

**ISTANBUL TECHNICAL UNIVERSITY  
FACULTY OF COMPUTER AND  
INFORMATICS**

**PROJECT TITLE**

**Graduation Project**

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## Özgünlük Bildirisi

1. Bu çalışmada, başka kaynaklardan yapılan tüm alıntılarım, ilgili kaynaklar referans gösterilerek açıkça belirtildiğini,
2. Alıntılar dışındaki bölümlerin, özellikle projenin ana konusunu oluşturan teorik çalışmaların ve yazılım/donanımın benim tarafımdan yapıldığını bildiririm.

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## Acknowledgments

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# 1 Introduction

In November 1936 Alan Turing published his groundbreaking paper which creates foundations of computer science [1]. It was the Big-Bang of the computer science that created a new universe from dusty works of his ancestors.

## 2 Project Description and Plan

This is the best graduation project ever. In Figure 2.1 you can see the Gantt diagram of the project.

Work Package	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Literature Research											
Changes in the core system											
Generic Input Source Implementation											
Learning the Hark-ROS integration											
Hand State Input Source											
Hark Input Source											
Testing & Experiments											
Report											

**Figure 2.1:** The Gantt diagram of the project

## 3 Background

A long long section with many papers.

## 4 Analysis and Modeling

After long hours of studying we decided. A\* is the best algorithm for searching on the graphs.



## 5 Design and Implementation

We implemented the depth first search algorithm as shown in Algorithm 5.1.

```

1: Graph  $G$ 
2: Node  $start$ 
3: function DEPTH-FIRST-SEARCH( $G, start$ )
4:   Tree  $T$                                 ▷ The resulting search tree
5:   Stack  $S$                                 ▷ An empty stack
6:   Set  $V$                                   ▷ An empty set of visited nodes
7:   SET-ROOT( $T, current$ )
8:   PUSH( $S, start$ )
9:   while NOT-EMPTY( $S$ ) do
10:     $current \leftarrow$  POP( $S$ )
11:    if not CONTAINS( $V, current$ ) then
12:      INSERT( $V, current$ )
13:      for all  $n : \text{NEIGHBORS}(current)$  do
14:        PUSH( $S, n$ )
15:        INSERT-SUB-NODE( $T, current, n$ )    ▷ Insert node to subtree of
       $current$ 
16:      end for
17:    end if
18:  end while
19:  return  $T$ 
20: end function

```

**Algorithm 5.1:** The depth first search algorithm

## 6 Testing and Evaluation

We compared the performance of the graph search algorithms. The results can be seen in the Table 6.1.

**Table 6.1:** Performance test results of the graph search algorithms

Algorithm	Number of Generated Nodes	Number of Nodes Expanded	Max Number of Nodes in The Frontier
BFS	77480	6340	71142
DFS	820	88	760
A*	376	33	338

## **7 Conclusion and Future Work**

We tested algorithms and decided that future is bright.

## References

- [1] A. M. Turing, “On computable numbers, with an application to the entscheidungsproblem,” *Proceedings of the London Mathematical Society*, vol. s2-42, no. 1, pp. 230–265, 1937. [Online]. Available: <http://dx.doi.org/10.1112/plms/s2-42.1.230>