

Introduction to Firebird-V Robotics Research Platform

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Agenda for Discussion

- 1 Introduction to Robotics
 - Major Components of a Robot
- 2 Introduction to FireBird Platform
 - Firebird V 8051 Platform
 - Firebird V AVR Platform
 - Firebird V ARM Platform
- 3 Introduction to FireBird LPC2148 Platform
 - Major Components of a Robot
 - Sensors
 - Actuators
 - Control
 - Intelligence
 - Power
 - Communication
 - Indicating Devices
 - Block Diagram



Major Building Blocks of Robot

What are the Major Components needed for Designing a Robot?



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- 6 Communication: Robot can talk to another robot/PC



Flavors of Firebird Robots



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1 Configuration-1:

Master: P89v51RD2

Slave: ATmega 2560



Flavors of Firebird Robots

- 1 Configuration-1:
Master: P89v51RD2 Slave: ATmega 2560
- 2 Configuration-2:
Master: ATmega 2560 Slave: ATmega 8



Flavors of Firebird Robots

- 1** Configuration-1:
Master: P89v51RD2 Slave: ATmega 2560
- 2** Configuration-2:
Master: ATmega 2560 Slave: ATmega 8
- 3** Configuration-3:
Master: LPC 2148 Slave: 2 x ATmega 8



Firebird V P89v51RD2 Platform



Firebird V P89v51RD2 Platform



Firebird V P89v51RD2 Platform



- 1 This Platform has 8051 architecture based adaptor board.



Firebird V P89v51RD2 Platform



- 1 This Platform has 8051 architecture based adaptor board.
- 2 Microcontroller used is Philips manufactured P89v51RD2 as master.



Firebird V ATmega2560 Platform



Firebird V ATmega2560 Platform



Firebird V ATmega2560 Platform



- 1 This Platform has AVR architecture based adaptor board.



Firebird V ATmega2560 Platform



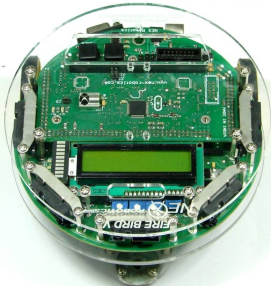
- 1 This Platform has AVR architecture based adaptor board.
- 2 Microcontroller used is Atmel manufactured ATmega2560 as master.



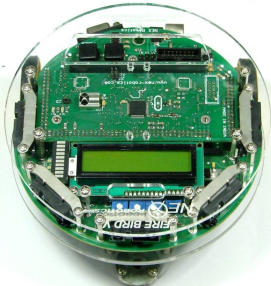
Firebird V LPC 2148 Platform



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Firebird V LPC 2148 Platform



- 1 This Platform has ARM-7 architecture based adaptor board.



Firebird V LPC 2148 Platform



- 1 This Platform has ARM-7 architecture based adaptor board.
- 2 Microcontroller used is Philips manufactured LPC2148 as master.



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The Major Components needed for Designing a Robot

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Sensors on Firebird V Platform

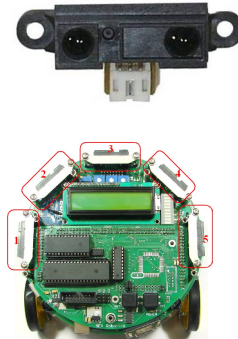
1. Sharp IR Range Sensors



Sensors on Firebird V Platform

1. Sharp IR Range Sensors

- 1 Transmitter: IR ray
Receiver: CCD Array

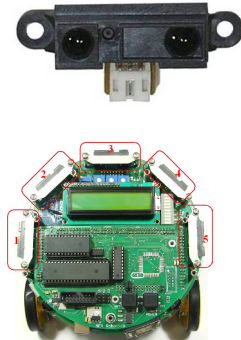


Sensors on Firebird V Platform

1. Sharp IR Range Sensors

- 1 Transmitter: IR ray
Receiver: CCD Array

- 2 Count on Firebird: 05



Sensors on Firebird V Platform (cont.)

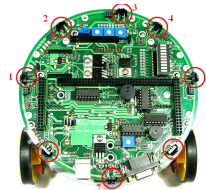
2. IR Proximity Sensors



Sensors on Firebird V Platform (cont.)

2. IR Proximity Sensors

- 1 Transmitter: IR ray
Receiver: Phototransistor

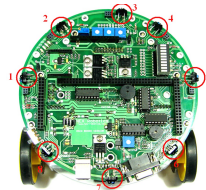


Sensors on Firebird V Platform (cont.)

2. IR Proximity Sensors

- 1 Transmitter: IR ray
Receiver: Phototransistor

- 2 Count on Firebird: 08



Sensors on Firebird V Platform (cont.)

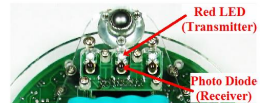
3. White Line Sensor



Sensors on Firebird V Platform (cont.)

3. White Line Sensor

- 1 Transmitter: Red LED
Receiver: PhotoTransistor

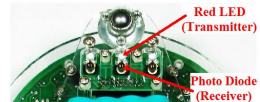


Sensors on Firebird V Platform (cont.)

3. White Line Sensor

- 1 Transmitter: Red LED
Receiver: PhotoTransistor

- 2 Count on Firebird: 01



Sensors on Firebird V Platform (cont.)

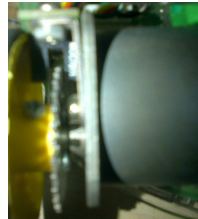
4. Position Encoder



Sensors on Firebird V Platform (cont.)

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- 1 Transmitter: IR Transmitter
Receiver: PhotoTransistor

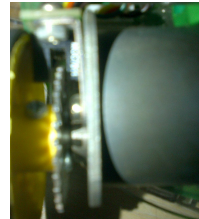


Sensors on Firebird V Platform (cont.)

4. Position Encoder

- 1 Transmitter: IR Transmitter
Receiver: PhotoTransistor

- 2 Count on Firebird: 02



Sensors on Firebird V Platform (cont.)

5. Infrared TSOP Receiver



Sensors on Firebird V Platform (cont.)

5. Infrared TSOP Receiver

1 Receiver: PhotoTransistor



Sensors on Firebird V Platform (cont.)

5. Infrared TSOP Receiver

1 Receiver: PhotoTransistor

2 TSOP1738



Sensors on Firebird V Platform (cont.)

5. Infrared TSOP Receiver

1 Receiver: PhotoTransistor

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3 Count on Firebird: 01



Sensors on Firebird V Platform (cont.)

6. Servo Mounted Sensor Pod



Sensors on Firebird V Platform (cont.)

6. Servo Mounted Sensor Pod

- 1 Purpose: Mount Camera or Sensor



Sensors on Firebird V Platform (cont.)

6. Servo Mounted Sensor Pod

- 1 Purpose: Mount Camera or Sensor
- 2 Count on Firebird: Optional Add-on Module



Sensors on Firebird V Platform (cont.)

7. Accelerometer



Sensors on Firebird V Platform (cont.)

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- 1 Accelerometer is used for measuring acceleration in particular direction



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- 2 Count on Firebird: Optional Add-on Module



Sensors on Firebird V Platform (cont.)

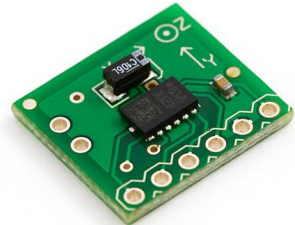
8. Gyroscope



Sensors on Firebird V Platform (cont.)

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- 1 Gyroscope are devices used for providing stability and maintain fixed orientation



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Sensors on Firebird V Platform (cont.)

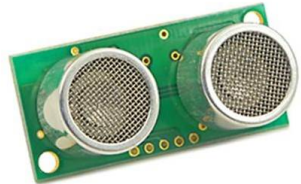
9. Ultrasonic Sensor



Sensors on Firebird V Platform (cont.)

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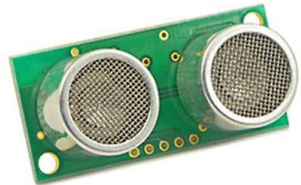
- 1 Ultrasonic sensor is used for object detection



Sensors on Firebird V Platform (cont.)

9. Ultrasonic Sensor

- 1 Ultrasonic sensor is used for object detection
- 2 Count on Firebird: Optional Add-on Module



Sensors on Firebird V Platform (cont.)

10. Motion Sensor



Sensors on Firebird V Platform (cont.)

10. Motion Sensor

- 1 PIR Motion Sensor is used for detecting motion of live object.



Sensors on Firebird V Platform (cont.)

10. Motion Sensor

- 1 PIR Motion Sensor is used for detecting motion of live object.
- 2 Count on Firebird: Optional Add-on Module



Sensors on Firebird V Platform (cont.)



Sensors on Firebird V Platform (cont.)

11. Global Positioning System(GPS)

- 1 GPS module are devices which receives GPS signal to locate itself on earth



Sensors on Firebird V Platform (cont.)

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- 2 GPS module gives latitude and longitude information



Sensors on Firebird V Platform (cont.)

11. Global Positioning System(GPS)

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- 2 GPS module gives latitude and longitude information
- 3 Count on Firebird: Optional Add-on Module



Actuators



Actuators

1 Two 60 RPM DC Geared Motor



2 Servo Motors



Control Room of Robot



Control Room of Robot

- 1 NXP Phillips Manufactured ARM-7 architecture based LPC2148 microcontroller



How is Robot Made Intelligent



How is Robot Made Intelligent

- 1 Language used for programming: EMBEDDED 'C'
- 2 EMBEDDED 'C' similar to C.



Powering the Robot



Powering the Robot

- 1 Battery Powered: 9.6V, 2100mAH, NiMH battery



- 2 Auxillary Power: 9V, 1A Adaptor



Communication



Communication

- ✓ Wired Communication: Between Robot and System



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- ✓ USB; RS-232 Serial; USB-to Serial



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- ✓ Wire-less Communication: Between Robot and System and Robot and Robot



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- ✓ Infrared Remote



Indicating Devices



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- ✓ 16x2 Alpha numeric LCD



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- ✓ Buzzer



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Indicating Devices

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- ✓ Buzzer



- ✓ Bar-LED

Indicating Devices

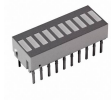
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- ✓ Buzzer



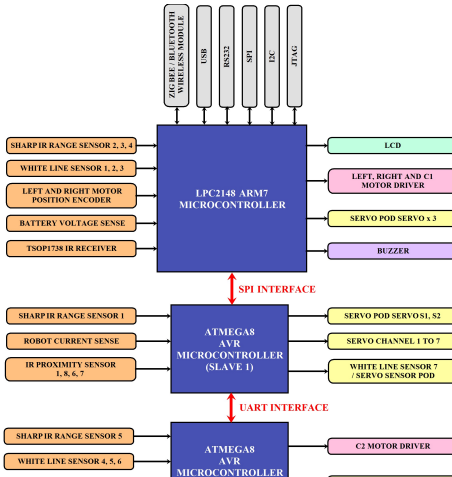
- ✓ Bar-LED



Block Diagram of LPC2148 ARM7 based Robot



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Thank You!

Post your queries on: <http://qa.e-yantra.org/>

