

Crouch Simulation

Review

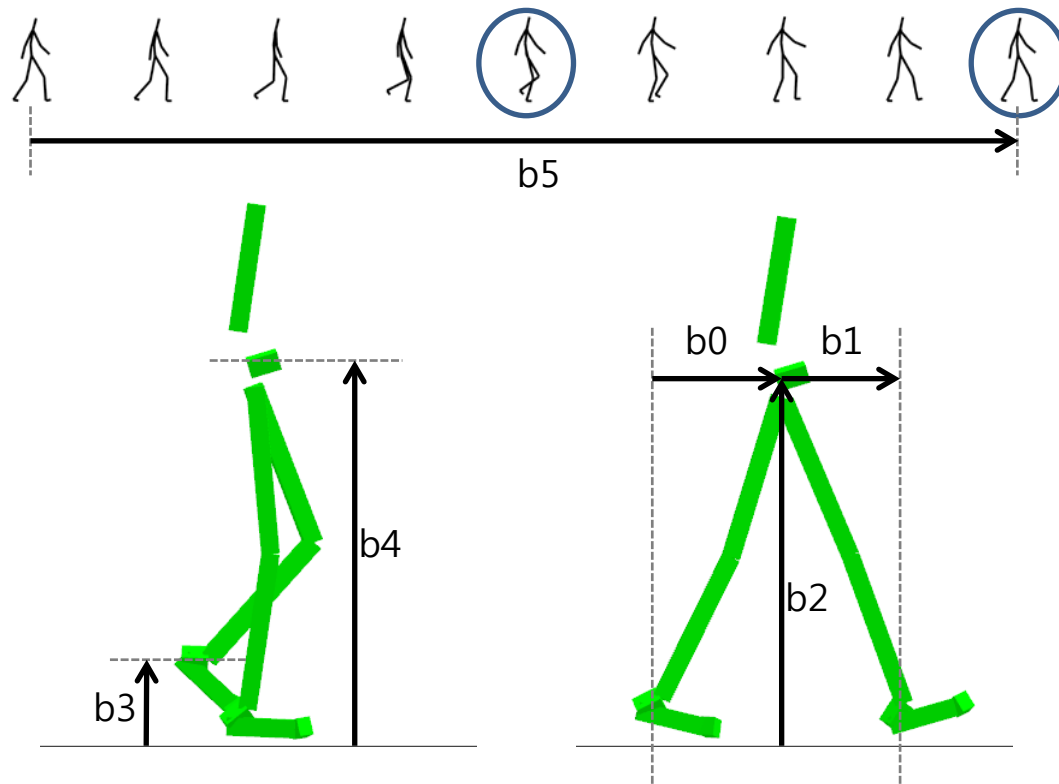
- Crouch 실험의 모션 데이터와 실험조건을 그대로 재현하여 시뮬레이션으로 실험
- Crouch 정도에 따른 안정도가 실제 실험과 같은 경향성으로 나타날 것인가?
- 실제 실험의 결과를 만족하는 하나의 balancing parameter set을 찾아보자

Trouble

- Crouch 실험 모션데이터 후처리
- 후처리한 모션데이터를 이용한 보행시물레이션
- -> 어려움이 존재

New Method

- 하나의 원본 보행 데이터를 이용
- 모션 변형 기술을 이용하여 보행속도, 보폭, 크라우치 정도 등을 변화



Simulation Cases

- pushStep : 몇 번째 걸음에 미는가
- pushDuration : 몇 초동안 미는가
- pushForce : 미는 힘 (N)
- pushTiming : half gait cycle내에서의 미는 시점의 percentage (0 : initial contact)
- stepLength : 원본 모션의 보폭에 대한 실험 모션의 비율
- walkingSpeed : 원본 모션의 한걸음 시간에 대한 실험 모션의 비율 (실제로는 1/보행속도에 비례)
- crouchAngle : 원본 모션의 root 높이에 대한 실험 모션의 비율

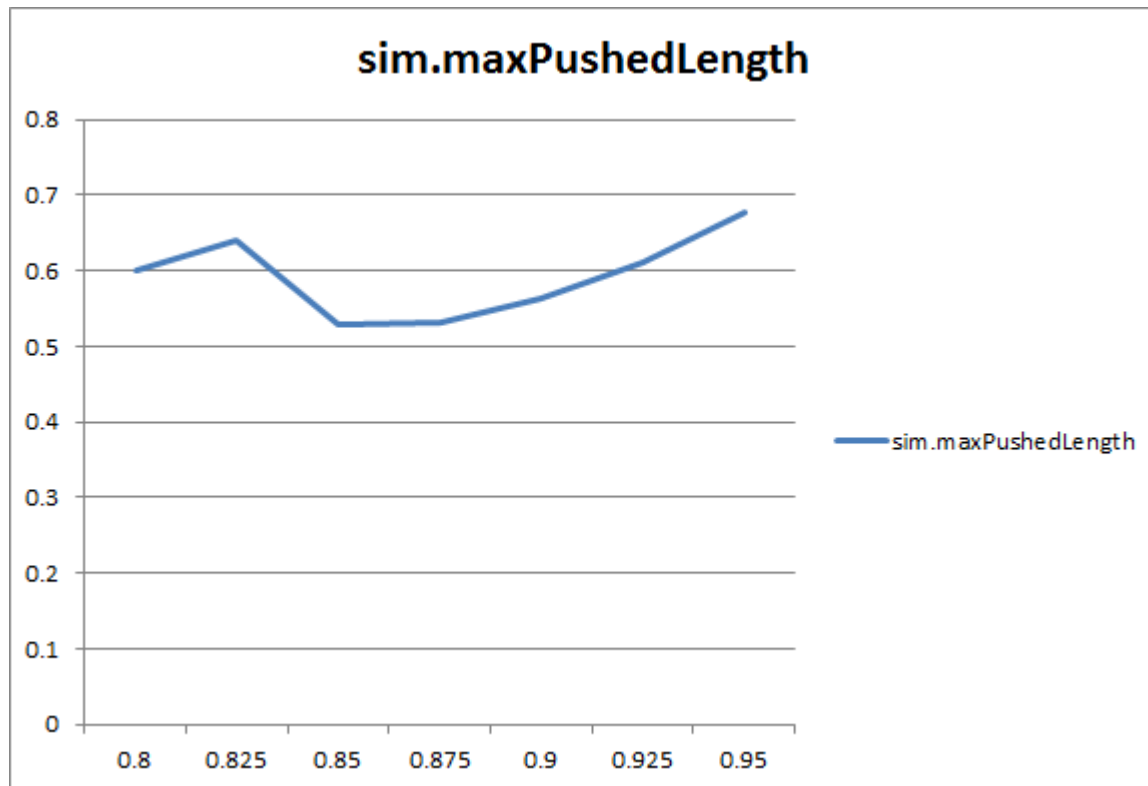
Simulation Cases

- pushStep : 8
- pushDuration : 0.2s
- pushForce : [-50. -100. -150. -200. -250.] N
- pushTiming : [0. 20. 40. 60. 80. 100.] %
- stepLength : [0.5 0.75 1. 1.25 1.5] 배
- walkingSpeed : [0.5 0.75 1. 1.25 1.5] 배
- crouchAngle : [1. 0.975 0.95 0.925 0.9 0.875 0.85 0.825 0.8
0.775 0.75 0.725 0.7] 배
- 총 $1*1*5*6*5*5*13 = 9750$ cases

Result

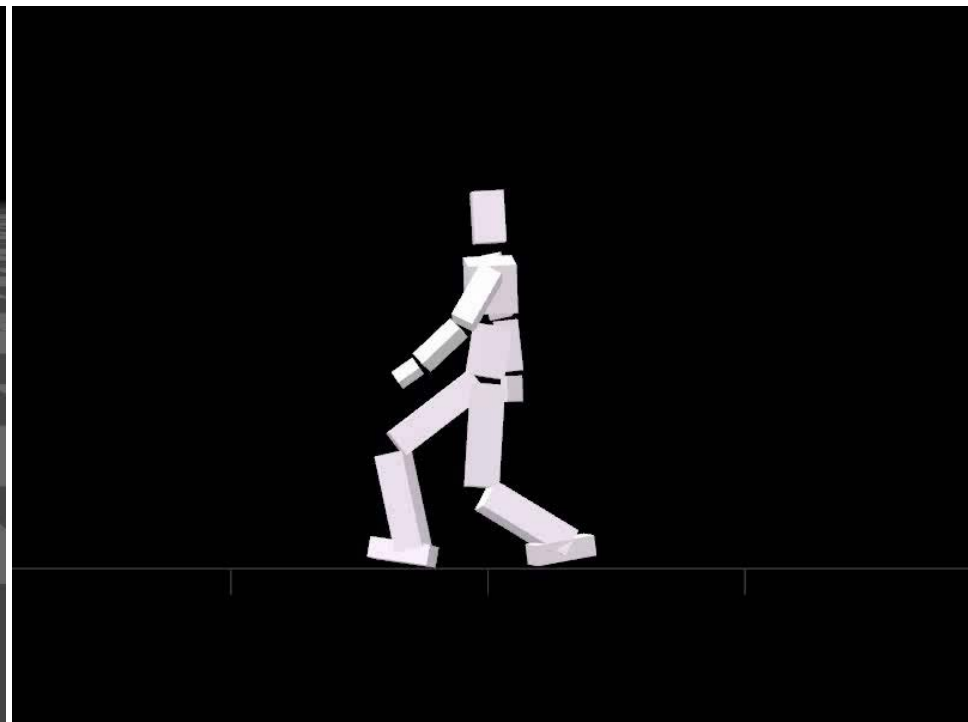
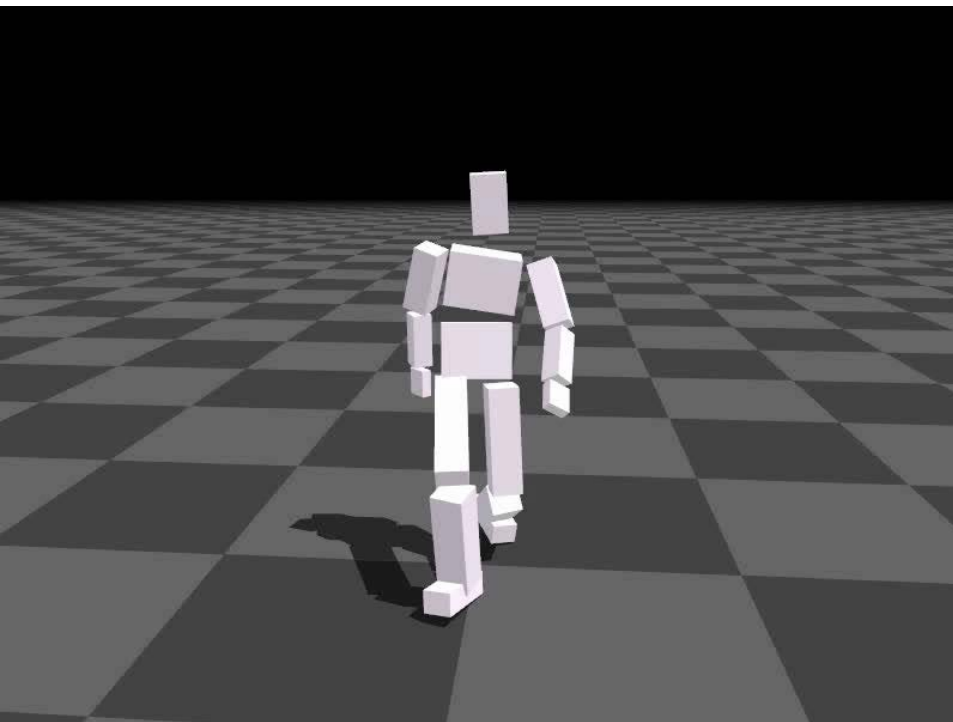
- 전체 case중 약 10% 가량이 넘어지지 않고 결과 측정
- Crouch 정도 - 안정도 관계에 있어 대략의 경향성이 관찰됨

pushStep	pushDuration	pushForce	pushTiming	stepLength	walkingSpeed	crouchAngle	sim.maxPushedLength	sim.maxPushedStep
8	0.2	-100	20	1	1	0.8	0.599098536	5
8	0.2	-100	20	1	1	0.825	0.64032274	5
8	0.2	-100	20	1	1	0.85	0.5288616	5
8	0.2	-100	20	1	1	0.875	0.532525863	3
8	0.2	-100	20	1	1	0.9	0.562587421	3
8	0.2	-100	20	1	1	0.925	0.610548943	5
8	0.2	-100	20	1	1	0.95	0.677966338	5



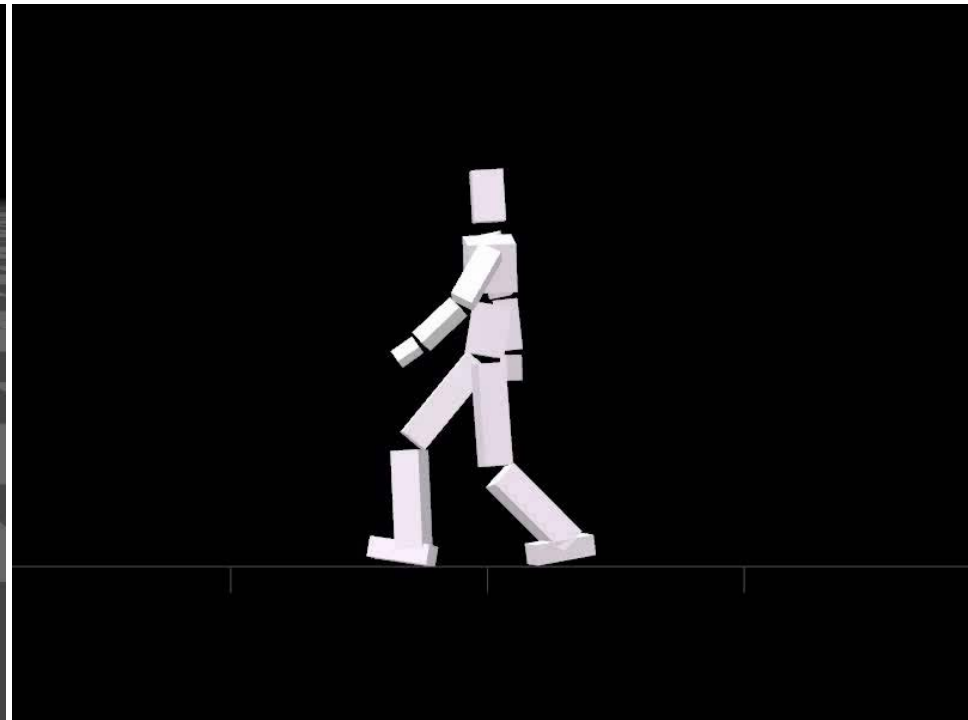
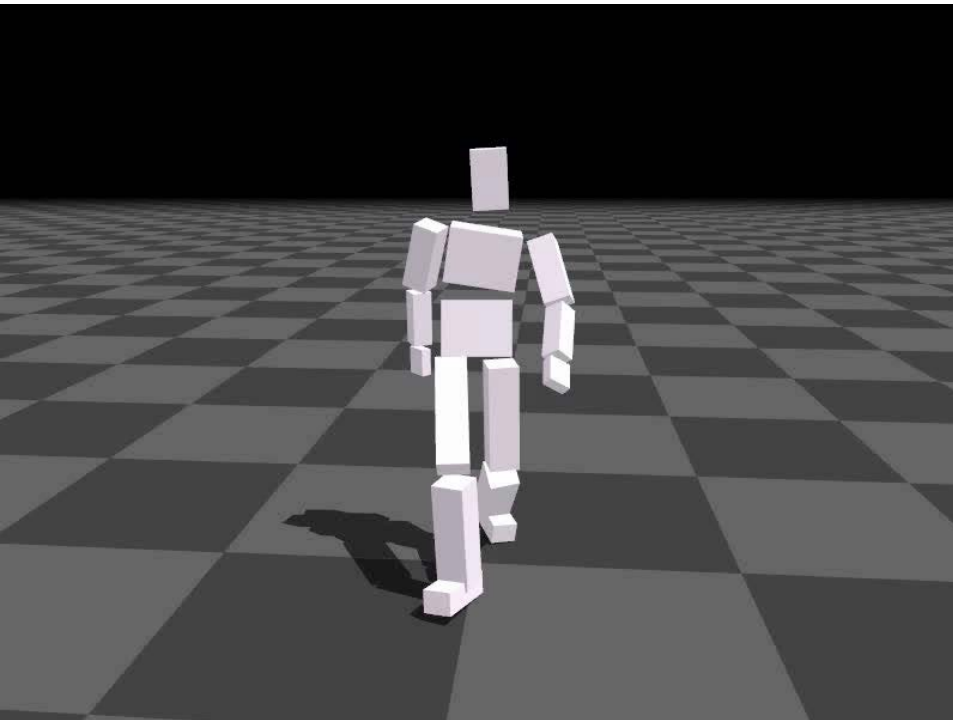
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pushStep	pushDuration	pushForce	pushTiming	stepLength	walkingSpeed	crouchAngle	sim.maxPushedLength	sim.maxPushedStep
8	0.2	-100	20	1	1	0.8	0.599098536	5
8	0.2	-100	20	1	1	0.825	0.64032274	5
8	0.2	-100	20	1	1	0.85	0.5288616	5
8	0.2	-100	20	1	1	0.875	0.532525863	3
8	0.2	-100	20	1	1	0.9	0.562587421	3
8	0.2	-100	20	1	1	0.925	0.610548943	5
8	0.2	-100	20	1	1	0.95	0.677966338	5

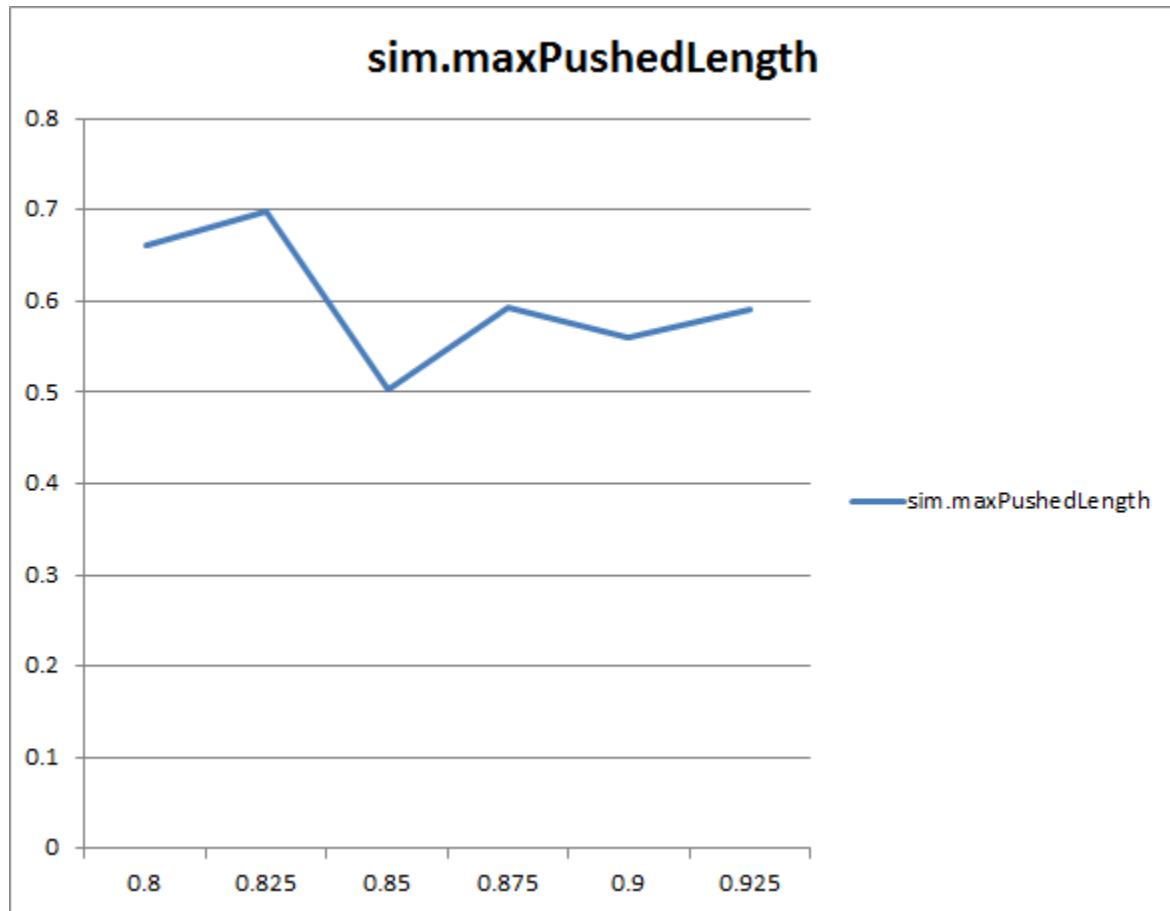


pushStep	pushDuration	pushForce	pushTiming	stepLength	walkingSpeed	crouchAngle	sim.maxPushedLength	sim.maxPushedStep
8	0.2	-100	20	1	1	0.8	0.599098536	5
8	0.2	-100	20	1	1	0.825	0.64032274	5
8	0.2	-100	20	1	1	0.85	0.5288616	5
8	0.2	-100	20	1	1	0.875	0.532525863	3
8	0.2	-100	20	1	1	0.9	0.562587421	3
8	0.2	-100	20	1	1	0.925	0.610548943	5
8	0.2	-100	20	1	1	0.95	0.677966338	5

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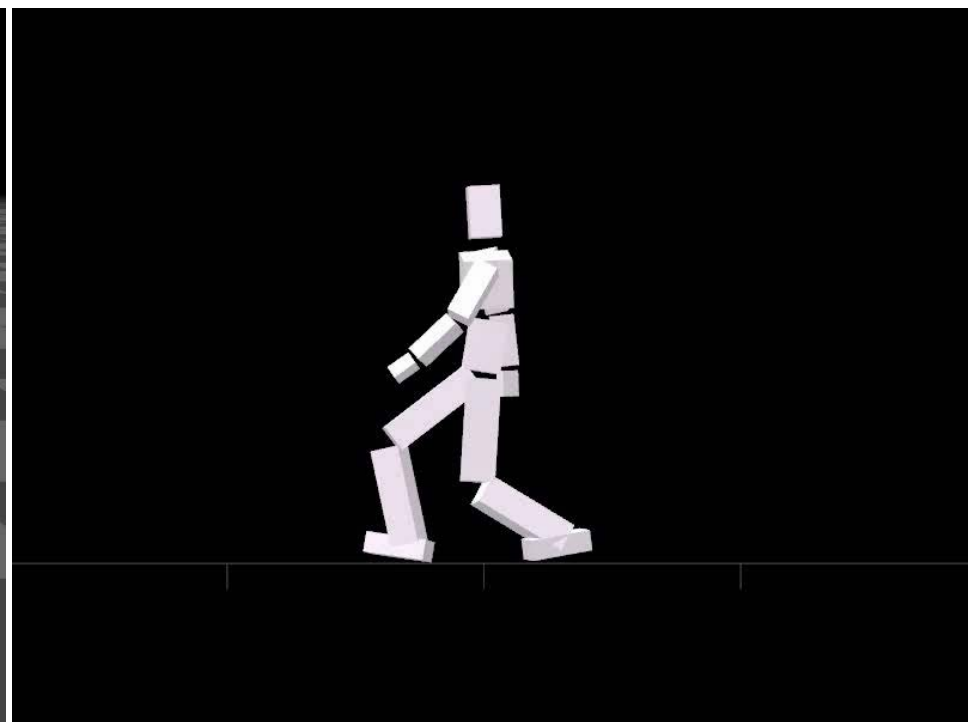
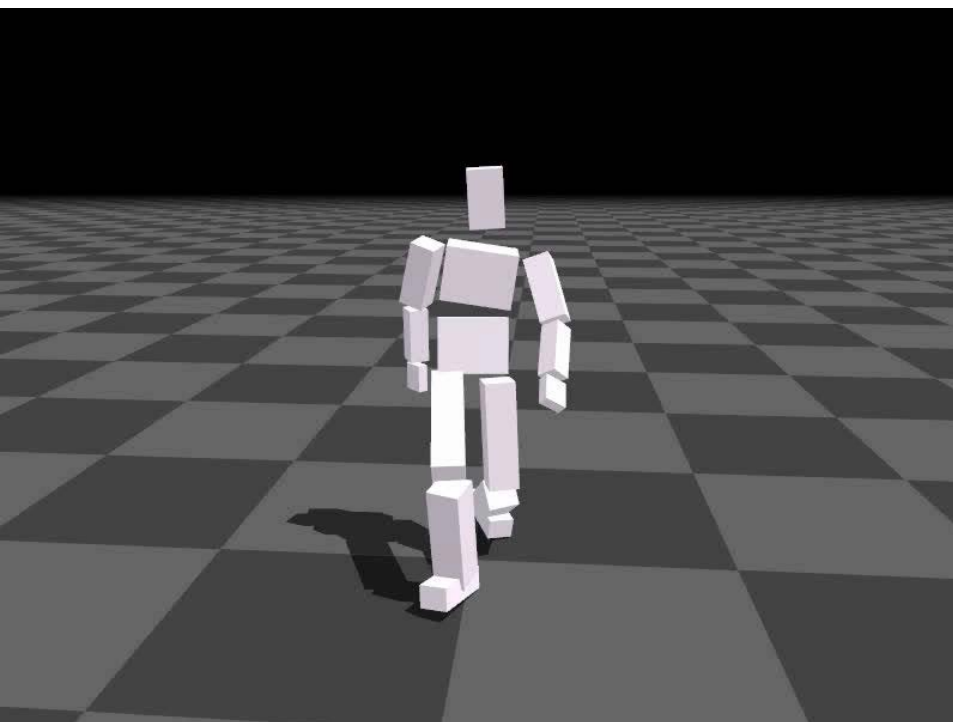


pushStep	pushDuration	pushForce	pushTiming	stepLength	walkingSpeed	crouchAngle	sim.maxPushedLength	sim.maxPushedStep
8	0.2	-100	60	1	1	0.8	0.66121	5
8	0.2	-100	60	1	1	0.825	0.69778	5
8	0.2	-100	60	1	1	0.85	0.502332	5
8	0.2	-100	60	1	1	0.875	0.593992	5
8	0.2	-100	60	1	1	0.9	0.559669	3
8	0.2	-100	60	1	1	0.925	0.59152	5

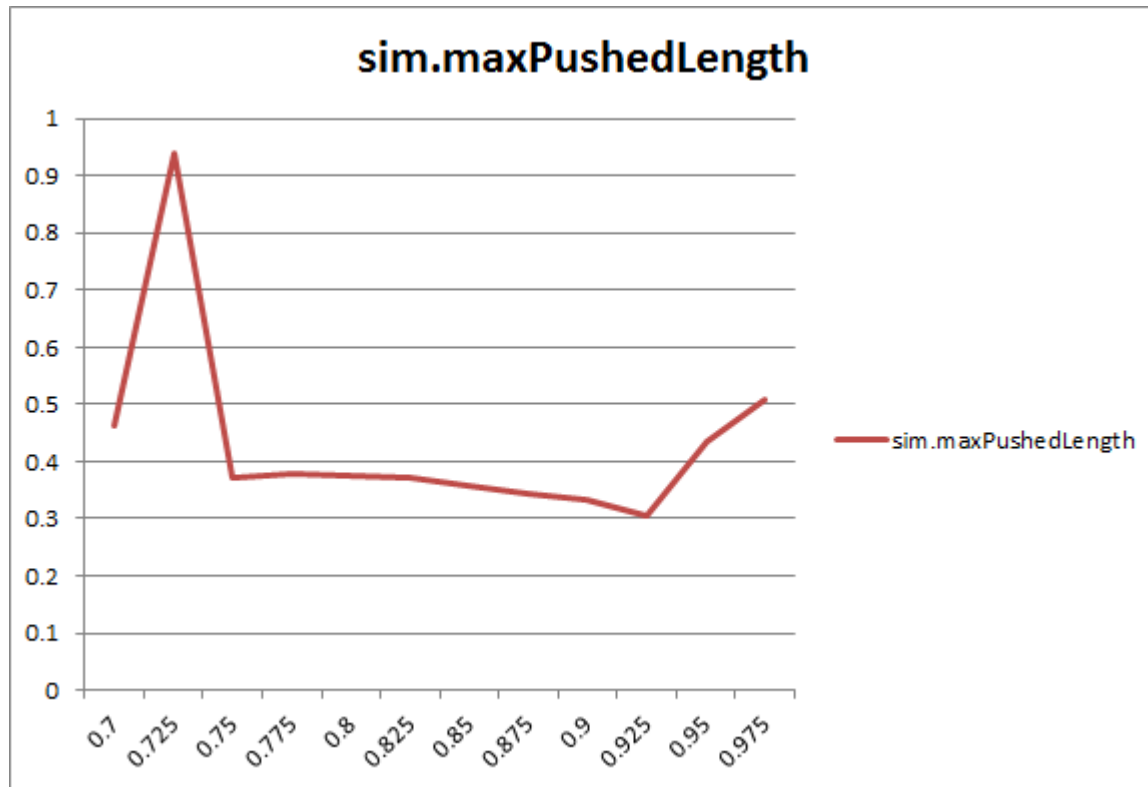


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pushStep	pushDuration	pushForce	pushTiming	stepLength	walkingSpeed	crouchAngle	sim.maxPushedLength	sim.maxPushedStep
8	0.2	-100	60	1	1	0.8	0.66121	5
8	0.2	-100	60	1	1	0.825	0.69778	5
8	0.2	-100	60	1	1	0.85	0.502332	5
8	0.2	-100	60	1	1	0.875	0.593992	5
8	0.2	-100	60	1	1	0.9	0.559669	3
8	0.2	-100	60	1	1	0.925	0.59152	5



pushStep	pushDuration	pushForce	pushTiming	stepLength	walkingSpeed	crouchAngle	sim.maxPushedLength	sim.maxPushedStep
8	0.2	-100	20	0.75	0.75	0.7	0.464061934	9
8	0.2	-100	20	0.75	0.75	0.725	0.937550685	5
8	0.2	-100	20	0.75	0.75	0.75	0.372461771	3
8	0.2	-100	20	0.75	0.75	0.775	0.379645846	3
8	0.2	-100	20	0.75	0.75	0.8	0.375971274	3
8	0.2	-100	20	0.75	0.75	0.825	0.372837498	3
8	0.2	-100	20	0.75	0.75	0.85	0.357979875	3
8	0.2	-100	20	0.75	0.75	0.875	0.342025721	3
8	0.2	-100	20	0.75	0.75	0.9	0.332337159	3
8	0.2	-100	20	0.75	0.75	0.925	0.304208089	3
8	0.2	-100	20	0.75	0.75	0.95	0.43314499	5
8	0.2	-100	20	0.75	0.75	0.975	0.507829897	7



pushStep	pushDuration	pushForce	pushTiming	stepLength	walkingSpeed	crouchAngle	sim.maxPushedLength	sim.maxPushedStep
8	0.2	-100	20	0.75	0.75	0.7	0.464061934	9
8	0.2	-100	20	0.75	0.75	0.725	0.937550685	5
8	0.2	-100	20	0.75	0.75	0.75	0.372461771	3
8	0.2	-100	20	0.75	0.75	0.775	0.379645846	3
8	0.2	-100	20	0.75	0.75	0.8	0.375971274	3
8	0.2	-100	20	0.75	0.75	0.825	0.372837498	3
8	0.2	-100	20	0.75	0.75	0.85	0.357979875	3
8	0.2	-100	20	0.75	0.75	0.875	0.342025721	3
8	0.2	-100	20	0.75	0.75	0.9	0.332337159	3
8	0.2	-100	20	0.75	0.75	0.925	0.304208089	3
8	0.2	-100	20	0.75	0.75	0.95	0.43314499	5
8	0.2	-100	20	0.75	0.75	0.975	0.507829897	7

(id 335)

