MOBILE ROBOT WITH FLOOR LEVEL MEASURING APPLICATION

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" I hereby declared that this PSM report is a result of my own work , as clearly stated in the sources of reverences and sources is explained and stated . "

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" I hereby declared that I have read through this report and found that it has comply the partial fulfillment for awarding the degree of Bachelor Of Mechatronics Engineering . "

Signature : .....

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Date : 12th May 2010

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ABSTRACT

This project is all about the combination mobile robot with floor level measurement application . The mobile robots have the capability to move around in their environment and are not fixed to one physical location by using complicated and controlled by C programming . Mobile robots are regularly found in industry , military and security environment . Basically gyro sensor is use as a sensor for floor level measurement application but for this project the accelerometer is use to measure floor level . For this project the accelerometer was chosen because it will measures acceleration with a minimum full-scale range of ±3 g . It can measure the static acceleration of gravity in tilt-sensing applications , as well as dynamic acceleration resulting from motion , shock , or vibration . The floor level will be measure from the angle of the floor . For the display the output of floor level measured , the standard solution is using VB programming . VB Programming is created to display the data , convert the data from gravity to voltage and draw the movement of mobile robot . In additional the programming can simplify the all problem for this case . These combination will make life easy for us to measure the distance and convert the data . For purpose succeed this project a combination based on Mobile Robot , C Programming and VB Programming had used .

ABSTRAK

Projek ini adalah gabungan " mobile robot " bersama aplikasi sistem pengukuran paras lantai . "Mobile Robot" mempunyai keupayaan untuk bergerak dikawasan persekitarannya dan tidak terbatas pada sesuatu kawasan sahaja dan dikawal oleh pengaturcaraan C . "Mobile Robot" sering terdapat dalam industry , ketenteraan dan sistem keselamatan . Pada kebiasaannya pengesan gyro digunkan dalam aplikasi sistem pengukuran paras lantai tetapi untuk projek kali ini meter pecut digunakan dalam aplikasi mengukur paras lantai . Bagi projek ini meter pecut telah dipilih kerana ia boleh mengira nilai pecutan dengan saiz minimum ±3 g . Disamping itu ia juga dapat mengukur pecutan statik graviti dalam keadaan terbalik melalui cara pergerakan , kejutan dan getaran . Bagi memaparkan keluran paras lantai yang diukur dengan menggunakan " mobile robot " pengaturcaraan VB digunakan . Dengan menggunkan pengaturcaraan jenis ini data boleh dipaparkan , data boleh ditukar nilai dari gravity kepada voltan dan ia juga berfungsi untuk melukis kawasan yang dilalui oleh "mobile robot" . Tambahan pula pengaturcaraan ini akan memudahkan manusia untuk menyelesaikan masalah dalam kes ini dari segi megukur paras lantai dan menukarkan nilai kepada voltan . Bagi tujuan menjayakan projek ini satu kombinasi berdasarkan robot mudah alih, pengaturcaraan C dan pengaturcaraan VB telah digunakan .

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CHAPTER 1

INTRODUCTION

1.1 Background

A mobile robot is an automatic machine which is affords to move in given area .

Definition for floor level measurement is measuring an angle to an object . Form the definition of mobile robot and floor level measurement , this project is all about mobile robot with floor level measurement application given by the scope of the project .

Most project in floor level measurement , they use the gyro sensor to measured floor level . It's different with this project where mobile robot uses accelerometer to measured floor level . The combination between mobile robot and floor level measurement application facilitate human life .

The problems statement on this project firstly is simplifying human work to measure floor level in industries for example civil industries . Customary when using manual measurement system , there are usually have errors . For more accurate measurement of floor level we can use this system to solve the problem . VB programming is used as an output to display the data in voltage and draw the movement of mobile robot . This project used the robot as an intermediate to solve human problem in the measuring floor level .

1.2 Problems Statement

In this project there are three problem statement. First problem statement is the human still use the manual method such as floor level water ruler to get the result for the floor level. The method is not efficient to get the floor level result at the huge area. After that the floor level water ruler has limitation because it will use only for the certain area not to entire area. When human use the manual method the result is not accurate and data collected is use a long time.

1.3 Objective Of Project

There are five objective for this project :

1) To build mobile robot with floor level measurement application .

2) To implement the accelerometer as a floor level measurement application .

3) To invert the data from accelerometer (degree) to display output (voltage) .

4) To invent the VB programming for display the output .

5) Get the result belong to the condition of floor which the floor is smooth or uneven or very uneven

1.4 Scope Of Project

- Accelerometer Circuit

- Microcontroller Circuit

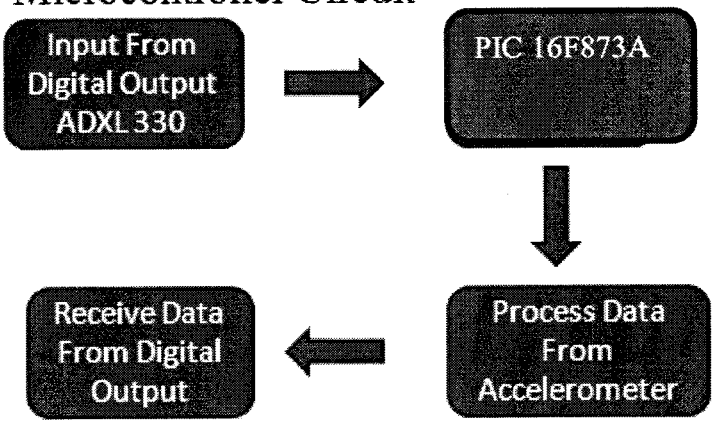

Figure 1.1 The Circuit Diagram

- Flow Of Project

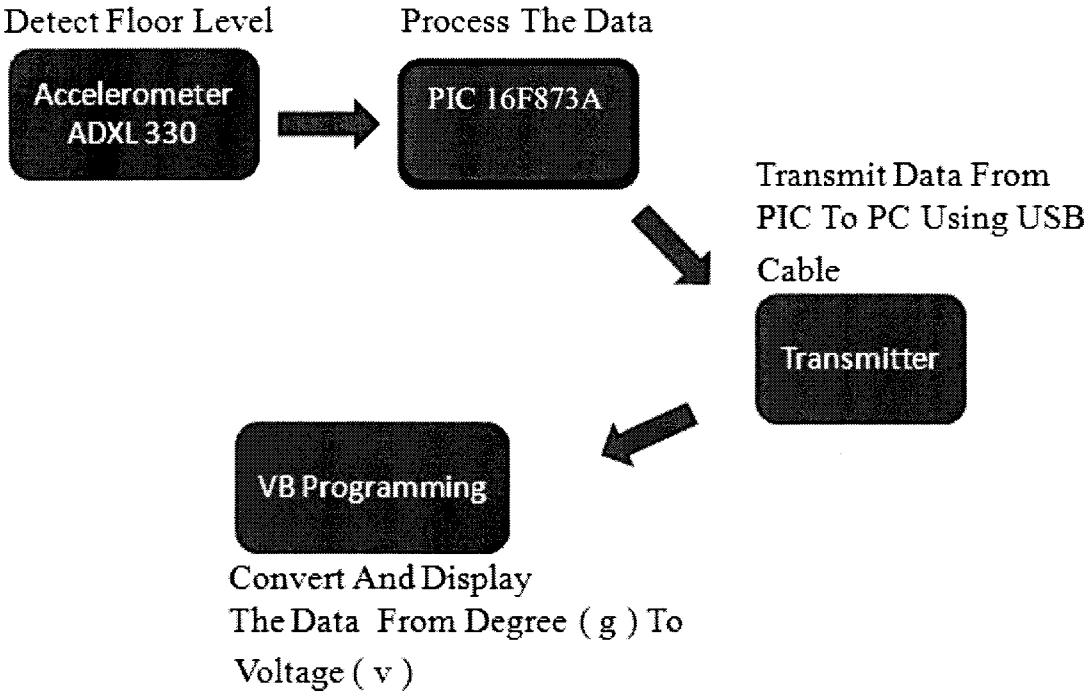

Figure 1.2 System Block Diagram

The figure 1.1 above is show the circuit diagram . The accelerometer could only function when get 3.3 V supply . Then it will measure the floor level by motion , shock and vibration in digital signal . After that the data will transfer to the PIC 16F873A to process it .Then PIC will send the signal the data will upload or transmit to the pc by using Serial Port cable connection . Next the visual basic programming loads the data . The VB programming also used to display the position of the floor and get the result belong to the condition of floor which the floor is smooth or uneven or very uneven.

1.5 Mobile Robot System Specification

- Accelerometer – Detect the floor level with certain output in voltage

- PIC16F873A - Process the voltage output from the accelerometer and send the Usart signal to the VB such as for the right position the Usart signal sent is '187'

- VB Programming – Display the position of the floor level whether the floor level is right position, flat position and so on.

- Range - No limited
- Operating Voltage – 3.3V and 5V
- Power – 12V and 9V Batteries
- Interface – Serial Communication

1.5.1 System Requirement

- Microsoft Visual Basic 6.0
- MicroC Programming
- Proteus 7.4
- Virtual Serial Port Emulator

1.6 Outline Of Thesis

This thesis consist of five chapter . The first chapter discussed about the background , problems statement , objective and the scope . In the chapter 2 discussed more on theory and literature reviews that have been done . It will discuss on components of the hardware and software used in this project. This project also discusses about mobile robot application and floor level measuring technique that already currently available in the market . Chapter 3 discussed on the methodology of hardware and software development of this project . Then in the chapter 4 will present the result and discussion about the whole of the project . Chapter 5 discussed the conclusion and recommendation of this progress report .

CHAPTER 2

LITERATURE REVIEW & THEORY

2.1 Introduction

Robot is a mechanical or virtual , artificial agent. It is usually an electromechanical system by its appearance or movements , conveys a sense that it has intent or agency of its own . The word robot can be referred to both physical robots and virtual software agents but the latter are usually referred to as bots to differentiate .

A typical robot will have several though not necessarily all of the following properties :

a) Is not 'natural' has been artificially created .

b) Can sense its environment .

c) Can manipulate or interact with things in its environment .

d) Has some degree of intelligence or ability to make choices based on the environment or automatic control / preprogrammed sequence .

e) Is programmable .

f) Can move with one or more axes of rotation or translation .

g) Can make dexterous coordinated movements .

h) Appears to have intent or agency (reification , anthropomorphisation or pathetic fallacy)

i) Is in some degree metallic .

2.2 Floor Level Measuring Technique

The device or detector used to measured floor level has various type . Basically the device or detector measure the floor level by detect the floor angle or Z axis of the floor . This part explains several devices for measuring floor level . For floor level measurement the device that selected is a accelerometer . The following sentences show the advantages of accelerometer compares to another devices .

2.2.1 Non-Contact Ultrasonic Sensors

The non-contact ultrasonic level sensors consist of the following elements such as sensor, analog signal processor, microprocessor, binary coded decimal (BCD) range switches, and an output driver circuit. The microprocessor generates a series of transmit pulses and a transmit gate signal that are routed through the analog signal processor to the sensor. The sensor transmits an ultrasonic beam to the surface level, and the returned echo from the surface is detected by the sensor and routed to the microprocessor, which processes the signal into a digital representation of the distance between the sensor and the surface level. The microprocessor stores the distance value and, by means of a moving average technique built into the software program, compares it to the value of others stored in memory. If the value does not correspond to prior signals or new signals being received, it is rejected. Incorporation of a moving average technique and a non-linear digital filter ensures rejection of spurious signals and noise.

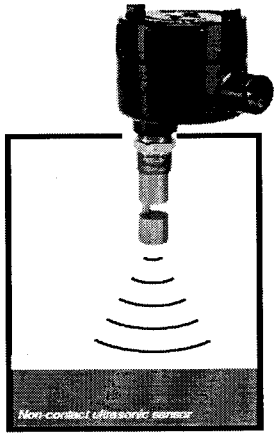

Figure 2.0 : Non-Contact Ultrasonic Sensors

2.2.2 LISY300AL (MEMS Inertial Sensor)

The LISY300AL is a low-power single-axis yaw rate sensor . It includes a sensing element and an IC interface able to provide the measured angular rate to the external world through an analog output voltage . The sensing element , capable of detecting the yaw rate , is manufactured using a dedicated micromachining process developed by ST to produce inertial sensors and actuators on silicon wafers . The IC interface is manufactured using a CMOS process that allows a high level of integration to design a dedicated circuit which is trimmed to better match the sensing element characteristics . The LISY300AL has a full scale of ±300 °/s and is capable of measuring rates with a -3 dB bandwidth up to 88 Hz . The LISY300AL is available in a plastic land grid array (LGA) package and can operate within a temperature range from -40 °C to +85 °C .

The LISY300AL belongs to a family of products suitable for a variety of application including :

- Gaming and virtual reality input devices
- Motion control with MMI (man-machine interface)
- Image stabilization for digital video and digital still cameras
- GPS navigation systems
- Appliances and robotics