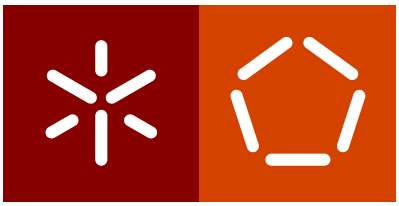

Universidade do Minho
Escola de Engenharia
Departamento de Engenharia Eletrónica
Nonlinear Dynamic Systems and Neural Networks

Autonomous Navigation: Report

Autonomous Navigation for mobile robots with modest computational resources

José Pires A50178
Mariana Duarte A85420

Supervised by:
Full Professor Estela Bicho

October 11, 2021

Contents

List of Figures

List of Listings

1 Introduction

Hugo was here!!

CITATION: [1]

1.1 Problem statement

Design a remote control with three buttons that can remotely control the television (TV). It should be very light, powered by batteries and controls your TV via an infrared emitter. The TV has a built-in infrared receiver. A button on the remote control switches the TV on/off and will be labeled with the word "Power". The other two buttons are used to scroll up/down and select the available channels and they are labeled with the arrows up/down.

1.2 Market research

A TV remote is a device which is used to operate a television from distance in a wirelessly mode. It also makes the TV usage more simpler, making it more user friendly with its suggestive buttons. These buttons control functions such as power, volume, channel witch and various other features.

TV remotes are composed by the TV remote Shell, the TV remote membrane, one LED and a data acquisition & Infrared emitter PCB.

The unit cost of universal TV Remotes is about 3 to 5 euros - Time to market - Sales/Quantity of sold items anually

2 Analysis

2.1 Requirements

- Remotely operated - Low weight - Powered by batteries - 3 buttons: 1) Power 2) Up 3) Down - Infrared emitter response time (system output response time): 100 ms - The TV remote may be upgraded in the future to use more buttons

2.2 Constraints

- Contains an infrared emitter (the TV already has an infrared receiver) - The TV remote control must supply the required data frames imposed by the TV manufacturer - Data frames may not be provided by the client - Security concerns are defined by the data frames and the specific communication frequency imposed by the TV manufacturer - 1 week deadline: 14 h - 2 people - Budget: - HW (parts acquisition and assembly): fixed costs — 1 EUR/unit - TV remote Shell - TV remote membrane - LED - Data acquisition & Infrared emitter PCB - Development: project - 20 EUR per hour per person: 20 * 14 * 2 = 560 EUR + IVA

2.3 Theoretical foundations

Talk about the theoretical foundations.

3 Design

3.1 Hardware specification

- Block diagram with COTS components, if possible - List of constraints of functions to be implemented in HW or SW - Inclusion of a multiplexer may reduce SW burden - CPU peripherals: - PCA for wave generation

3.2 Hardware interfaces definition

- I/O ports - HW registers - Memory addresses for shared or I/O by memory mapping - HW interrupts

3.3 Software specification

Top-down methodology 1. Identify main subsystems 1. Signal input detector 2. Event handler 3. Output generator

3.4 Software interfaces definition

- Define the APIs in detail: - header files with: - functions prototypes - data structure declarations - class declarations

3.5 Start-up/shutdown process specification

3.6 Error handling specification

- Create error-handling routines - Watchdog timer can be used for system recovery

3.7 Design verification

Bibliography

[1] Ian Sommerville. Software engineering 9th edition. ISBN-10, 137035152:18, 2011.