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Moving Robot

Design Document

Table of Contents

[Introduction 4](#_Toc44757754)

[Problem Description 5](#_Toc44757755)

[TASK-1 6](#_Toc44757756)

[Proposed Solution 6](#_Toc44757757)

Table of Figures

[Figure 1: Moving Robot Architecture 6](#_Toc44757758)

Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Date | Name | Comment |
| 0.1 | 04-Jul-2020 | Awad A. Bekhet | Initial document |
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# Introduction

Design document for Tasks for Embedded SW Design course.

# Problem Description

A Moving Robot has 4-DC motors and can move in four directions; forward, backward, right and left.

The robot has a character LCD to display the moving direction.

At power-up:

* The robot moves forward with increasing speed from 0% to 100% speed for 5 seconds.
* The robot enters a running state.

At Running State:

* The robot decreases its speed gradually to 50% in 5 seconds.
* Robot rotates right 90 degrees clockwise.
* The robot decreases its speed gradually to 0% in 5 seconds.

# TASK-1

1. Extract the modules from moving robot requirements.
2. Design modules’ APIs.

## Proposed Solution

1. Modules:
   * Port
   * DIO
   * PWM
   * Timer
   * MotorDc
   * LcdChar
   * Robot
   * Print
   * System



Figure : Moving Robot Architecture

1. Modules’ APIs

|  |  |
| --- | --- |
| Module | APIs |
| PORT | Port\_Init |
| DIO | Dio\_Init Dio\_ReadPin Dio\_WritePin Dio\_ReadPort Dio\_WritePort |
| LcdChar | LcdChar\_Init LcdChar\_SetLcdState(ON|OFF) LcdChar\_SetPosition(X, Y) LcdChar\_Write LcdChar\_SetBacklight(0%-100%) LcdChar\_SendCommand |
| Print | Print\_Init Print\_WriteString Print\_WriteValue  Print\_Erase |
| PWM | Pwm\_Init Pwm\_SetDuty Pwm\_SetPeriodAndDuty |
| Timer | Timer\_Init Timer\_Start Timer\_Stop Timer\_EnableNotification Timer\_DisableNotification  Timer\_IsTimerExpired |
| MotorDc | MotorDc\_Init MotorDc\_DeInit MotorDc\_Start(Forward|Backward) MotorDc\_Stop  MotorDc\_SetSpeed |
| Robot | Robot\_Init  Robot\_SetDirectionAngle  Robot\_SetSpeed |
| System | System\_Init |

Questions and Concerns.:

* HW behavior and Proposed Controllers to check how to achieve that on the controller? Right!
* Reqs. are not clear enough.