

Pathfinding Robot

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Abstract—Our Pathfinding Robot is an intelligent, two-wheeled robot capable of navigating the shortest-path between points-of-interest within a maze, projected as a line from a ceiling mounted projector. This robot has been developed in COMPSYS 301 during Semester Two of 2023 by Team 1, and has involved the exploration of both hardware and firmware/software aspects. This development has included time- and frequency-domain analysis of phototransistor and photodiode sensors, analogue circuit design, sensor constellation & printed circuit board design, pathfinding algorithm implementation, and firmware development on a PSoC 5LP microcontroller. This engineering effort has produced a high-quality, robust robot that comfortably exceeds the goals that we set out to achieve. The engineering design considerations and decisions made towards this outcome are outlined in this following report.

Index Terms—psoc 5, pathfinding, photodiode, firmware, pcb

I. HARDWARE DESIGN

A. Frequency Domain Analysis

B. Analogue Circuitry Design

C. Printed Circuit Board Design

II. PATHFINDING ALGORITHMS

III. FIRMWARE IMPLEMENTATION

IV. INTEGRATION

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REFERENCES

Coursebook information from COMPSYS 305 directed by Dr. Morteza Biglari-Abhari of the Department of Electrical, Computer, and Software Engineering at The University of Auckland.