Progress Presentation-I e-Yantra Summer Internship-2015

B Suresh Ramiz Hussain Devendra Kumar Jangir Mentors: Piyush Manavar,Saurav Shandilya

PC CONTROLLED TWO WHEEL BALANCE BOT

IIT Bombay

June 16, 2015

Overview of Project

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B Suresh Ramiz Hussain Devendra Kumar Jangir Mentors: Piyush Manavar,Saurav Shandilya

Overview Project

Image

Overview of Task

Task Accomplised

Task Accomplished

Task Accomplished

L293D Interfacing

L298N Interfacing

LCD Interfacing

GY-80 Module Interfacing

Task Accomplished

- Project Name :PC controlled two wheel balanced bot
- Objective: To make a two wheel balance bot which can balance itself without any extra support.
- Deliverables:
 - 1 Two wheel balance bot
 - PC controlled motion
 - 3 Documentation and tutorials
 - 4 Sample code

Image

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Overview of Project

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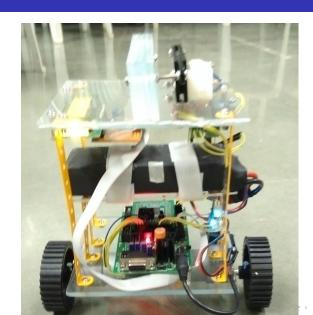
L293D Interfacing

L298N Interfacing

 $\mathsf{LCD}\ \mathsf{Interfacing}$

GY-80 Module Interfacing

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L293D Interfacing L298N Interfacing

Task Accomplished

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Task No.	Task	Deadline
1	Selection of components, sensors and	week 1
	actuators	
2	Design and fabrication of bot	week 1
3	Designing of circuit, power management and	week 1
	interfacing	
4	Algorithm and code implementation for	week 2,3
	balancing	
5	Algorithm and code implementation for	week 4,5
	locomotion via PC communication	
6	Analysis and documentation	week 6

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TASK1:Selection of components, sensors and actuators

- ATmega 2560 Development board
- DC Motor(300 RPM)
- 3 Linear Actuator(150 RPM)
- 4 L293D and L298N Motor driver
- 5 16x2 LCD Display
- 6 GY-80(Accelerometer and Gyroscope module)
- **7** 3 cell Li Po battery 11.1 Volts
- 8 Xbee module and adapter

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Task Accomplished TASK2:Design and fabrication of bot

Fabricating materials

Weight Shifting mechanism

Center of gravity

4 Protection from falling

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TASK3:Circuit design, power management and interfacing

- 1 L293D and L298N Interfacing
- **2** LCD(16x2)
- 3 GY-80(ADXL345 and AGD8) Interfacing
- Protection circuit for battery

L293D Interfacing

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L293D Interfacing

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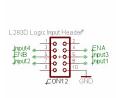
LCD Interfacing

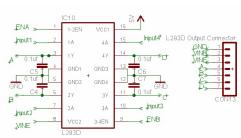
GY-80 Module

Task

Interfacing

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L298N Interfacing

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Task Accomplished

L293D Interfacing

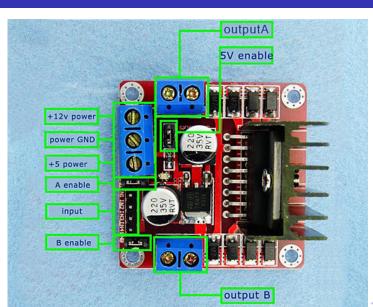
L298N Interfacing

LCD Interfacing

GY-80 Module Interfacing

Task Accomplished

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LCD Interfacing

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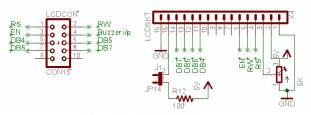
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Task



Schematic of LCD interfacing

GY-80 Module Interfacing

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Accomplished

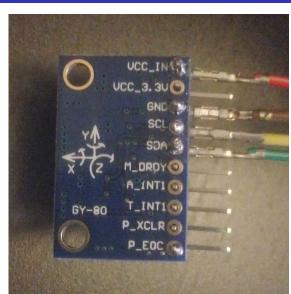
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TASK4:Algorithm and code implementation

- 1 I2C protocol for accelerometer and gyroscope
- PWM(10bit Fast PWM or Phase Correct PWM) for controlling velocity of motors
- Timers for PWM and PID calculations
- 4 PID Algorithm for balancing the bot

I2C Protocol

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L293D Interfacing L298N Interfacing

LCD Interfacing

GY-80 Module

Interfacing Task

- It is a synchronous data transfer protocol and uses master/slave technique.
- Maste initiates the communication .
- Slave works according to the master.
- Multiple devices can connect at the same time, each having a unique 7-bit address.
- Two bidirectional lines used for communication are:SCL(Serial clock) and SDA(Serial Data)

I2C software protocol

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SINGLE-	BYTE WRITE						
MASTER	START SLAVE ADDRESS + WRITE		REGISTER ADDRESS		DATA		STOP
SLAVE		ACK		ACK		ACK	

SINGLE-BYTE READ										
MASTER	START	SLAVE ADDRESS + WRITE		REGISTER ADDRESS		START ¹	SLAVE ADDRESS + READ			NACK STOP
SLAVE			ACK		ACK			ACK	DATA	

PID algorithm for the bot

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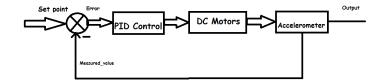
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LCD Interfacing

GY-80 Module Interfacing

Task



Challenges Faced

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Accomplished

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LCD Interfacing

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Task Accomplished

- Maintaining Center Of Gravity(COG) while fabricating the bot
- Understanding and Implementing I2C protocol
- Converting accelerometer values to angles in degrees
- Erroneous reading from accelerometer
- Generating time function using 16 bit timer
- PID tuning

Future Plans

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Overview of Project

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Task Accomplised

Task Accomplished

Task Accomplished

L293D Interfacing

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LCD Interfacing

GY-80 Module Interfacing

Task

- PID implementation for balancing and moving the bot
- Integrating gyroscope values using Complementary filter
- Xbee interfacing

Thank You

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Overview of Project

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Task Accomplised

Task Accomplished

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Accomplished

L293D Interfacing

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LCD Interfacing

GY-80 Module Interfacing

Task

Accomplished

THANK YOU!!!