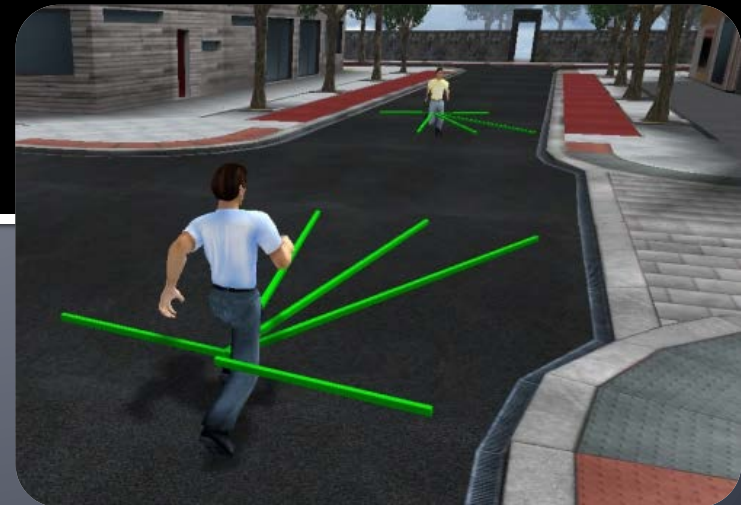Faculty of Mathematics and Physics
Charles University in Prague
17th March 2015

UT2004 & UE2 bots made easy!

Pogamut 3

Lecture 4 – Steering Behaviors
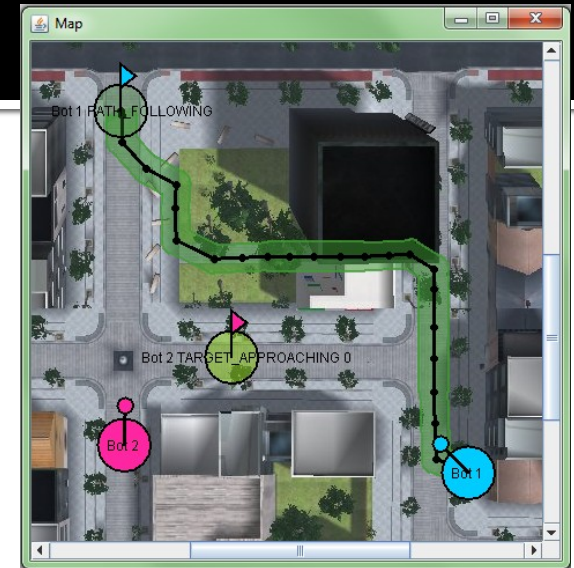
Setup

- Start downloading SteeringGame 2.0 ZIP
  - http://goo.gl/gm02RT

- Unzip it into D:\

Warm Up!

- Fill the short test for this lessons
  - 10 minutes limit
  - http://goo.gl/90jOri

- Permanent link
  - https://docs.google.com/forms/d/1Cz5pgWc5CtCG6_z3ADSbmfRchvF1tR5IFCQbtiWaGs4/viewform

Today's menu

- Tag Tournament Results
- Steerings
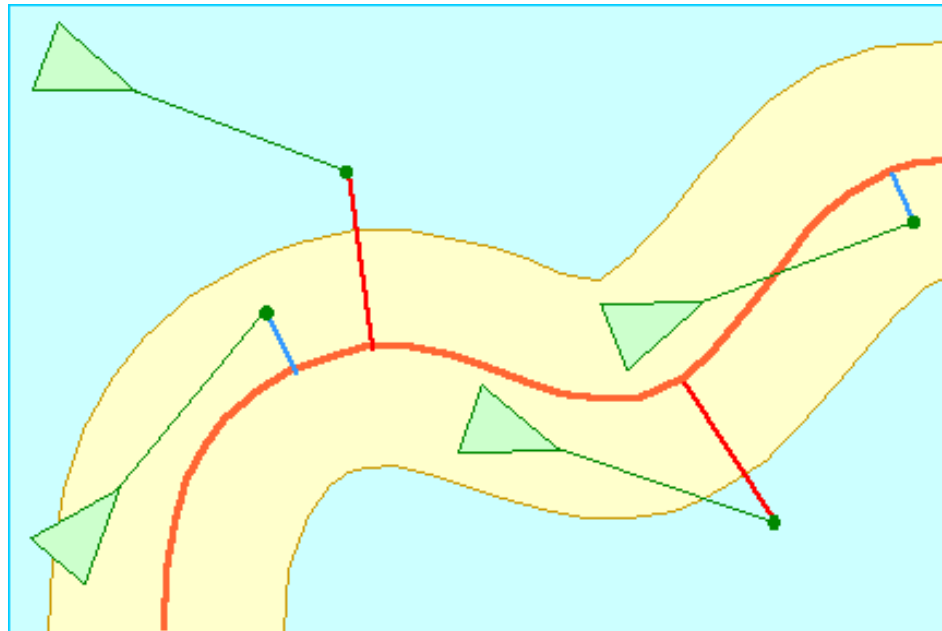 - Steering Game
- Steering Assignment

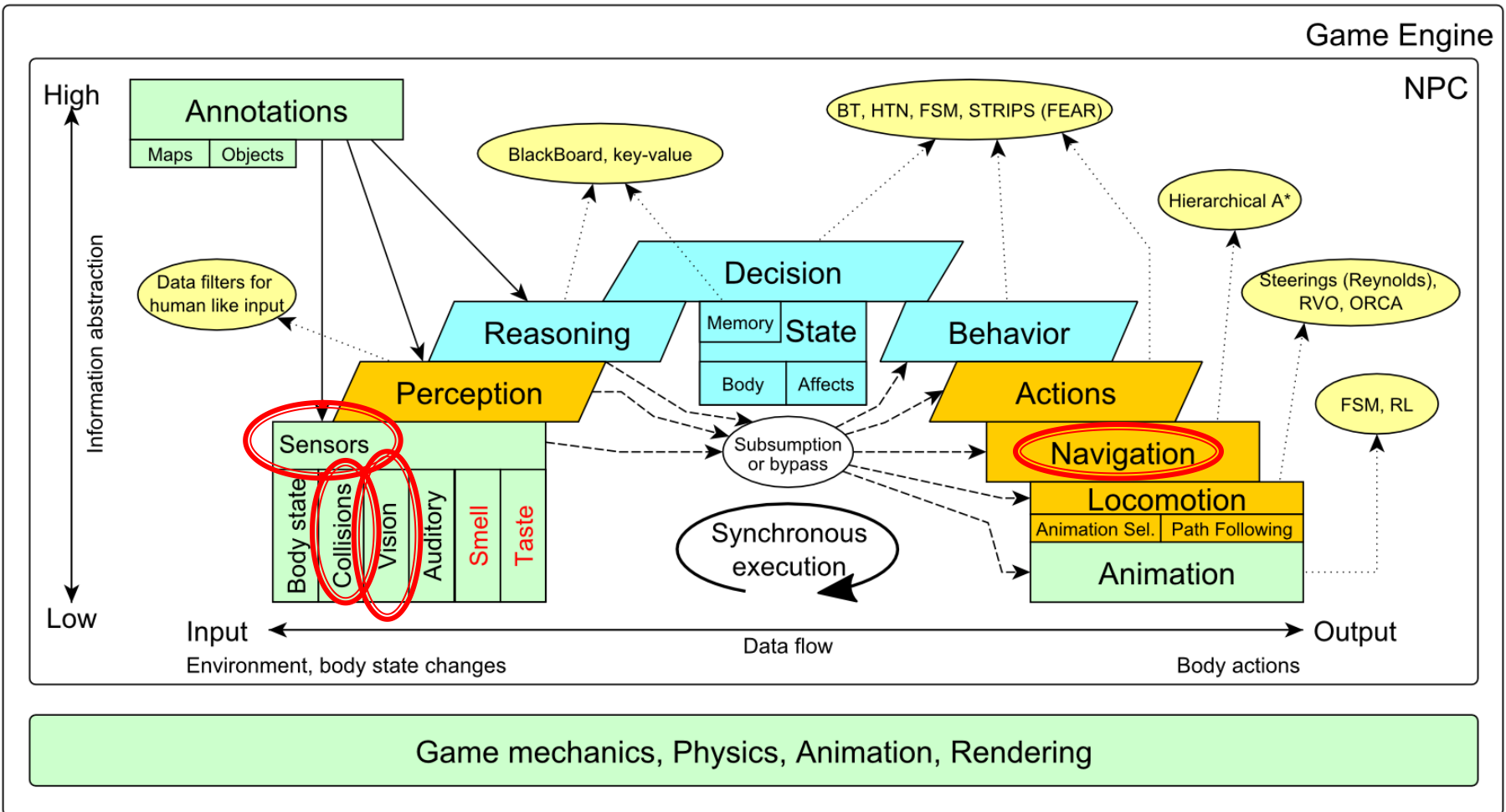# What is Steering?

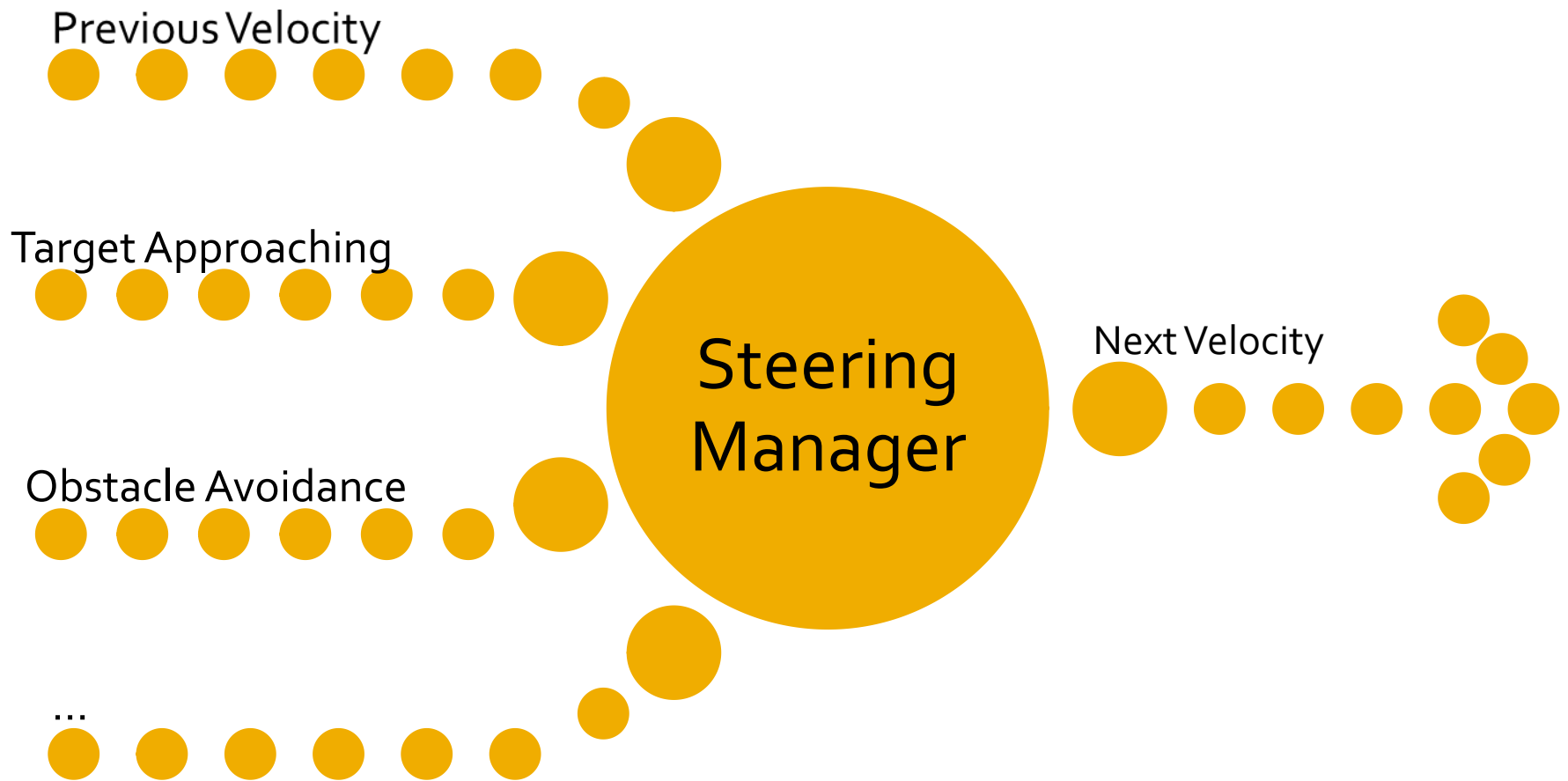… Google: reynolds steering ☺
- Craig Reynolds
  - http://www.red3d.com/cwr/steer/

Big Picture
Today

| NPC component | NPC Layer | Simulation | Low-level reasoning | High-level reasoning | INDUSTRY STATE OF THE ART |

Steering Schema

Previous Velocity

Target Approaching

Obstacle Avoidance

...

Steering Manager

Next Velocity

Steering Schema

Previous Velocity v_t weight w_0

Target Approaching s_1 weight w_1

$$\frac{w_0 \cdot v_{t-1} + \sum_{i \in I}(w_i \cdot s_i)}{w_0 + \sum_{i \in I} w_i}$$

Next Velocity v_{t+1}

Obstacle Avoidance s_2 weight w_2

...

$$I = \{i = 1, \dots, n \mid s_i \neq 0\}$$
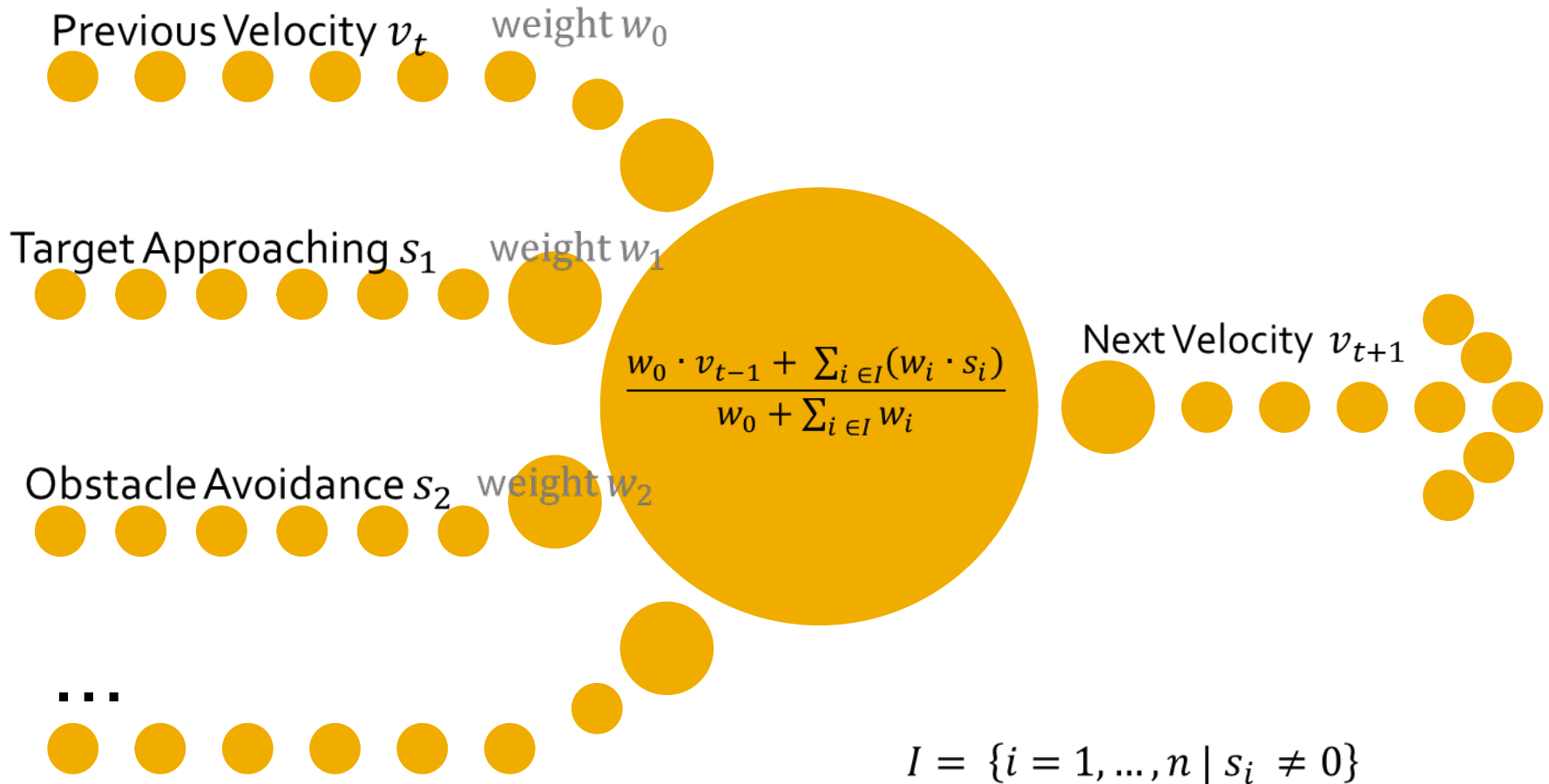
Steering Game

- Steering Tool & Steering Game website
  - http://goo.gl/NQsDrG
  - Contains explanation how to work with the game!

- SteeringGame 2.0 Installer
  - http://goo.gl/JE6uh0

- SteeringGame 2.0 ZIP
  - http://goo.gl/gm02RT

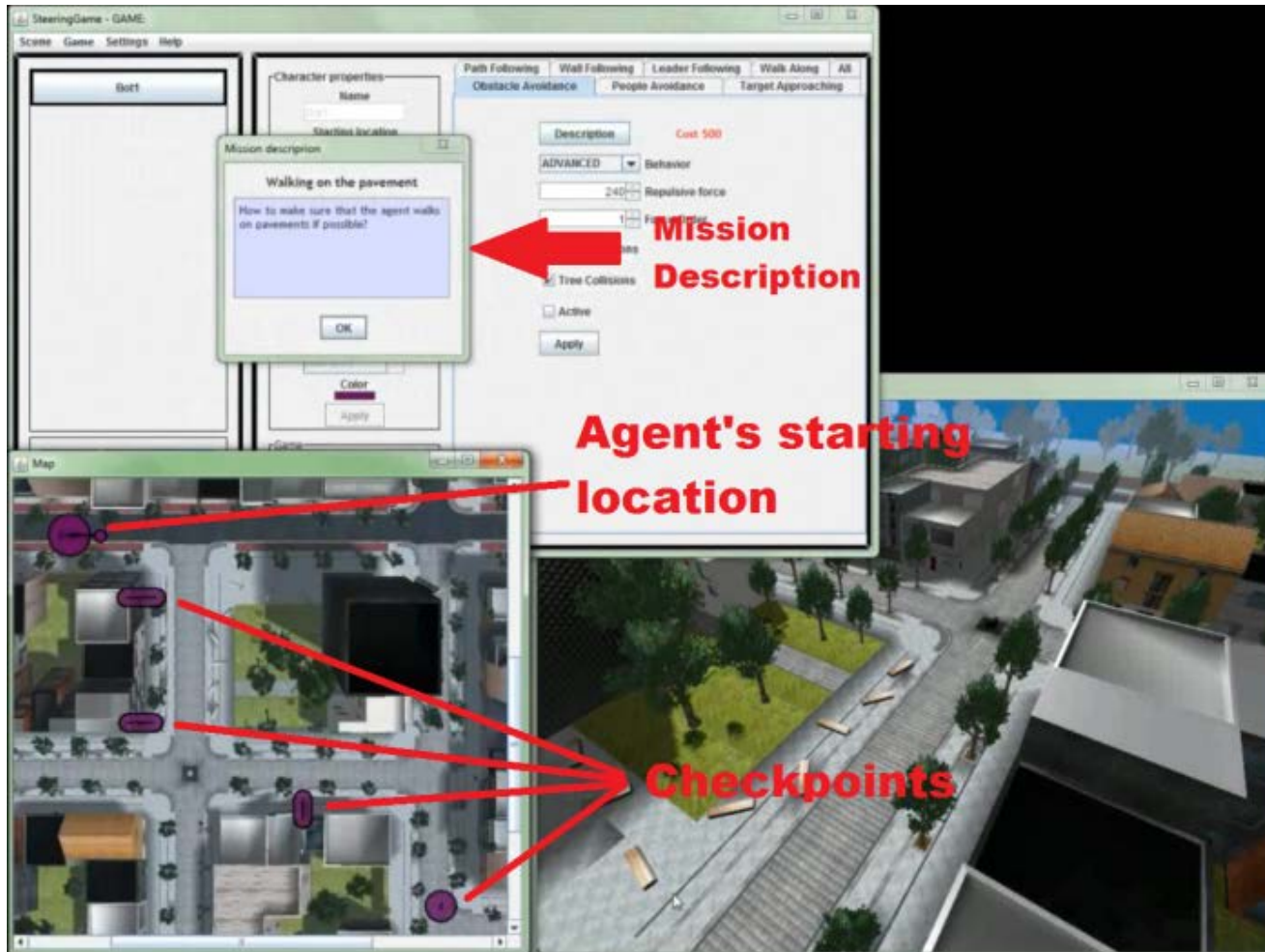- Files used in this lesson : PracticalsScenes
  - http://goo.gl/PlIlzE

Steering Game
Starting the game

- You need to run 3 files in this order

1. Server. You will find it in the directory with the installed SteeringGame:
   - **`d:\SteeringGame2.0\StartServer.bat`**
   or
   - **`d:\SteeringGame2.0\UnrealEngine2RuntimeDemo\System\start EmohawkServer.bat`**
   - If the window about allowing communication of UCC appears, confirm Allow access.

2. 3D virtual environment (UE2Runtime). It will be in the same directory:
   - **`d:\SteeringGame2.0\StartClient.bat`**
   or
   - **`d:\SteeringGame2.0\UnrealEngine2RuntimeDemo\System\start UE2Runtime.bat`**
   - Wait 10s and then confirm OK. When the environments is loaded, press Esc.

3. The SteeringGame. Run the file:
   - **d:\SteeringGame2.0\SteeringGame.exe**
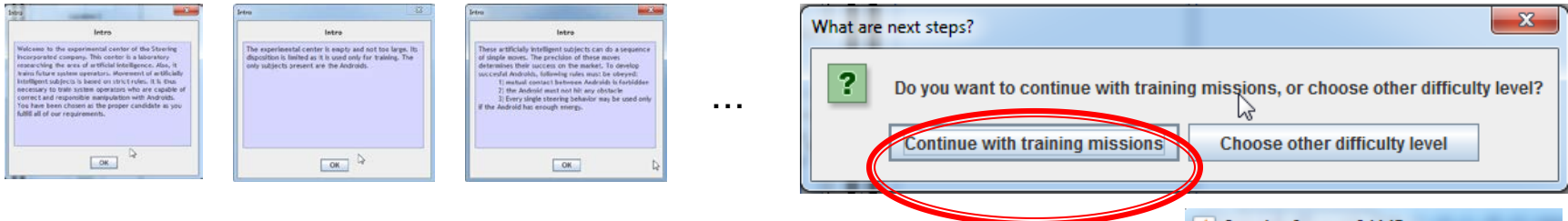   - Loading could last some time (about 1 min).
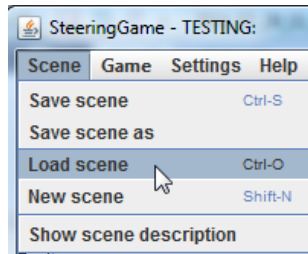
Steering Game
How it looks like

- Once you have Steering Game up-and-running

1. Ok, ok, ok... Continue with training mission

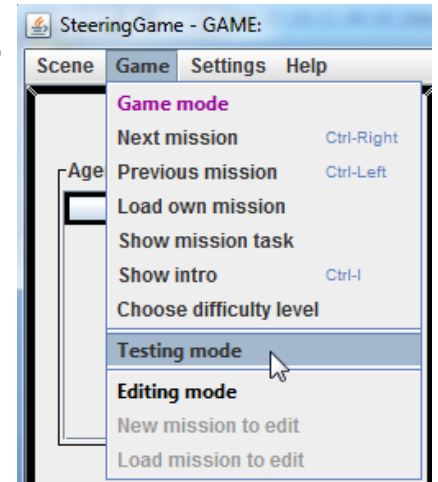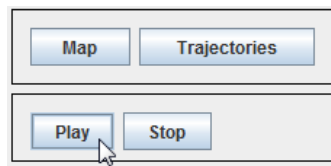2. Then switch to TESTING MODE -------->

3. Load first scene file
   - `OA_front_a_p.xml`
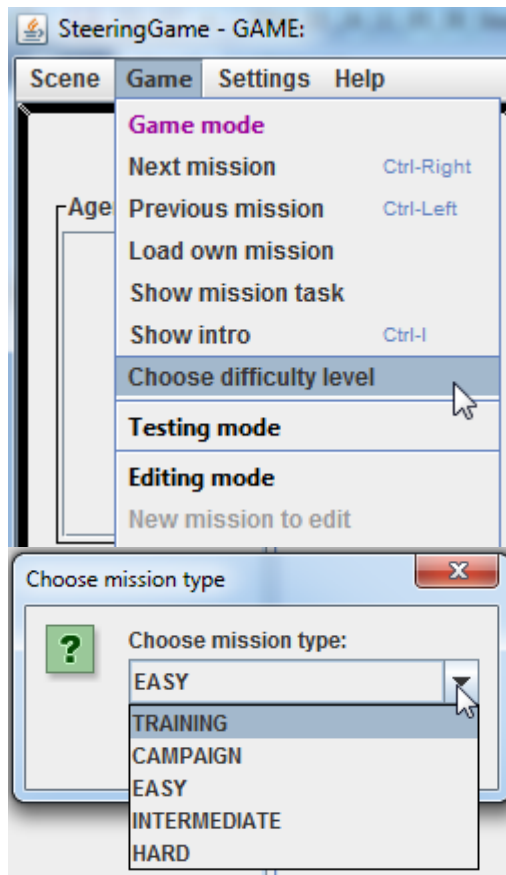

3. Click "play" and look for the guy in UE2
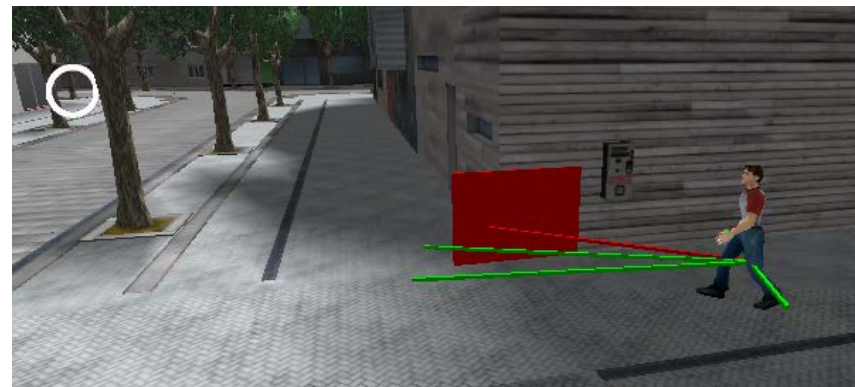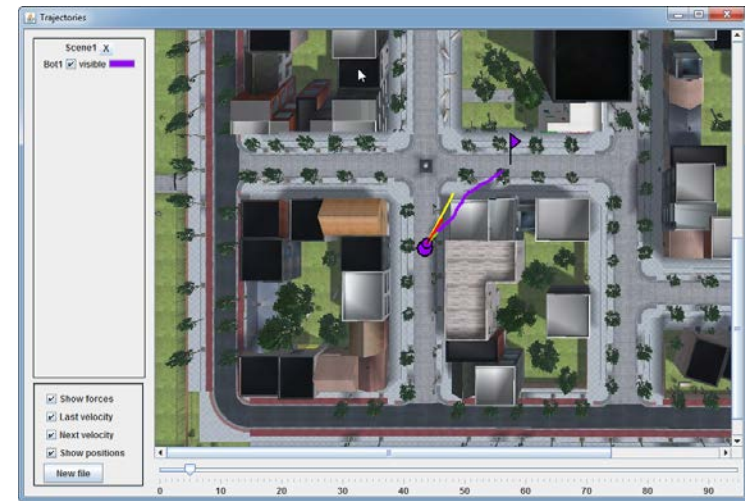   - Be patient!

Steering Game
Trajectories

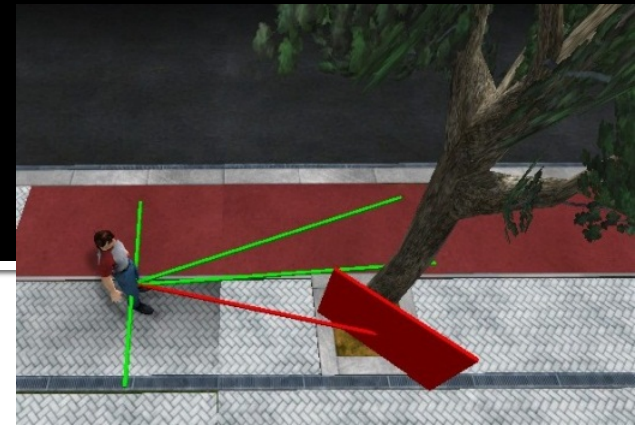Choosing difficulty level and iterating through missions.

Once you "play and stop" the steering, you can open "Trajectories" of bots and checkout step by step, what result steering force bots had.

When you succeed in the mission, the "Trajectories" are still holding the last run! Print-screen them as proofs!
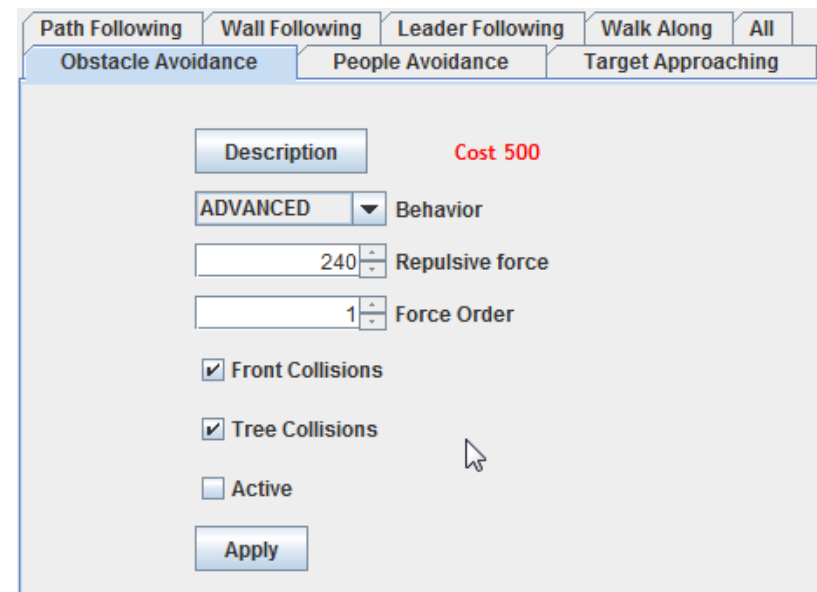
Steering Behaviors

1/3

- ## Obstacle Avoidance
  - ### Front Collision – Why and how to solve it?
    - `OA_front_a_p.xml`
  - ### Tree Collisions – Why and how to solve it?
    - `OA_tree_a_p.xml`

Steering Behaviors
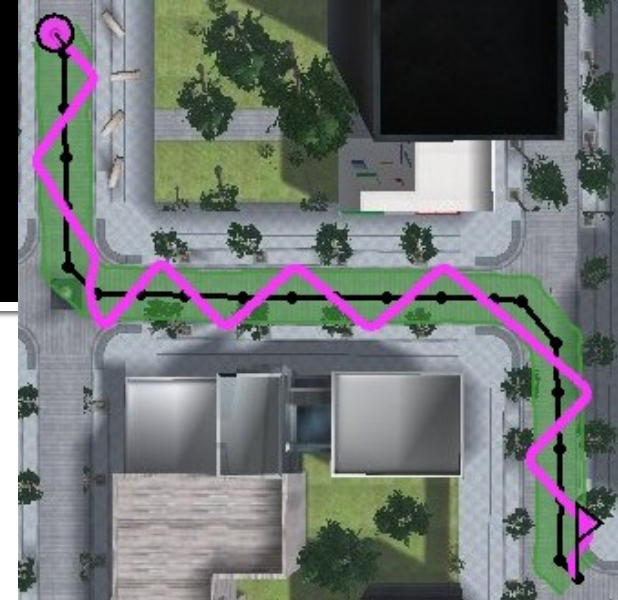
- ## Path Following
  - How to improve Path following
    - Smoother trajectory, more natural in curves)?
    - What will be the impact of longer Projection and Regulation Force and why?
  - ## Regulation Force
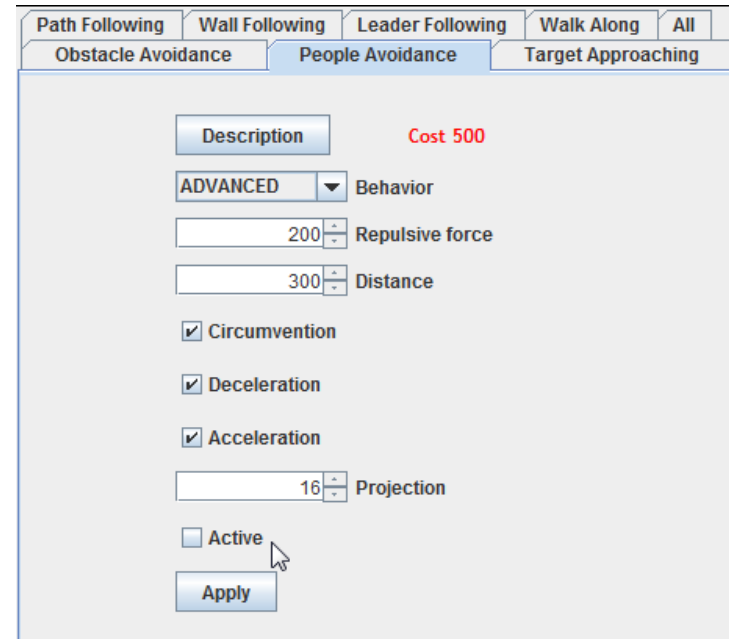   - Find the ideal value.
    - `PF_regulation_p.xml`

- **People Avoidance**
  - **Oncoming** – How big has to be the steering force to prevent the collision? How to solve it better?
  - **Crossing** – What will happen? Why? How to solve it?

Assignment 4
SteeringGame

- Download and install Steering Game
  - SteeringGame 2.0 installer
    - http://goo.gl/JE6uho

- Learn how to work with the game
  - http://goo.gl/NQsDrG

- Compulsory
  - Solve at least four EASY levels from the Steering Game
    ~ 1 point each
  - Solve two INTERMEDIATE levels from the Steering Game
    ~ 3 points each
  - *10 points*

- Bonus (up-to 10 points)
  - Solve two HARD levels from the Steering Game
    ~ 5 points each
  - *Up to 10 points*

Assignment 4
SteeringGame

- After finishing the level, save trajectories of your solution AND make a screenshot with your trajectory!

- Name files as "`Level-Difficulty-X`" (without quotes of course), where X is the actual number of the level from chosen difficulty.

Send us finished assignment

Via e-mail:
- *Subject*
    - "Pogamut homework 2014 – Assignment X"
        - Replace 'X' with the assignment number and the subject has to be without quotes of course
        - …or face -2 score penalization
- *To*
    - jakub.gemrot@gmail.com
        - Jakub Gemrot (Tuesday practice lessons)
- *Attachment*
    - Completely zip-up your folders containing level solution, level solutions are named "Level-DIFFICULTY-X" where DIFFICULTY is level's difficulty and X is the actual number of the level of the chosen difficulty (or face -2 score penalization)
- *Body*
    - **Please send us information about how much time it took you to finish the assignment + any comments regarding your implementation struggle**
        - *Information won't be abused/made public*
        - *In fact it helps to make the practice lessons better*
    - Don't forget to mention your full name!

Questions?
I sense a soul in search of answers…

- We do not own the patent of perfection (yet…)
- In case of doubts about the assignment, tournament or hard problems, bugs don't hesitate to contact us!
  - Jakub Gemrot (Tuesday practice lessons)
    - jakub.gemrot@gmail.com