MODELING AND CONTROL OF A QUADRUPED ROBOT

A thesis submitted in partial fulfillment of the requirements for the award of the degree of

B.Tech

in

Electronics and Communication Engineering

By

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MAY 2016

BONAFIDE CERTIFICATE

This is to certify that the project titled **MODELING AND CONTROL OF A QUADRUPED ROBOT** is a bonafide record of the work done by

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in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Electronics and Communication Engineering** of the **NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**, during the year 2015-2016.

NAME	**NAME**
Guide	Head of the Department

ABSTRACT

Removal of colour from industrial wastewater can be achieved by extraction using liquid emulsion membrane. A dye, named, Crystal Violet (CV) is extracted using water/oil/water liquid emulsion membrane. An experiment on single dye component is carried out. A stable emulsion is formed by agitating NaOH solution and an organic solvent (n-hexane) at high speed. Span 80 (surfactant) is used to stabilize the membrane. Extraction is carried out by dispersing the emulsion in an external water phase (feed) at lower speed resulting in the formation of small globules thereby increasing surface area and providing better extraction. The constituent (dye) to be extracted from the external phase diffuses through the membrane phase into the internal phase (NaOH solution). Reaction occurs in the internal phase resulting in the formation of sodium salt of the dye (s). The emulsion can be reused after demulsification. During extraction, the effect of Span 80, NaOH concentration, n-hexane, stirring speed and feed concentration have been investigated. The main objective of this study is to find the optimum operating conditions for the extraction of crystal violet.

Keywords: Emulsion; Internal phase; Extraction; Diffusion; Dye separation

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Chapter 1

Introduction

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1.1 A Section

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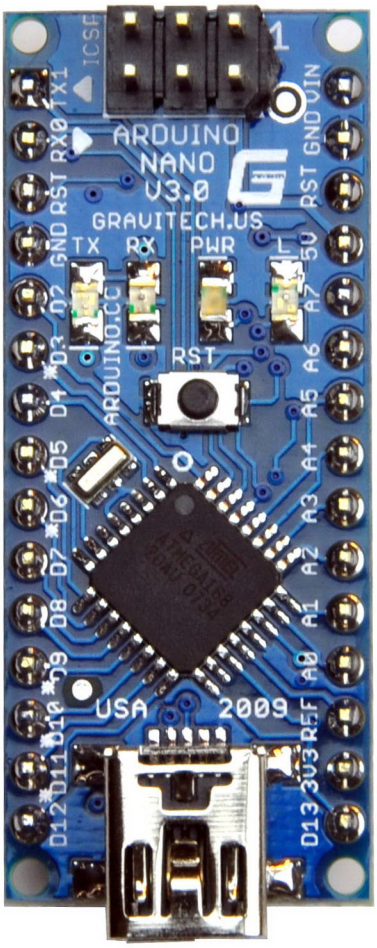

Figure 1.1: This is Arduino Nano

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The table 1.1 is an example of referenced LaTeXelements.

Col1	Col2	Col2	Col3
1	6	87837	787
2	7	78	5415
3	545	778	7507
4	545	18744	7560
5	88	788	6344

Table 1.1: Table to test captions and labels

1.2 Another Section

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Single equation

$$e^{i\pi} = -1 \tag{1.1}$$

Multiple equations

$$\text{State Vector: } x = \begin{bmatrix} q & \vec{\omega} \end{bmatrix}^T \tag{1.2}$$

$$\text{Process Model: } x_{k+1} = A(x_k, w_k) = \begin{bmatrix} q_k q_w q_\Delta \\ \omega_k \end{bmatrix} \tag{1.3}$$

$$\text{Measurement Model: } z_k = H(x_k, v_k) = \begin{bmatrix} q_k g q_k^* + \vec{v}_{acc} \\ \vec{\omega}_k + \vec{v}_{rot} \end{bmatrix} \tag{1.4}$$

Figure 1.2: This is a servo controller.