Final Exam – Civilians & Aliens

Assignment

Your task is to create an agent, that can find and guide the Civilian bot down to the science factory while watching out for Aliens bot protecting the Civilian bot from them.

Civilian reacts to different commands (their concrete implementation is available in the template project), which are all sent through UT2004 chat (no TeamComm in this task!).

Commands are simple, but they are sufficient for solving the task, e.g.: „stop“, „turn“, or „follow me“. Unfortunately, the civilian is not smart... So it will follow your agent only if it can see your bot. Whenever Civilian lose your agent from sight, it will stop. You have to prepare for that.

The civilian also acts as if it has a phone and is broadcasting its location in the map from time to time. Whenever you lead the civilian to the factory, it will respawn itself.

The scenario takes place on the map DM-UnrealVille-ub provided in `UT2004` directory.

Package contents

`GuardBot`	…	Java Maven project containing the exam bot template you start your coding from.
`Scenario`	…	Contains Civilian and Alien bot jar files together with batch files to start them quickly. Also contains `start-scenario.bat` batch file that runs a special UT2004 dedicated server that contains extra code for the scenario. ALWAYS RUN DEDICATED SERVER THROUGH THIS FILE ONLY!
`UT2004`	…	Directory containing UT2004 files you need to patch your installation with, e.g., containing the map and concrete GameBots2004.ini file configuring the scenario.

Setup

In order to run the scenario, follow these steps.

1. Copy your installation of UT2004 into C drive root, i.e., to have `C:\UT2004`
2. Patch (overlay) folder `C:\UT2004` with exam package `UT2004` folder
3. Run `Scenario\start-scenario.bat`, this will start UT2004 dedicated server with scenario mod; if you do not have UT2004 at `C:\UT2004` edit the batch file first!
4. Run UT2004 client via `Scenario\start-ut2004.bat`; if you do not have UT2004 at `C:\UT2004` edit the batch file first!
5. Start some civilian(s), e.g., via `Scenario\start-civilian-1.bat`
6. Start some alien(s), e.g., via `Scenario\start-alien-1.bat`

If you done above steps right, you should see 1 civilian and 1 alien bot present in the game. The alien bot should be running around with Flak Cannon in hands and if it sees a civilian, it will run towards it and shoot it down.

Example (simplified) solution

There is simplified solution guard bot present in the Scenario folder. The example solution works ONLY with 1 civilian and 1 alien within the environment. You can run it via `Scenario\start-guard-bot.bat` to check what your goal is.

It is highly recommended to check this simplified solution out as it give you a good understanding of the task.

Terms of exam

To obtain full 90 points, you actually do not have to safe civilians always. But it would be nice ☺

Your grade will depend on how many "behaviors" you will be able to integrate.

Follows the list of behaviors to implement you may choose from (text in bolds highlights functional requirements):

1. You arm yourself with Flak Cannon [5 points]
    - **If your bot does not have a flak cannon, you run to get one**.
2. You get ammo for Flak Cannon [5 points]
    - **If your bot has 0 ammo,** you **always try to get more.**
3. You collect ammo for Flak Cannon if it is near by [10 points]
    - If bot happens to be **less than 750 UT** units **away (path-metric)** from **flak cannon ammo** and **can collect it**, **bot runs to get it**.
4. Collecting ammo while leading civilian [10 points]
    - **If** you are **leading a civilian and want to collect flak cannon ammo**, you **tell civilian to stop first**. **After you collect the ammo, you return for the civilian**.
5. You can fight 1 alien [10 points]
    - **The bot can effectively kill an alien**.
6. Lead civilian to the factory [20 points]
    - You can **talk civilian into following you** and **lead it into the factory not losing them**.
7. Guarding civilian [10 point]
    - **While leading the civilian**, you **scan surroundings** and if you **spot an alien less than 1000 UT units (path-metric) away from a civilian**, you **hunt alien** down.
    - **Before hunting** the alien, you **tell the civilian to stop**, **after** you kill the alien, you **get back to the civilian**.
8. Fighting multiple aliens [20 points]
    - You can **prioritize between targets** always trying to **kill alien that is the nearest to civilian**. [5 points]
    - **When fighting multiple aliens,** you are trying to **keep distance from aliens you are not currently targeting**. [15 points]

Rules of play

1. Position of the factory can be obtained from the object `factoryNavPoint`.

2. Civilian is not running around randomly, it waits for your bot.
3. To communicate with the Civilian bot, you have to use correct action primitives that are present in the template project. Take care whether the Civilian is close enough to understand you, use sense `isCivilianInTalkingDistance(…)`, otherwise the Civilian will reply that it does not understand you because you are too far.
4. Available commands:
   a. `tellOne_Stop()` - the Civilian will stop and react with `answerStopped()`
   b. `tellOne_Turn()` - the Civilian will turn 90 degrees and react with `answerTurning()`
   c. `tellOne_FollowMe()` - if the Civilian can see your agent, it will answer `answerFollowMe_YES()` and start to follow you, otherwise it will react with `answerFollowMe_NO_CanNotSee()` and will stand-still.
   d. `tellOne_CanYouSeeMe()` - query, whether the Civilian can see your agent. If it can, it will react with `answerCanYouSeeMe_YES()`, if not, it will react with `answerCanYouSeeMe_NO()`.

   There are some others as well...
5. Again, just to be sure, the Civilian will be following you only if it can see you and it will understand your commands only if it is close enough.
6. The Civilian bot is moving slower than your bot. The concrete constant and primitives for setting speed of your agent are present in the template project.
7. Note that there is method that returns "Civilian location", but that is updated only IFF Civilian is broadcasting its location or when you actually can see Civilian ... so it may lead to problems if you let your Guide turn its back on Civilian while guiding him to the factory.
8. In the map, only weapons of `UT2004ItemType.FLAK_CANNON` and ammunition of `UT2004ItemType.FLAK_CANNON_AMMO` can be found. Both weapon and ammo items will give you only 1 unit of the flak cannon ammunition.
9. Flak cannon can have **5 ammo at max**, you can't have more of them!
10. Alien is running around the map randomly, but if it sees any agent, it will try to hunt it down. When it gets to the distance less than 200 Unreal units, it will fire (it also has flak cannon, which means it will typically kill your agent instantly from that distance).
11. If your agent dies, it loses all ammunition, weapons.
12. Alien is not collecting any items – if it runs through them, nothing will happen.
13. Civilian can be "frozen by fear":
    a. `civilianSeeAlien()` - civilian can see the Alien but it is far, so it won't freeze the Civilian
    b. `civilianFrozen()` - Alien is too near to Civilian, Civilian stopped following you and you have to first kill the Alien and then issue `tellOne_FollowMe()` again.

Template project

Read carefully through the code of template project before you dive into the implementation!

Note that you might need to adapt some methods in the template in order to finish the assignment, watch out!

Tips!

Start with single civilian first and try to guide it to the factory. Then start with single alien (no civilians) and debug basic combat behaviors. Then put it together and try to save the civilian while you have opposition. Finally, play with more civilians and more aliens!

REMEMBER: Your code will be tested in the situation where there are 3 civilian bots and 3 alien bots present within the environment.

Final grading

The final score of the Pogamut 3 track is then made out of the sum of "final exam points" and "homework points", which determines the grade.

>= 85 points	… Grade A ("jednička")
<70;85) points	… Grade B ("dvojka")
<55;70) points	… Grade C ("trojka")
< 55 points	… Failure

When you are done

1. If you decide you are done (or the submission deadline is steadily approaching), edit README.TXT within `GuardBot` folder and document what behaviors you have been working on and what is their status. Then zip up your `GuardBot` folder and submit it to me via, e.g. wetransfer.com, to address jakub.gemrot@gmail.com
2. The submission deadline is 7.9.2021, 17:00 CEST

Q & A

For clarification, you can reach me:

1. at Discord;
2. or via Skype, my Skype name is jakub.gemrot;
3. or just call me directly +420 724 508 170.