ROBOT DANCE USING 68000 MICROPROCESSOR CONTROLLER

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BEKP

July 2009

" I hereby declare that I have read through this report entitle *"Robot Dance Using 68000 Microprocessor Controller"* and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Industrial Power)"

Signature : 

Supervisor's Name : Mazree Bin Ibrahim

Date : 2 July 2009

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A report submitted in partial fulfillment of the requirements for the degree of Bachelor In Electrical Engineering (Industrial Power)

Faculty of Electrical Engineering

UNIVERSITY TEKNIKAL MALAYSIA MELAKA

2009

I declare that this report entitle "*Robot Dance Using 68000 Microprocessor Controller*" is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : .....

Name : Azmeer Zakki Bin Mohd Harith

Date : 2 July 2009

This project is dedicated to my parents and my families who gave me fully support to complete this Final Year Project (FYP) project.

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Bissmillahirahmanirahim. In the name of Allah S.W.T, the most gracious and merciful, praise to Allah the lord of universe and may blessing and peace of Allah be upon his messenger Nabi Muhammad S.A.W. Alhamdulillah. First of all, all praised and thank you to Allah S.W.T for leading and giving me strength and guidance to complete in writing this Final Year Project (FYP) report entitled "Robot Dance Using 68000 Microprocessor Controller".

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ABSTRACT

Dance is one form of entertainment where physical movement is the key factor. The propose to develop Robot dance using 68000 microprocessor controller is develop to produce a programmable robot dance that can dance when the music starting. This robot has DC servo motors that can control robot dance movement. The main control uses a 68000 microprocessor controller (Programmable Integrated Circuit) to process and calculated inputs and outputs. This robot will respond to the inputs and the circuits gives the signal to DC servo motors as an output in order to dance follow the program and music.

ABSTRAK

Tarian adalah salah satu jenis hiburan di mana kunci utamanya adalah pergerakan fizikal. Tujuan Robot Tarian ini di bangunkan menggunakan 68000 microprocessor adalah untuk menghasilkan Robot Tarian yang telah diprogramkan untuk menari apabila muzik dibunyikan. Robot Tarian ini mempunyai 'DC servo motors' yang akan mengawal pergerakan robot. Kawalan utama menggunakan 68000 mikropemproses pengawal (Litar Bersepadu yang telah diprogramkan) untuk memproses input yang telah dikira dan mengeluarkan outputnya. Robot ini akan bertindak balas terhadap input dan litar akan memberikan signal kepada 'DC servo motors' sebagai output arahan kepada robot menari mengikut program dan muzik.

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CHAPTER 1

INTRODUCTION

1.1 Project Background

Dance is one form of entertainment where physical movement is the key factor. The main reason robots are experiencing a kind of movements is that robots have a physical body. This project proposed a robot dance system that combines these two elements. First, various factors concerning entertainment and dance are studied. Then other project proposed is a robot dance system in which a robot achieves various dance performances by different short dance motions. Also this project can describe the details of the system by focusing on its software functions and show evaluation results of robot dance performances.

The robot dance is a robot that can make dancing movement with following the music. The robot dance uses a 68000 microprocessor controller to perform movement for robot functions. The microprocessor controller module is plugs on the robot servo motors. The microprocessor controller is used to read switch positions and generate control signals for the robots motors.

1.2 Problem Statement

This project is develops to finding way to entertain people by using robot but it is difficult to ensure the movement of robot dance follow the music with used microprocessor controller. These uncertainties may be due to unknown the parameters of the robot system and their environment.

Other than that, robot control becomes an attractive field to many researchers to research about robot control. There is various method of robot control proposed. One of the controls is by using microprocessor controller. The aim of this control is to ensure the system is function and the robot will move follow the music or direction.

In this study, 68000 microprocessor controller (Programmable Integrated Circuit) is applied to process and calculated inputs and outputs. Robot will respond to the inputs and the circuits gives the signal to servo motors as an output in order to dance follow the program and music.

1.3 Project Objectives

The project objectives are:

- To develop simple robot dance.
- To develop and apply servo motor controller.
- To write robot dance programming using 68000 Visual Simulator.
- To develop and apply 68000 microprocessor controller for robot dance. 68000 microprocessor controllers is a one of microprocessor by Motorola.
- To entertain people especially children by using robot. This project is develops to finding the way to entertain people by using high technology.

1.4 Scopes

The scope of this project is to design a robot dance using 68000 microprocessor controller with capable of performing to do the dancing movement with following the music. Hardware and software are the two parts to implement this project. In hardware, circuit and its components such as IC 68000 Microprocessor, DC servo motor and others is

the important device to create the robot dance. For software, IDE 68000 Microprocessor is used as programming controller for this project.

For this project, only robot hand and hip can be moved. There are some problems to move the whole part of robot body. Robot will move after switch on the switch and will dance about 1 minute. This project is suitable for all people who want and need entertainment using high technology.

1.5 Project Significance

This project has a lot of significance and it can be categorized from the point of user and software IDE 68000 microprocessor controller. User will have a lot of benefit when used this robot dance. It is different from the other robot because it used microprocessor controller which used to read switch positions and generate control signals for the robot motors. Microprocessor controller can be plugs into the device for device controller. Microprocessor also can used to perform robot movement.

Besides the software, the hardware used such as circuit, it is important to make sure the robot move. The design and small size can attract user to use this robot dance because it can bring to where we go. User also can learn 68000 microprocessor programming through this project.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Research has been doing in this chapter to resolve the problem in this project. The research about robot dance using 68000 microprocessor controller is important in this project to make the project successful and achieve the objectives. A detail about is needed such the detail how robot dance using 68000 microprocessor controller with capable of performing to do the dancing movement with following the music.

Other than that, the research about the robot design, DC motors and 68000 microprocessor controller components is finding to make sure the right robot dance using 68000 microprocessor controller is develop. The Software IDE 68000 microprocessor and programming were studied which included in the objectives of this project.

2.2 Robot Designs

A robot can be defined as a mechanical device that is capable of performing a variety of tasks on command or according to instructions programmed in advance. A typical robot performs a task by following a set of instructions that specifies exactly what it must do to complete the job. These instructions are stored in the robots control center, a computer or part of a computer. The computer, in turn will sends commands to the robots motorized joints, which function much like human joints to move various parts of the robots.

Robots vary in design and size but few resemble the humanlike machines that appear in works of science fiction. Most are stationary structures with a single arm capable of lifting objects and using tools. Engineers have also developed mobile robots equipped with television cameras for sight and electronic sensors for touch. These robots are controlled by stored instructions, feedback from sensors, and remote control. Scientists have used such robots to explore the sea floor on Earth and the surface of Mars.

2.2.1 Robosapien

Designed by a NASA scientists, the Robosapien is simple enough for kids and advanced enough for adults. It is based on the science of applied biomorphic robotics [6].

Robosapien is fully functional right out of the box, requiring no complex set up. All functions are handled by the remote control and no computer is required. It provides more than six hours of continuous entertainment and automatically shuts down after has been idle for more than 20 minutes.

It movements like walks forward and backward, leans over in four directions, and can lift bulky items and pieces of paper alike. Best of all, the movements look natural and are quiet. This attribute separates Robosapien from less sophisticated entertainment robots on the market. Robosapien impressive flexibility is evident as walks in two different speeds, dances and easily handles 180 degree turns.

Robosapien also has touch sensors on his hands, on front and back of both his feet and a sound sensor. This means Robosapien can be programmed to walk forward until it bumps into something.The right hand is for picking up round or bulky objects like balls, cardboard tubes, etc. and left hand is for thin things like pencils, napkins, dollar bills, business cards, and paper.

It's also has lights in the center of hands, which allows the robot to illuminate the area on the floor when its goes to pick something up. Robosapien is controlled via infrared remote control to send commands to the IR receiver in the dome on its head.

Some great projects on Robosapien including:

- Wireless Cameras: A user has installed a miniature cam into the bot, pavin the way for some machine vision applications.

- Autonomous Control: The University of Freiburg has made created a fully autonomous Robosapien by doing some extreme hacking and performing a pocket-pc brain transplant.

- Computer Control: Some quick research has produced the infrared controller codes, opening the way for Robosapiens to be controlled from computers, custom remotes, or even PDA.

- Sequence Programmers: Quite a few tools are being created to make it easier to program the Robosapien.

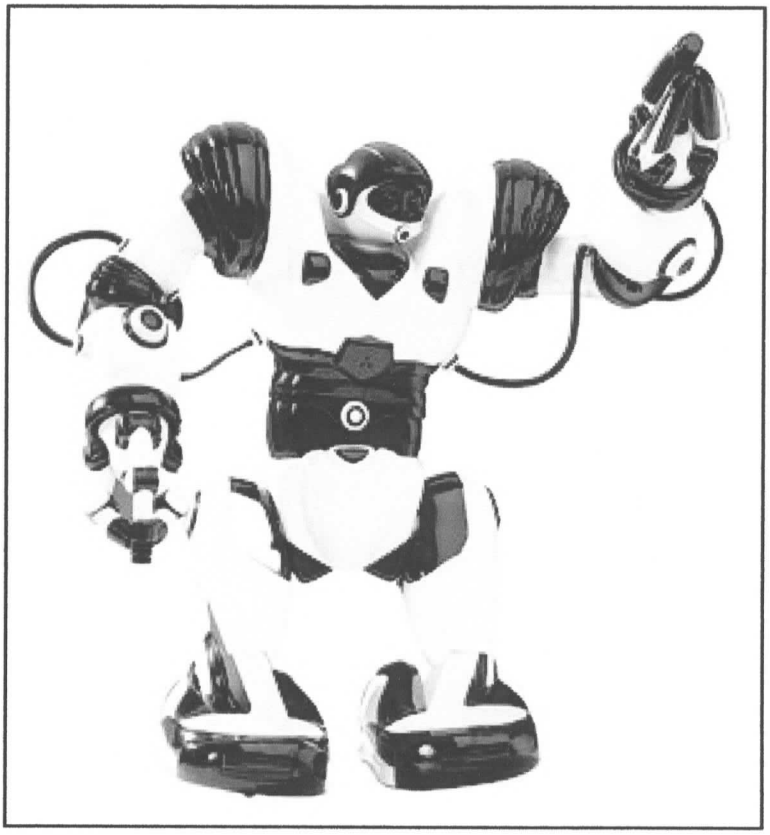

Figure 2.1: Robosapien

2.2.2 Robonova 1

Robonova 1 is a fully customizable and programmable aluminum robot. Its movement is done with high technology muscles. These smart muscles and joints give complete control of torque, speed and position. The programming software is simple and so advanced knowledge of programming is not needed. It can walk, run, do flips, cartwheels and dance. In addition to the typical robot talent for walking until it senses a wall using ultrasound, Robonova 1 can be instructed to do cartwheels, take a bow and even do one handed pushups [7].

The plastic components are made of an extremely high quality material which provides all the robustness required for daily use. The custom gold anodized metal servo brackets serve as strong and lightweight exoskeleton and the durable plastic body case components protect the control board and battery from damage.

The brain and heart of the Robonova 1 is the well known Atmel Atmega 128 processor, its internal memory supplemented by a 64K*8 EEPROM as storage for Robo Script and Robo Basic programs. The robot can be fitted with an Infrared receiver and controlled using a standard IR remote control handset.

The robots muscles take the form of servos. This 12 inch high robot is controlled with 16 powerful HSR-8498HB digital servos that feature set pin locking of the servo arms for easy assembly, over voltage current protection, super strong Karbonite gear trains and feedback technology.

The control board can operate up to 24 servos and 16 accessory modules. Optional devices will eventually include gyros, acceleration sensors, speech synthesis modules and operational devices such as Bluetooth controllers and R/C transmitters and receivers.

Powering the Robonova 1 is a 5 cell, environmentally friendly NiMH rechargeable battery that delivers around 1 hour of operational time. Other battery options can include 7.4 volt 2 cell Lithium Polymer battery packs when used with a 6 volt regulator. The included D/C to D/C charger features a protection circuit to help prevent battery charging mishaps. On a single battery charge the Robonova 1 can be operated for around 60 minutes

and the actual operating time varies according to the complexity of the movement processes.

The software included in the set enables anyone to develop the movement processes of the Robonova 1 and define its response to sensor events using a PC running the Windows operating system (Windows 98 or latest).

The simplest way to program Robonova 1 is with the catch and play function. Using Robo Script or Robo Basic with just move the robot into any position and click the mouse to capture that position. Move the robot into another position and repeat the process. The software then links these 'captured' positions and once activated, smoothly transitions the robots movements through these programmed positions.

Beginners to robot programming technology can use the supplied Robo Script programming software. Using the Robo Remocon software users can create operational subroutines without knowing any programming language at all. Robo Script and Robo Remocon are ideal for the beginner. The computer screen displays sliders for every individual servo (joint). Moving the sliders changes the position of the servos. Simple movements can then be assembled to produce complex movements simply by clicking the mouse. Remocon provides a graphical user interface for calling up these movements.

More advanced users can use RoboBasic that is a programming tool based on the basic programming language. Robo Basic can also be used in conjunction with Robo Script to increase the performance of the supplied controller board. Robo Basic is a dialect of Basic. It enables to create complex applications designed to accomplish individual tasks. The independent development environment includes editor and compiler. Robo Basic includes commands for synchronous servo movements, servo point to point movements, servo motion feedback.

Figure 2.2: Robonova 1

2.2.3 Tomy i-SOBOT CAM

I-SOBOT has a built in voice sensor that allows the robot to dance with music. It has voice recognition capabilities and can respond to up to 10 vocal commands. It can also make its own punching and kicking sound effects. The 6.6-inch (165mm) tall two legged robot with a camera that can play music, dance, pick itself up when it falls and respond to users commands [8].

The robot is equipped with 17 servo motors provided throughout the body and also a gyro sensor. It is capable of making different kinds of smooth motions while automatically balancing itself. It features 5 modes of operation that is five operational modes like remote control mode, programmed mode, special action mode, voice control mode and dance mode.