MeJ Makers 26’ Spring School

Multi-agent crowd simulation - Learning week in Pertuis activity
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This document is the course material for the activity 10 (Multi-agent crowd simulation - Learning week in Pertuis) in the framework of the Erasmus+ KA210 Small-scale partnerships in school education project ***MeJ Makers****. 2023-2-FR01-KA210-SCH-000176068*

The electronic version is an interactive document delivered under the Wolfram Notebook format. Read it or interact with it can be done with the help of the freely available Wolfram Player.

Introduction

Bases of simulation : Vectors, Position, Velocity, Acceleration

Adding a bit of Physics to simulation

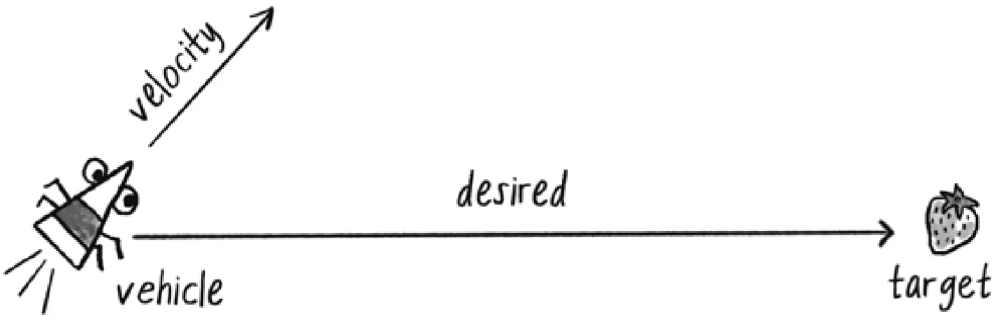
Reaching a target, Following a Path

Steering Force : seeking a target

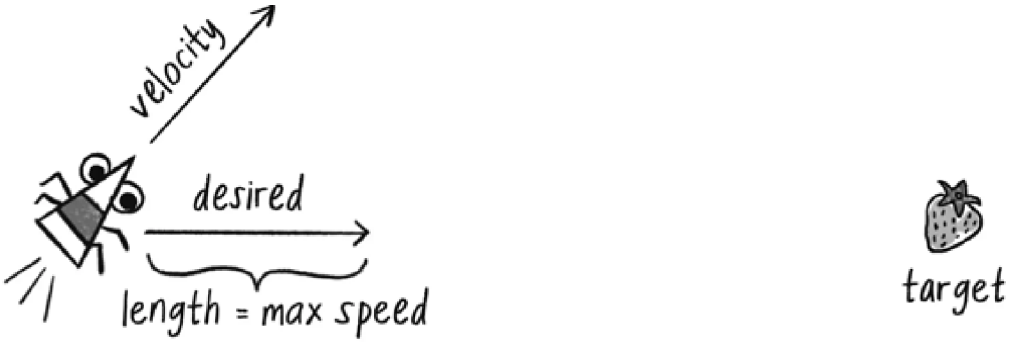
idea


velocity
vehicle
target

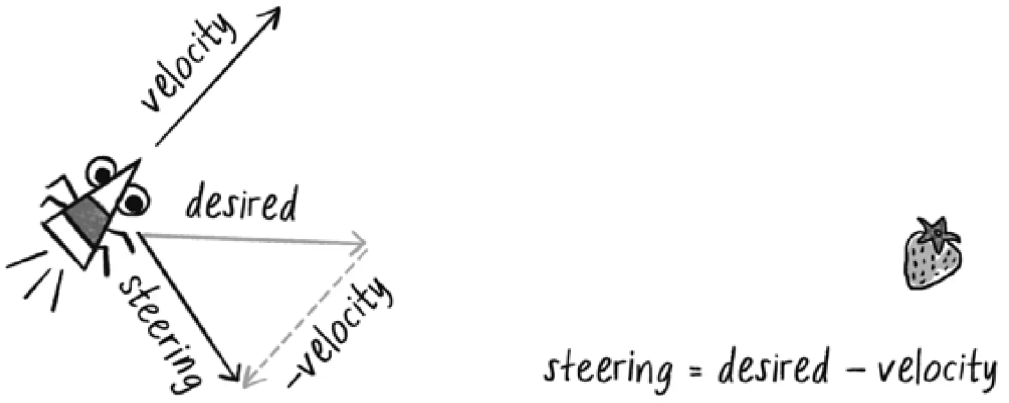
2.


velocity
desired
vehicle
target

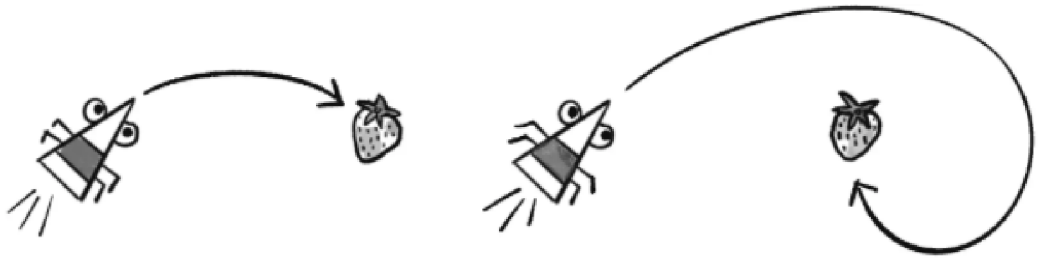
3.


velocity
desired
length = max speed
target

4.


velocity
desired
steering
velocity
steering = desired – velocity

results



Do It Yourself

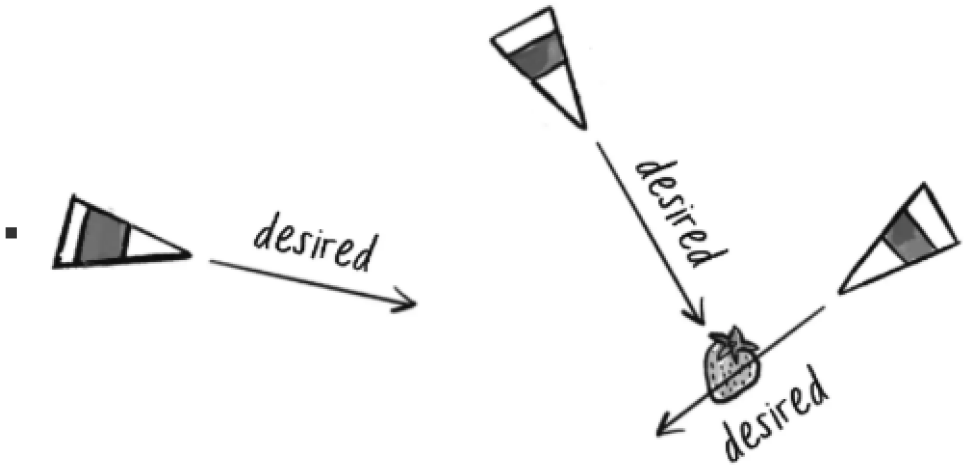
Go to the collection of today's course : https://editor.p5js.org/ypapegay/collections/px1m1ZvpU

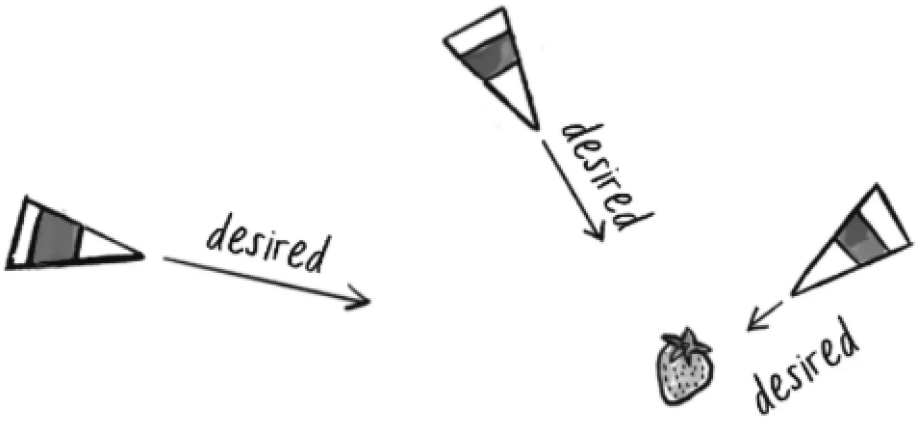
Steering force

Based on the sketch "Steering Force", implement a fleeing steering behavior i.e. where the desired velocity is the same as seek, but pointed in the opposite direction (solution is sketch "Fleeing Steering Force").

Implement a seeking behavior with a moving target, often referred to as pursuit. In this case, your desired vector won't point toward the object's current position, but rather its future position as extrapolated from its current velocity solution is sketch "Pursuit").

Arriving to a target





Do It Yourself

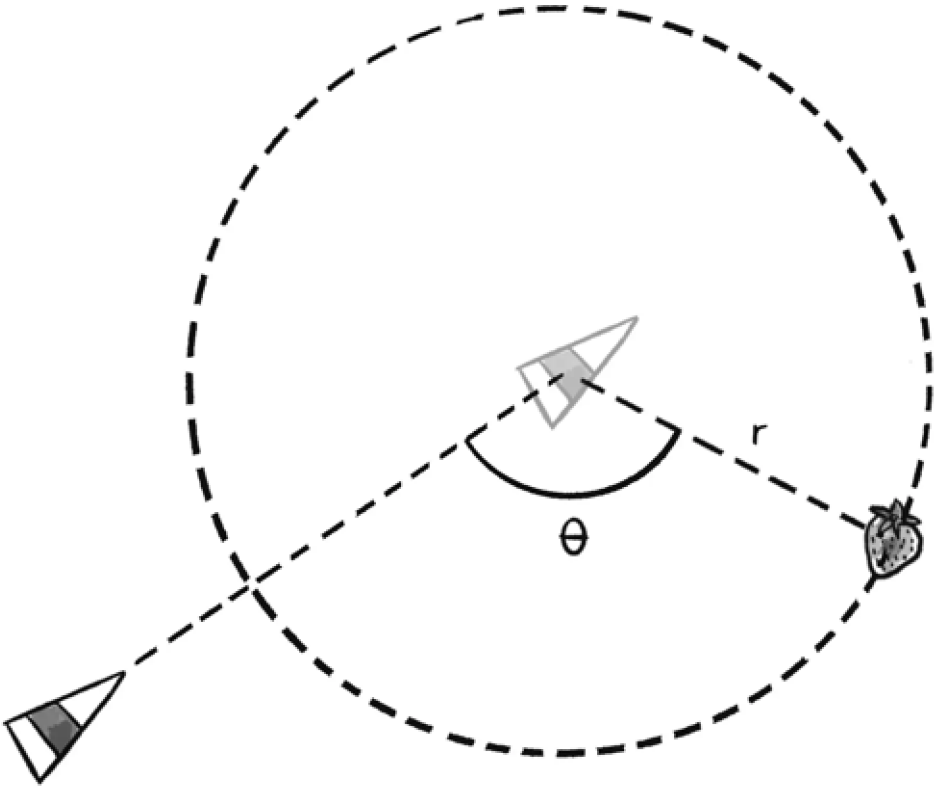
Arriving

Explore the sketch “Arrive” to see how the agent stop when reaching the target.

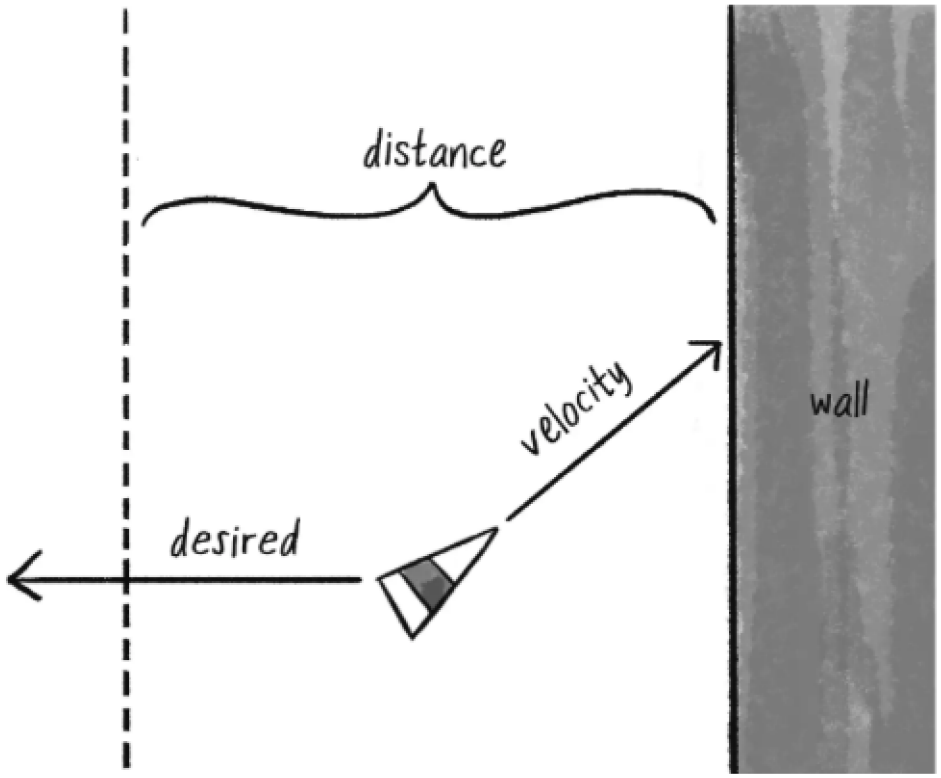
Other behaviors

Wandering

Wandering is a type of random steering which has some long-term order: the steering direction on one frame is related to the steering direction on the next frame. This produces more interesting motion than, for example, simply generating a random steering direction each frame.



Stay within Walls



Do It Yourself

Wandering

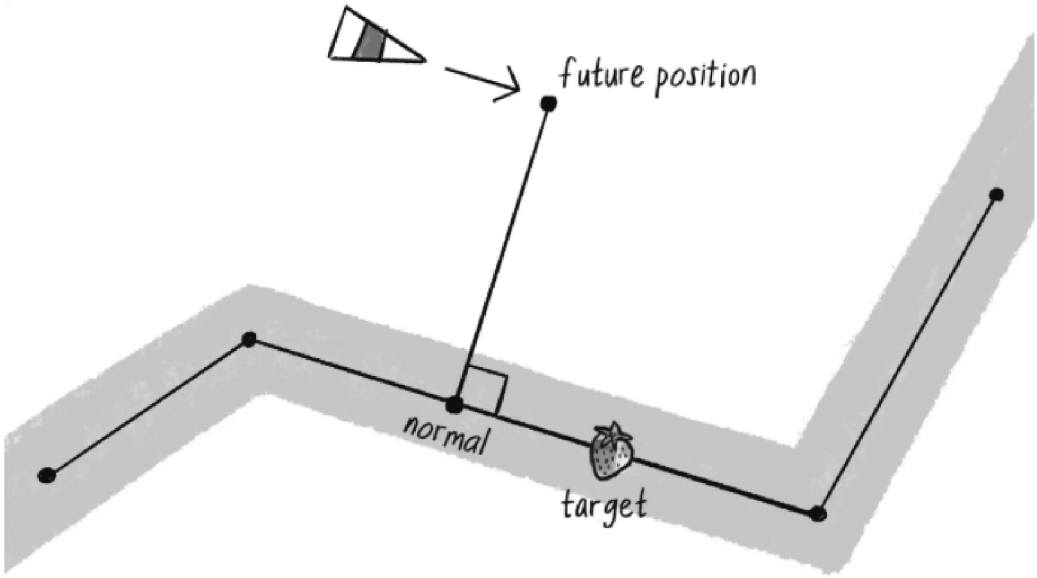
Explore the sketch “Wandering” to understand the random wandering.

Stay within Walls

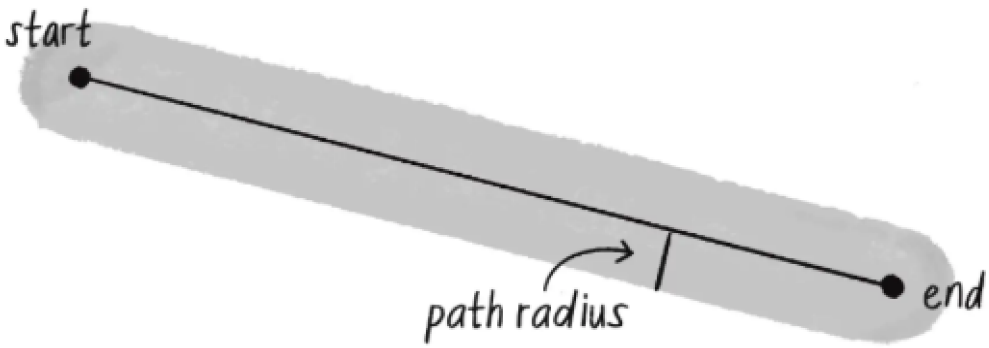
Explore the sketch “Stay within Walls” to understand how it works.

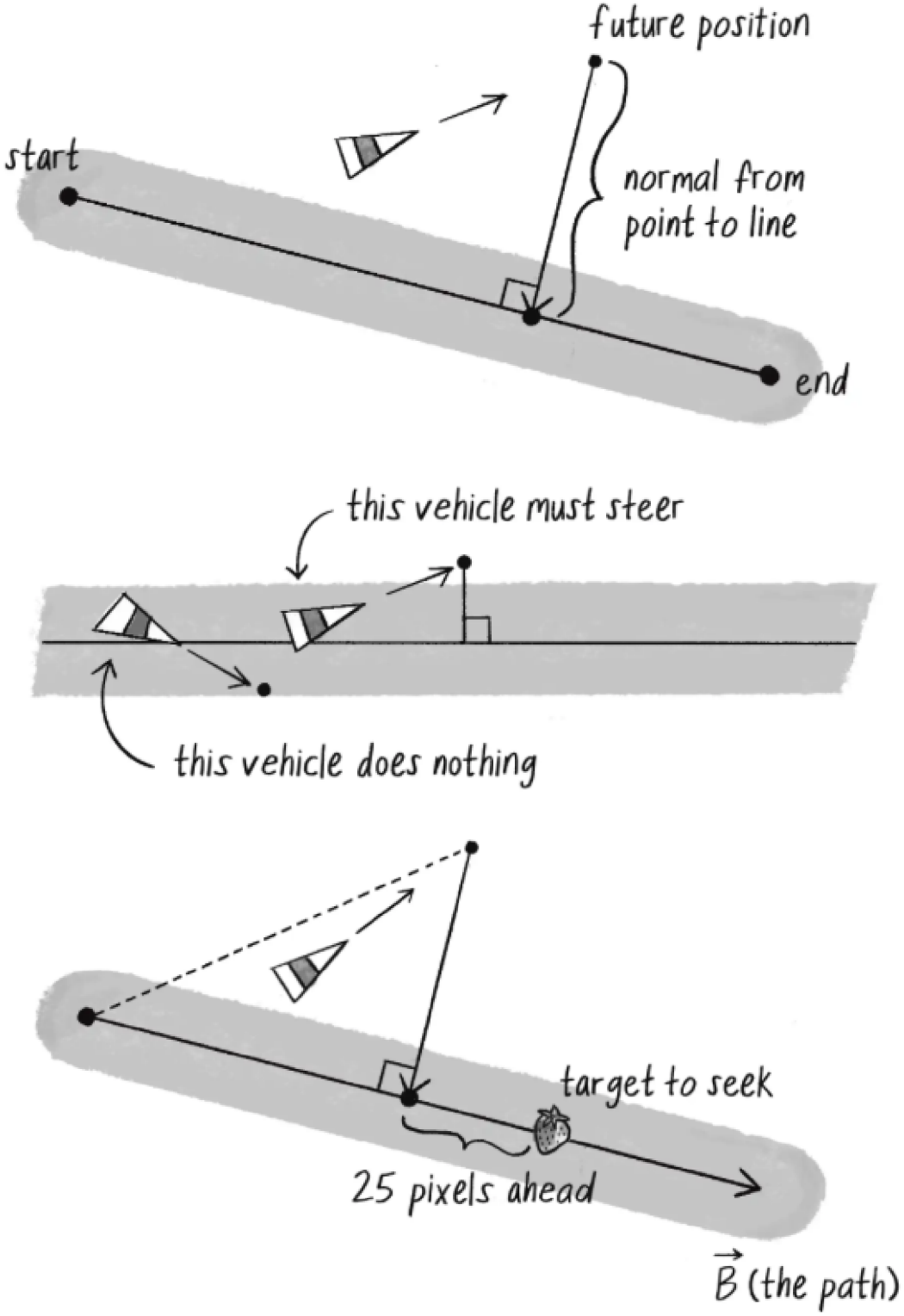
Based on the two previous sketch, develop a sketch where several agents are wandering staying within walls.

Following a Path



What is a path ?




future position
start
normal from
point to line
end
this vehicle must steer
this vehicle does nothing
target to seek
25 pixels ahead
$\vec{B}$ (the path)

Do It Yourself

Following a path

Explore the sketch “Path following” to understand.

Flocking : Separation, Alignment, Cohesion