GDC 14

An Indie Approach to Procedural Animation

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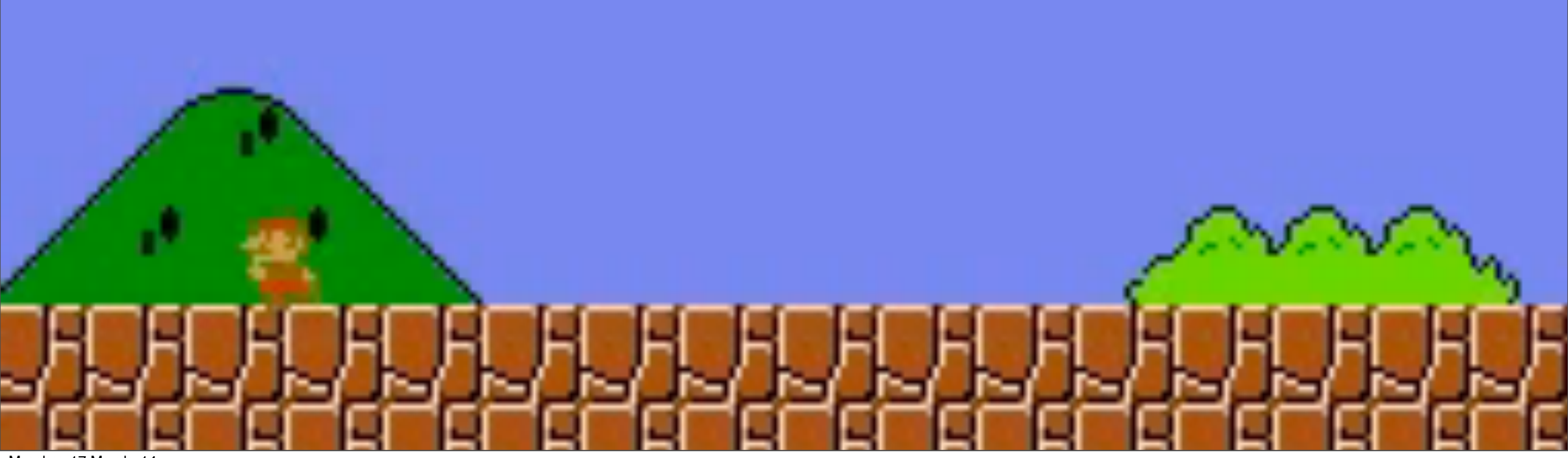
2014

Overgrowth

Movement

- Responsive
- Newtonian physics



Movement

- Fluid
- Long transitions

Movement

- Character vs Vehicle
- Responsive + smooth

Movement

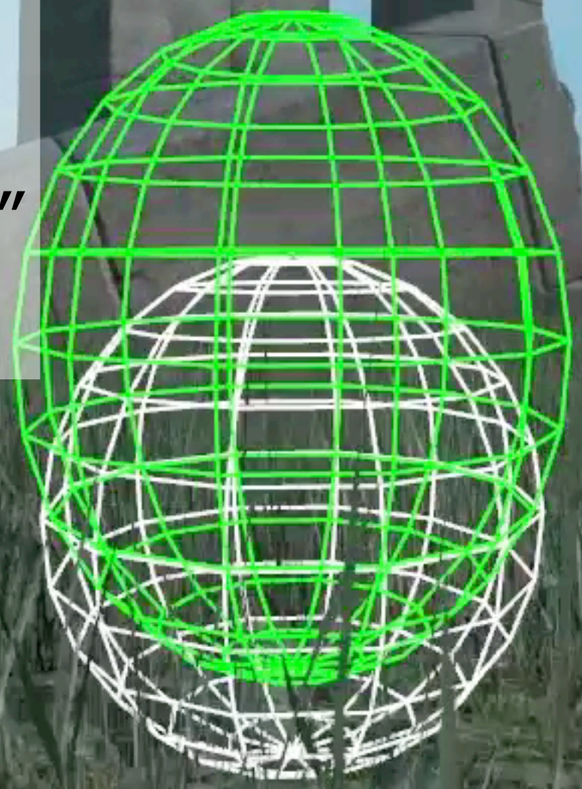
- Center of mass
- Shapes
- Balance
- Tilt
- Spin

Movement

- Bouncing ball
- Compression
- Constant gravity

Movement

- Start with physics
- Bumper and lifter
- Consistent controls
- “intuitive”, “responsive”
- Do no harm



Movement

- Idle pose
- Rotate towards velocity

Movement

- Acceleration tilt
- Rotate around COM

Movement

- Pass/Reach
- Stride wheel

FPS: 60

Movement

- Multiple speeds

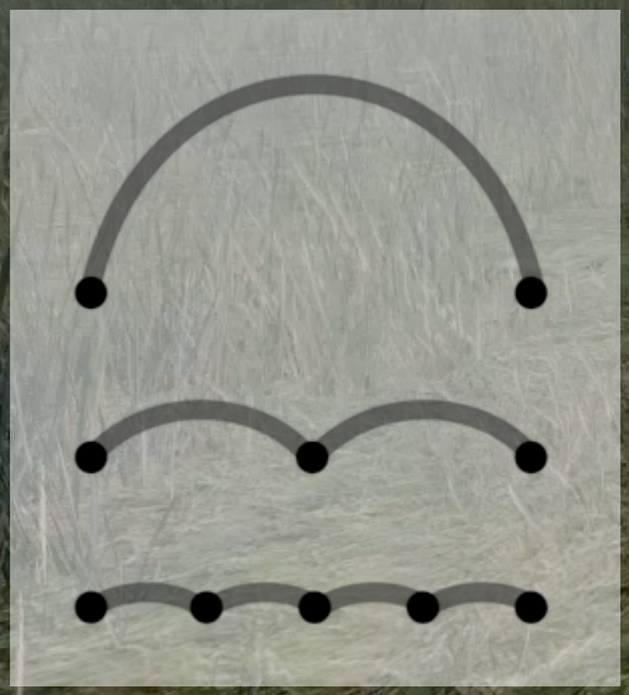
Movement

- Synchronized blend

FPS: 63

Movement

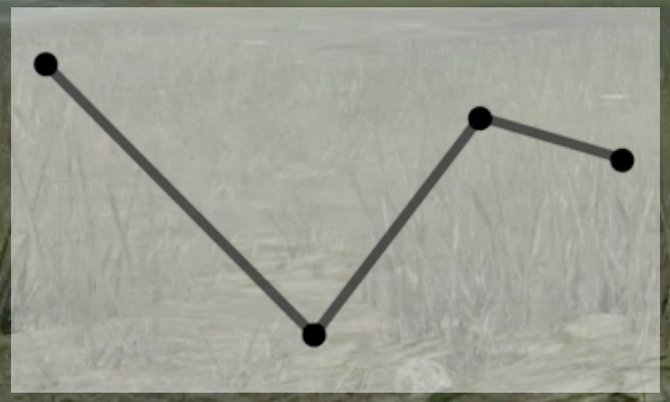
- Bounce gravity



FPS: 60

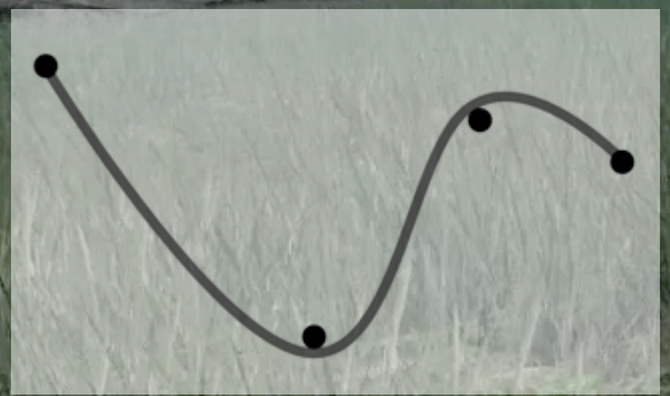
Movement

- Linear interpolation



Movement

- Bicubic interpolation

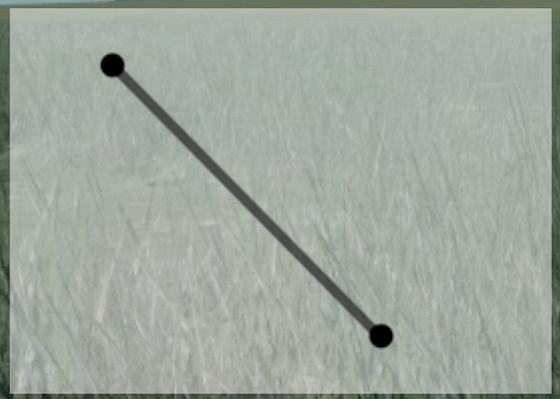


Movement

- Stand/crouch

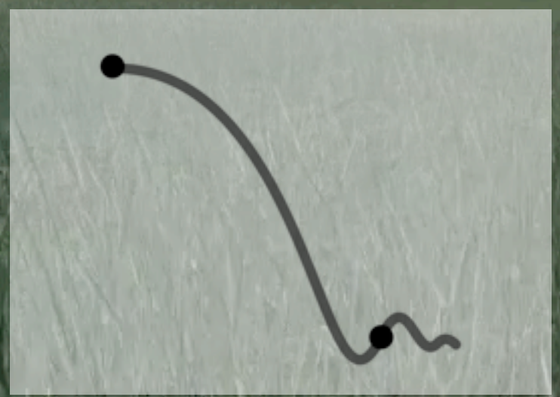
Movement

- Stand/crouch linear



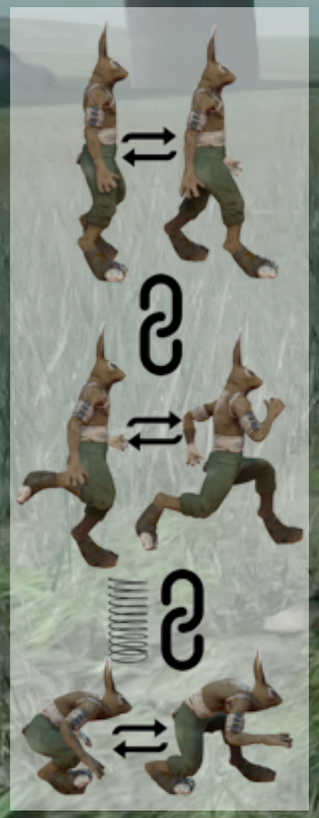
Movement

- Stand/crouch spring



Movement

- Synchronized spring

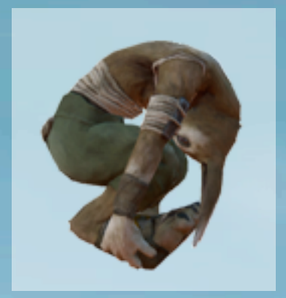


Movement

- Jump landing
- Just use crouch spring

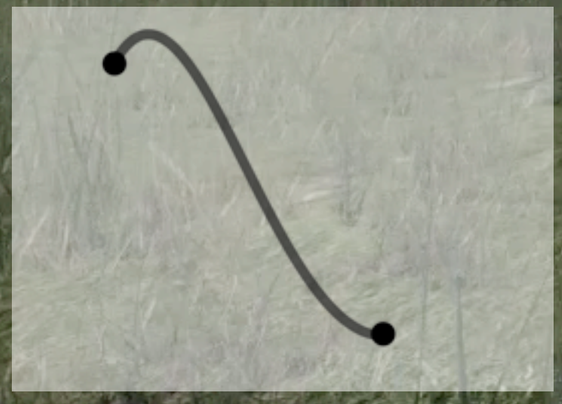
Movement

- Flip linear



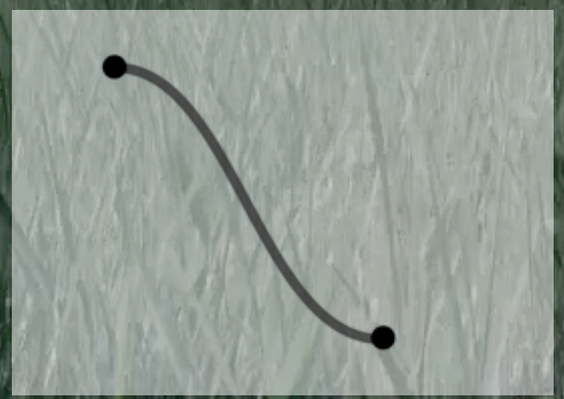
Movement

- Anticipation
- Angular momentum



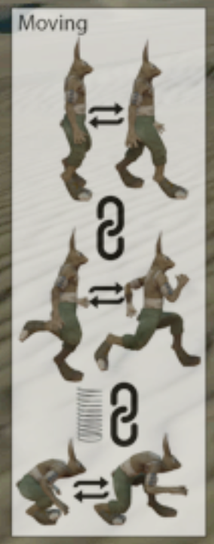
Movement

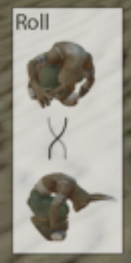
- Roll



Movement

- 13 keyframes





Refinement

- Inverse kinematics

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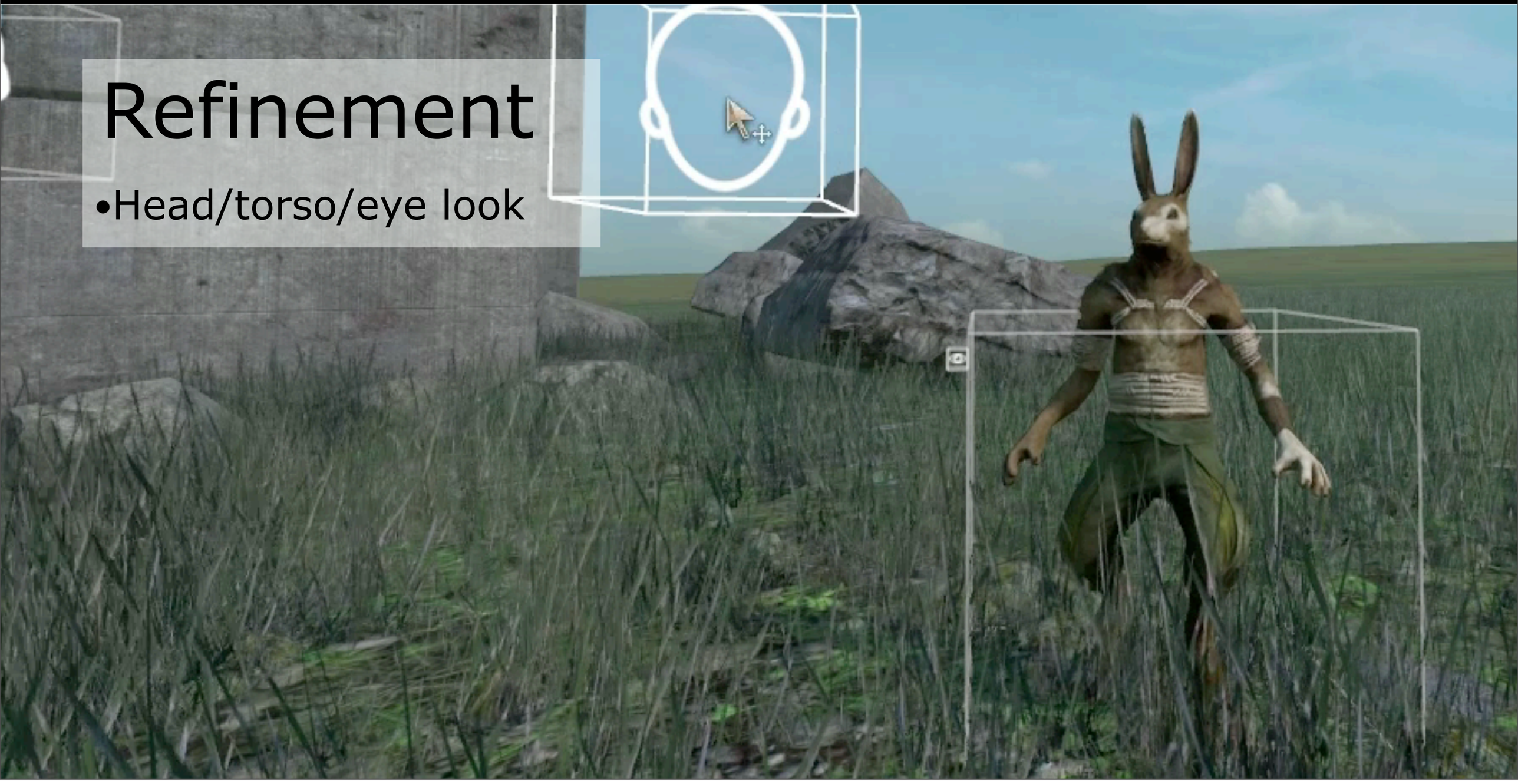
Refinement

- Inverse kinematics

FPS: 60

Refinement

- Head/torso/eye look



Refinement

- Secondary physics

Refinement

- Finding bad situations

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Refinement

- Solving with systems

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Ragdolls

28.8

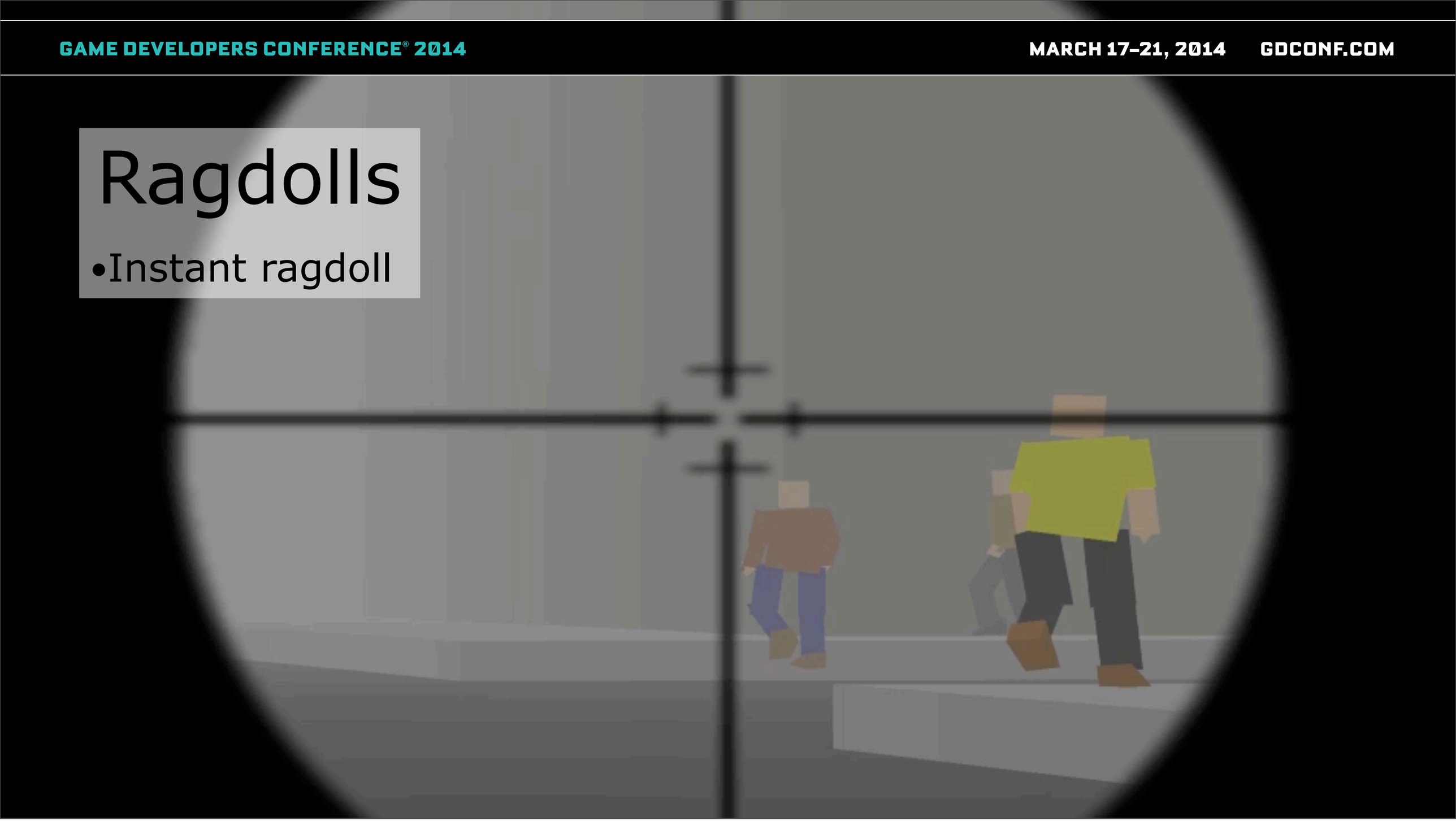
- Box physics

Ragdolls

- Articulated limbs

Ragdolls

- Instant ragdoll



Ragdolls

- Death performance?

Ragdolls

- Delayed ragdoll

Ragdolls

- Active ragdolls
- AI for joint forces
- "Like a ragdoll" test

Ragdolls

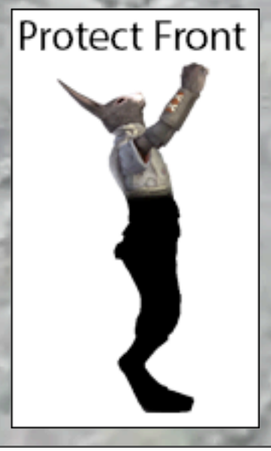
- Pose matching

Ragdolls

- Animation matching

Ragdolls

- Animation tree matching



First-person

- Keyframes

First-person

- Linear interpolation

First-person

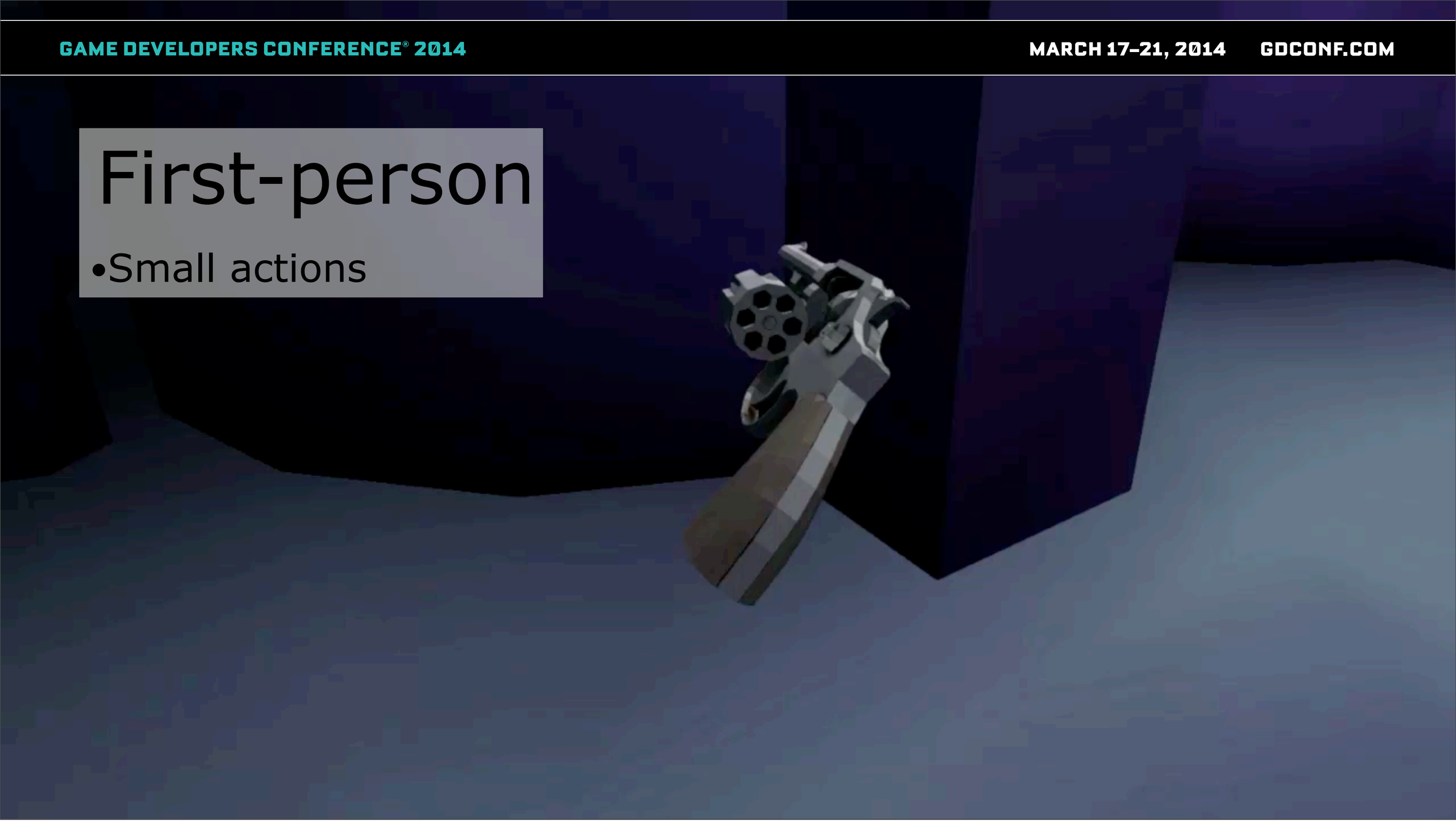
- Spring interpolation

First-person

- Recoil spring

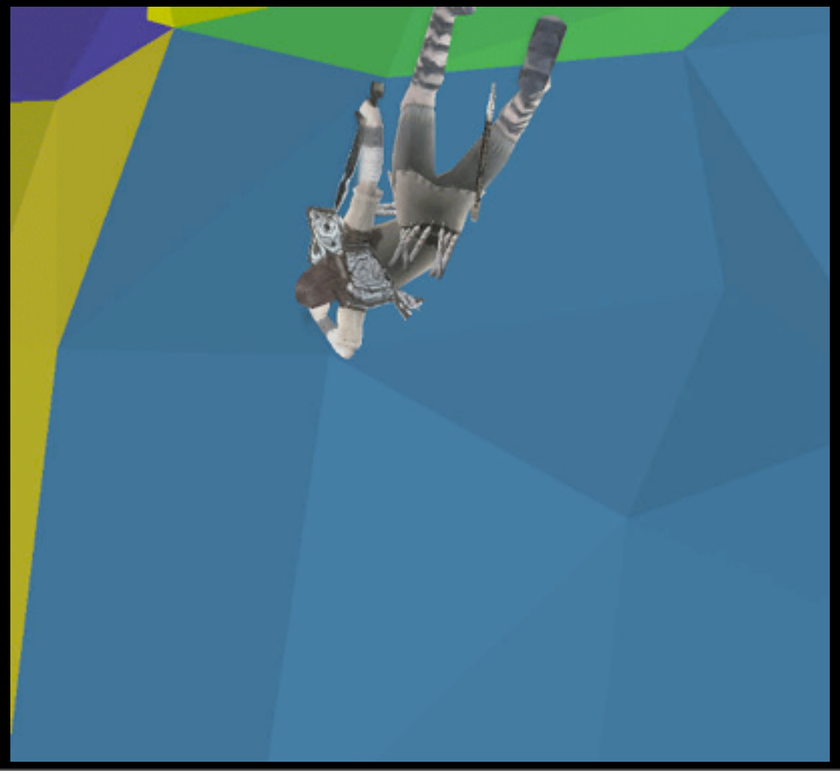
First-person

- Small actions



SOTC

- 2-part spring pendulum
- IK + rotation



Rain World

- Tilts
- “Snake” movement
- Limb IK
- Tail physics

Gang Beasts

- Always active ragdoll
- Invisible support

Future

- Animation and code must work together
- Simple overlapping systems
- Keyframes focus on performance

Thanks for watching!

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Case Studies

- Awkward physics genre

Intrusion 2

- Wolf physics

Topics

- Movement

Topics

- Movement
- Refinement

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Topics

- Movement
- Refinement
- Ragdolls

Topics

- Movement
- Refinement
- Ragdolls
- FPS weapons

Topics

- Movement
- Refinement
- Ragdolls
- FPS weapons
- Case studies

Ragdolls

- Rigid body physics sim
- Box collision with scene

Ragdolls

- Tool to assist animation
- Not replace it

Movement

- Hybrid
- Physics-driven
- Can cancel transitions

Movement

- Analog, 3D
- Tilt into turns
- Tilt to match ground

Movement

- Progress since 1996
- Rendering
- Mocap
- Blending and layering
- Appeal? Consistency?

Movement

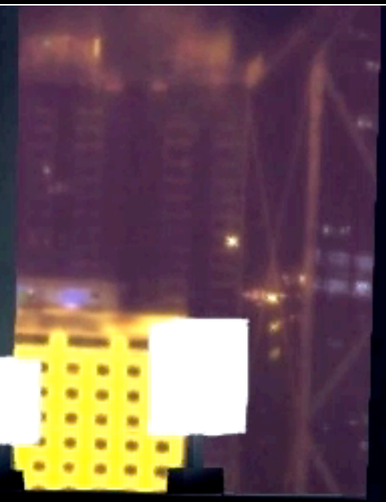
- Character as Vehicle
- Acceleration tilt
- Impact compression

Ragdolls

- Instant ragdoll

First-person

- Flashlight
- What needs to be lit?
- How many hands?



First-person

- Death is important
- Random variation