Informatics 2D Coursework 2 Report

1. (5 marks) Task 2.1 Design

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| *My harder problem included a second instance of mineBot. This expanded the search tree by introducing another value to consider for each action involving the mineBot, thereby increasing runtime and making the problem “harder”.* |

1. (10 marks) Task 2.2 Evaluation

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| *In this experiment, the weight values of g and h in a best-first search algorithm where varied* *to measure the effect on the search performance.*  *In total 90 tests were run for different combinations of the weights of g and h. The tests were conducted such that g<(h/2) is always true. This was due to time and computation restraints as when g is close to h, the run time of the algorithm increases. The quantitative results of the tests are displayed below in graphs depicting the ratio g/h against the total number of steps in the completed plan for this ratio, and the total time taken to find the* *plan.*  *It was observed, as mentioned above, that as the ratio of g to h increases, the run time would increase. It was also shown that the total number of path steps would decrease as the ratio increases.*  *When considering the function of g and h in the search heuristic, these results are to be expected. A greater value weight on g would force the algorithm to prioritise proximity to the start node, this means more nodes are expanded during the search thereby increasing run time.*  *The expansion of more nodes is also directly correlated to the decrease in the number of steps in the path. More expanded nodes means more parts of the search tree are explored so the algorithm approaches an optimal path length.* |

1. (25 marks) Task 3.4 Your Extension

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| *Another realistic factor of the mine world would be the fuel capacity of the hammer. In real life a mine bot would most likely use a battery powered drill as opposed to a hammer and it would be realistic for this drill do lose power as it is used, similarly to the way in which mineBot loses energy upon movement. Again, like the mineBot, the hammer can be recharged upon visiting the energy station. This would increase the complexity of the plan as a working hammer is necessary to break ores thereby vital to the bot achieving its goal.*  *This factor was implemented using a `fuel` function which exists for each hammer and decreases by 1 upon each instance of break. An action `RECHARGE` was implemented, it takes the tile, energy-station, bot an hammer as parameters. If the bot is holding the hammer and on the estation tile, the hammer’s fuel is increased to 2.* |