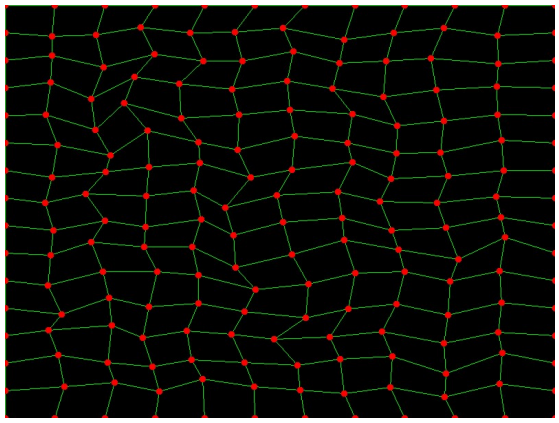
Physical Model

- Constrained and free mass points

- Self-adjusting system parameters

Choose: T (period),
m (mass)
γ (damping)
Given: F (forces)

→ $k = m \cdot \left(\frac{2\pi}{T} \right)^2$



→ Desired system behaviour

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Simulation Accuracy and Performance

- Set number of samples per period

- Background timer: repeated real-time calculations using time interval

- Multithread application: drawing thread repaints using latest grid data

→ Observed period stays the same

→ Independent of image processing time

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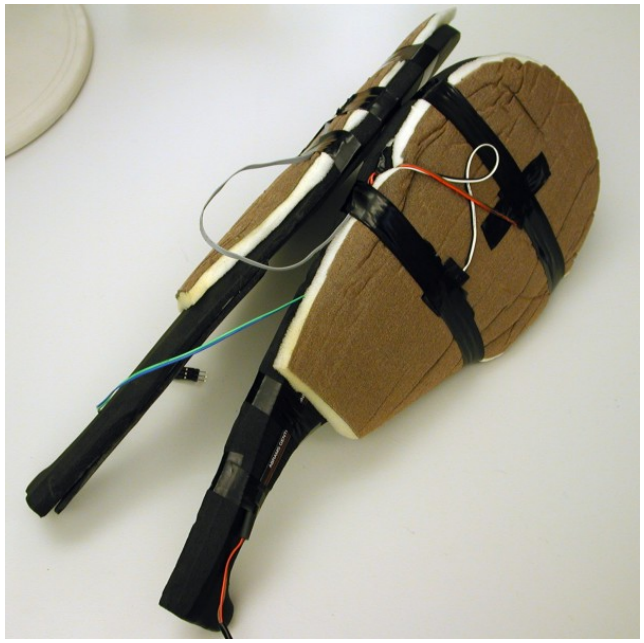
Applying Real Physical Forces

- Punching bag

- 4 pressure sensors:
  - → force
  - → motion chunks

- 1 bending sensor:
  - → directions
  - → global positions

- 2 acceleration sensors:
  - → global positions



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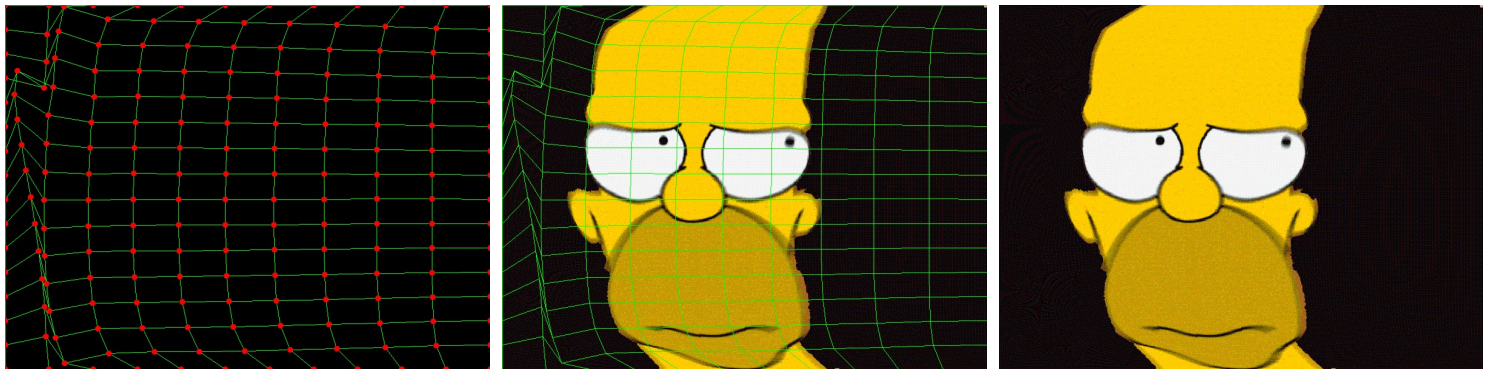
Advanced Image Processing

- Warping image based on mass point grid

- Using Java 2D and JAI (Java Advanced Imaging API) for image handling and processing



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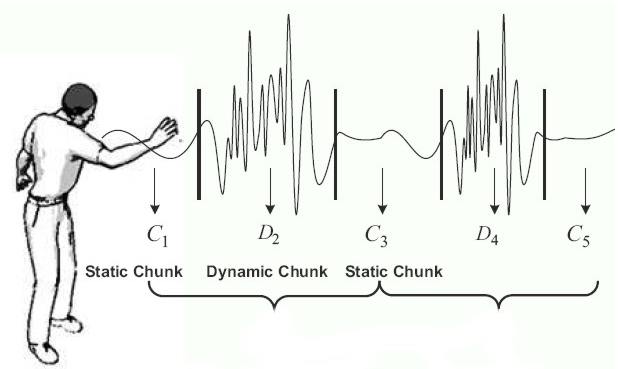
Fun and Game Features

- Detect motion chunks to count punches and kicks



- Show fighting progress after some hits

Martial Physics

Live Demonstration

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Live Demonstration?

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Thank you for your attention!