

**e-Yantra Robotics Competition - 2017**

**Theme and Implementation Analysis – Planter Bot**

**<Team ID>**

|  |  |
| --- | --- |
| **Team leader name** |  |
| **College** |  |
| **Email** |  |
| **Date** |  |

**Scope and Preparing the Arena**

**Q1. a. State the scope of the theme assigned to you.**

**(5)**

< Teams should briefly explain in their own words the theme assigned. What in your opinion is the purpose of such an application?

Answer format: Text, Word - limit: 100 words>

**b. Upload the Final Arena Images.**

**(20)**

< Prepare the arena according to the steps given in Section 3: Arena, of the Rulebook. Please follow the arena configuration shown in “Figure 1: Arena Design” and  “Figure 4: Arena Design with Dimensions” of the rulebook.

Configuration for Zone Indicators and Color Markers associated with them are as per following Table:

|  |  |  |  |
| --- | --- | --- | --- |
| Zone Indicator Number | Cell number for Zone Indicator | Color Marker Type | Number of Color Markers |
| 1 | N3 | Red Circle | 3 |
| 2 | F7 | Green Triangle | 4 |
| 3 | O11 | Red Square | 1 |
| 4 | E16 | Blue Square | 2 |

In addition to this, place a Zone Indicator at Cell number J16. This has no Color Markers associated. Refer to Section 2: Theme Description and Section 6: Theme Rules of Rulebook for more information about this.

**Take 4 photos** of the completed arena from different angles such that the entire arena along with its components such as Terrains, Zone Indicators, Cells, etc., is clearly visible in the photos.

Answer Format: The four image files should be uploaded as **.jpg** along with this document as per instructions in Read Me for Task 3. >

**Building Modules**

**Q2. Identify the major components required for designing the robotic system for the theme assigned to you.**

**(5)**

< Teams should classify the components into various categories: mechanical systems, electronic systems etc. and mention how these units will be used in the theme. You may draw diagrams/figures to illustrate your answer.

Answer format: Bulleted form

1. Component 1

2. Component 2

3. Component ….etc. >

**Power Management**

**Q3. a. Explain the power management system required for a robot in general and for the theme assigned to you in particular.**

**(5)**

< Teams should mention the power requirement of their system with current rating and voltage requirement. You can mention the mode (auxiliary/battery) you prefer to use in your system with necessary justification. You can also draw some diagrams/figures to illustrate your answer.

Please provide the answer in your own words.

Answer format: Text, Word-limit: 100 words>

**b. Can there be a single power supply for your robot? - Yes/No/Don’t know. Please elaborate/justify your answer choice.**

**(5)**

< Support your answer.

Answer format: Text, Word - limit: 200 words >

**Design Analysis**

**Q4.** **Teams have to design a robot which traverses a arena following a given path and simulate planting by overlaying image in GUI.**

**a. How will your robot traverse a field represented by the Arena given in the rulebook?**

**(5)**

    < Explain your path planning technique(s). Clearly specifying the hardware components, inputs and outputs for your technique. You can explain multiple techniques.

Word-limit: 500 words. >

**b. If you were to implement this theme in the real-world scenario, what would be the actuators you will employee? Explain their purpose.**

**(5)**

< Justify your answer by stating the advantage/s of the chosen actuator/s over others. Actuators that will be required for movement, planting mechanism, etc.

Answer format: Text, Word - limit: 200 words>

**Environment Sensing**

**Q5. a. Explain how you will use the PiCam to decide the course of traversal.**

**(5)**

< Team should explain in detail how they will use the mounted PiCam to sense the environment associated with the theme. Explain the role of Camera in providing important feedback during the Run.

Answer format: Text, Word - limit: 300 words>

**b. Would the webcam be a better choice of camera over the PiCam? Explain.**

**(5)**

< Think which a better option is: using a webcam or Picam? Support your answer by listing pros and cons of choosing each option.

Answer format: Text, Word - limit: 200 words >

**c. What other sensors will the robot require to complete its task successfully?**

**(5)**

< Answer format: Bulleted form

1. Sensor 1

2. Sensor 2

3. Sensor 3 ….etc. >

**Testing your knowledge (Theme Analysis and Rulebook-related)**

**Q6. a. If a team has an overlay similar to one shown in the Figure 1, how many points will you score for the overlay in total. Specify score for accuracy, penalty if any and total. Elaborate on penalty if any - why it will be applicable?**

**(5)**

**Note: The team has selected the correct seedling image upon detection of Color Marker and there are three such Color Markers at the Zone Indicator.**



**Figure 1: Overlay Example**

< Analyse the formula provided in the rulebook and explain how it will affect the score.

Answer format: Text/Bulleted form >

**b. Name the different Terrains in the Arena.**

**(3)**

<Answer format: Bulleted form

1:

2:

3:…etc. >

**c. How many possible unique Color Markers can be made in this theme?**

**(3)**

< Answer format: Single number >

**d. If there are 3 Blue Triangle Color Markers placed in front of a Zone Indicator, how will you indicate this via hardware only?**

**(3)**

< Answer format: Text

Word-limit: 200 words >

**e. What are the different conditions that indicate end of a run?**

**(3)**

< Explain in your own words. Answer format: Bulleted form, word-limit: 300 words

Condition 1:

Condition 2:

Condition 3:…etc. >

**Algorithm Analysis**

**Q7. Draw a flowchart illustrating the algorithm you propose to use for theme implementation.**

**(10)**

< The flowchart should elaborate on every possible function that you will be using for completing all the tasks in the assigned theme. Follow the standard pictorial representation used to draw the flowchart.

Answer format: Text, Word-limit: 1000 words >

**Challenges**

**Q8. What are the major challenges that you can anticipate in addressing this theme and how do you propose to tackle them?**

**(8)**

< Answer format: Bulleted form

1. Challenge 1

2. Challenge 2

3. Challenge 3, etc. >