MANDI
4TH INTER IIT TECH MEET
2016

LET THE BRAINS COMPETE AGAIN

Embedded Systems Problem Statement

TITLE:

Human Voice Controlled Pick and Place Robot

DESCRIPTION:

Today's generation is fond of rest & enjoyment with no interest in doing manual work. Thus we need to develop a robot which could, on human command, perform the task of moving objects from one place to another without human-intervention. This problem requires you to use hardware and software of your choice to create your own personal assistant.

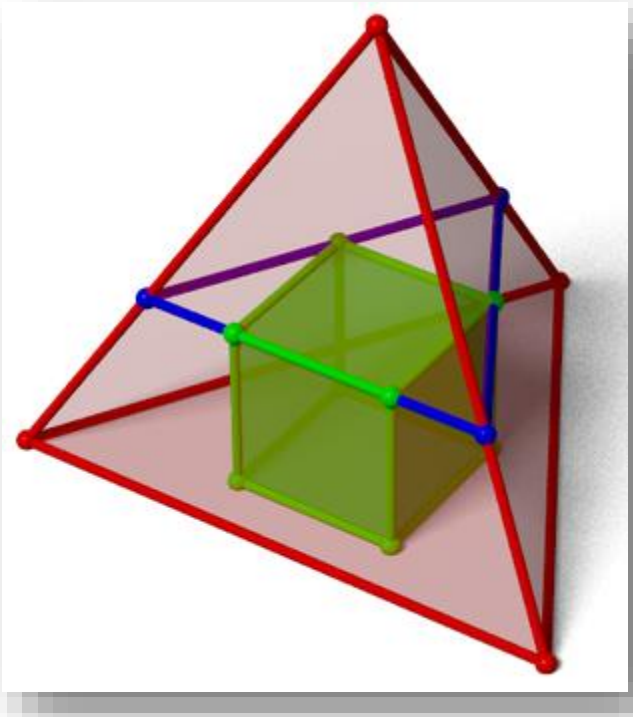
OBJECTIVE:

Design a hardware implementing the basic idea of picking and dropping a material from one place to another place. The robot is governed by the master's voice. The hardware should be operated easily on the voice command given to the robot to perform the specific purpose.

RULES AND CLARIFICATIONS:

I. There are no restrictions on the size of the machine/robot.
II. The robot will be granted access to the internet if required.
III. The object which has to be lifted may have any shape, depending on the choice of the participant(s). But for the object to qualify as a valid object for the competition, it needs to:

>> have a weight greater than or equal to 50 grams,
>> have minimum size greater than or equal to a cube of 4cm X 4cm X 4cm.
>>In case the object has an indefinite shape, or some other fixed shape like a sphere, the size of the object should be such that if the same object was hollow, then a cube of size 4cm X 4cm X 4cm could fit in it. For instance, if you choose a tetrahedron, its dimensions should be such that if we had a hollow tetrahedron of the same dimensions, then we should be able to fit a cube of the above dimensions into the hollow tetrahedron(see image):



IV. The robot should be able to recognize objects around itself using basic image processing techniques, either based on colour, or shape. Since it is an open-ended event, you may use advanced techniques, like the robot may recognize objects by the names they are called with, based on both shape and colour. For example : It may identify a 'football', 'glass', etc. But this is not necessary, but only an add-on feature which the participant(s) may choose to add in the robot.

V. You may use any kind of voice commands you prefer, but only to direction the robot , "forward", "left", "stop", "move", "turn left", etc. To pick up the desired object, you should only use something like "pick xyz", and it should automatically identify the object out of various objects kept there, and pick it up. You may again use directional voice commands to place the object to the desired place.

You will need to move the robot to a pre-decided point, and as the robot reaches that point, it will be surrounded by a group of objects in a circular shape, out of which, one object would be the object which has to be picked. The robot should identify the object and pick it up and bring it back. The size of the circle in which we place the objects will be 1 feet greater than the turning radius of the robot.

VI. You may use an Android device, laptop, etc. to control the robot if you want to.

VII. The position of the microphone depends on the robot design. If you wish, you may use the microphone of your mobile to make the robot work, or an external microphone which you can carry, or you may attach a microphone to the body of the robot.

VIII. You may use ready-made robotic arm(s) if required.

IX. The robot may be powered either by mains, or by a battery. The choice is up to the participant(s).