eyantra

e-Yantra Robotics Competition

Team Id : eYRC#1004-CS

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Theme assigned	Cargo Sorting
Date	22 Dec 2014

Scope (5)

State the scope of the theme assigned to you.

Ans :

Cargo sorting as the name suggests refers to arranging cargo according to the requirement. For eg. Criteria for sorting at an airport could be the destination to which the cargo is bound to, according to which a cargo unit would move to a terminal where a flight bound to that particular destination is standing.

Cargo sorting is a necessary for   variety services such as cargo sorting at airports, postal services etc. Such a cargo sorting robot can be used to sort cargo which is palletized. The purpose of such a robot would be to automate the cargo sorting process.   As the figure illustrates, using a robot for cargo sorting would automate and reduce cost for cargo sorting

Building Modules   (5)

Identify the major components in your robotic system provided required for designing a solution to the theme assigned.

Ans :

Mechanical Systems:
- Wheels and castor wheel: Required for   basic movement of   the robot.
- Gripper : For picking up cargo boxes

Electrical Systems:
- Motor : For   the motion of   the wheels.

Electronic Sytems:
-

Actuators   (10)

List all the actuators present on Firebird V robot. Besides the existing actuators, please mention the additional actuators that may be required for designing the robotic system in your theme if any.

Ans :

Explain the mechanism for controlling the actuators on your robot.

Ans :

Environment sensing   (10)

Explain the functioning of environment sensing technique used by Firebird V robot in your theme.

Ans :

Power Management   (5)

Explain the power management system required for a robot in general and for Firebird V robot in particular.

Ans :

Navigation Scheme (10)

Explain in brief the basic navigation technique for path traversal in the arena. Explain the concept and list the components required for basic navigation.

Ans :

The readings from the white line sensors would tell the microcontroller whether the robot is following the black line(on the flex sheet) or whether it is off. On the basis of this measurement the microcontroller would decide whether to take a left or a right turn i.e. take a corrective action so that the robot again starts following the black line.

Components required for basic navigation would be
- **Two motors**
- **White line sensors**
- **IC L293D (motor driving IC)**
- **Microcontroller (ATmega 2560 in case of Firebird V robot)**
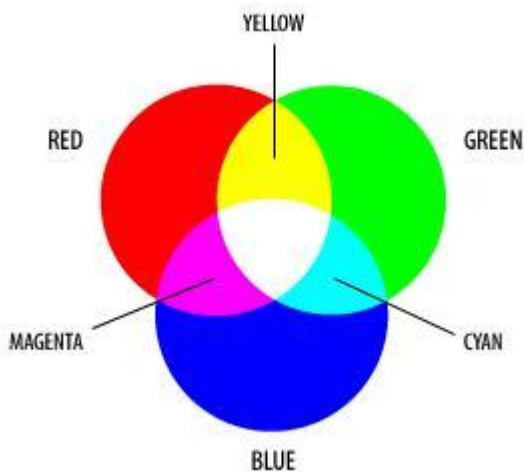
Testing your knowledge (Based on color sensor datasheet and tutorial) (10)

What is the principle of operation of the color sensor?

Ans :

Working principle

As we know, according to the RGB color model, a broad array colors is produced by red green and blue light

added together in various ways. In other word, if we know the RGB data which constitutes different kind of color, we can get the certain color we test. With a certain color filter is selected(e.g red filter), TSC230 color sensor allows red light to get through alone and prevent other color green and blue light, so we can get the intensity of the red color. Blue and green light of intensity can be got in the same way.

S2	S3	PHOTODIODE TYPE
L	L	Red
L	H	Blue
H	L	Clear (no filter)
H	H	Green

TCS230 includes 8X8 array of photodiodes, 16 photodiodes have blue filters, 16 photodiodes have green filters, 16 photodiodes have green filters and 16 photodiodes are clear with no filters. With the different combination of S2 and S3, we can choose different type of color filter The full-scale output frequency can be scaled via two control input S0 and S1, by which we can output the different frequency coefficient (100%, 20%, 2%).

S0	S1	OUTPUT FREQUENCY SCALING (f_o)
L	L	Power down
L	H	2%
H	L	20%
H	H	100%

What are the functions of pins 1-8 of the color sensor?

Ans :

- Pin 1 : Output frequency scaling selection input   (S0)
- Pin 2 : Output frequency scaling selection input (S1)

S0 and S1 are used to scale down the frequency of the output generated by the color sensor. This is done for measurement purpose.

- Pin 3 : Enable pin for output frequency f0. It is an active low signal (OE bar). It puts the output at pin 6 at high impedance state for multiple-unit sharing of the microcontroller input line.
- Pin 4 : Power supply ground
- Pin 5 : Supply Voltage (Vdd = 5V)
- Pin 6 : Output frequency f0

- Pin 7 :   Photodiode Type selection input (S2)

- Pin 8 : Photodiode Type selection input (S3)

Pins 7 and 8 (S2 and S3) are used to select one type of photodiode out of a possible   three.(red, green and blue)

What is frequency scaling and why is it necessary?

Ans :

Frequency scaling is done to provide a range of   output frequencies such that the different frequencies can be used for optimal measurement by different measurement techniques.

Also, frequecy scaling would help in interfacing with a low cost microcontroller that has a lower frequency counter. Thus, it provides flexibiltiy in terms of the microcontroller used.(It can be of a higher frequency or a lower frequency)

Further, scaling can be used to improve resolution for a given clock.

Did you study the color sensor tutorial?

Ans :   Yes

Did you burn the demo code on Firebird V and test the color sensor?

Ans : Yes

Was your color sensor working fine?

Ans : Yes

If no, please explain.

Not Applicable

Challenges   (5)

What are the major challenges that you can anticipate in addressing this theme?

Ans:

Challenge 1 : Deciding how to