

**e-Yantra Robotics Competition - 2018**

**Theme Analysis and Implementation - Nutty Squirrel**

**<Team ID>**

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

**Scope and Preparing the Arena**

**Q1. State the scope of the theme assigned to you. (5)**

< Teams should briefly explain in their own words the theme assigned. What in their opinion is the purpose of such an application? You may use figures / diagrams to support your answer.

Answer format: Text - limit: 50-100 words>

**Q2. Attach the image of final arena that you have prepared. (5)**

< Prepare the arena according to the steps given in *Preparing the Arena* section in Rulebook. Please follow the arena configuration shown in Final Arena of the Rulebook.

Place the Nuts (Red, Blue and Green) in the Pick-up Area and Lift structure in lift section.

Take 3 photos of the completed arena from different angles such that the entire arena is clearly visible in the photos.

The three image files should be uploaded along with this document in zip format.>

**Building Modules**

**Q3. Identify the major components required for designing the robotic system and lift mechanism for the solution of 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. Team should mention the usage of individual component.

Answer format: Bulleted form, word-limit: 300 words.

Robot:

1. Component 1

2. Component 2

3. Component ….etc. >

Lift Mechanism

1. Component 1

2. Component 2

3. Component ….etc. >

**Q4. Can you optimize the given sensors and actuators to perform the tasks. If yes, then how? (5)**

< Teams should classify the components into various categories: mechanical systems, electronic systems etc. and explain the usage.

Answer format: Bulleted form, word-limit: 300 words.

Robot:

1. Component 1

2. Component 2

3. Component ….etc. >

Lift Mechanism

1. Component 1

2. Component 2

3. Component ….etc. >

**Actuators**

**Q5. What are the different actuators you are planning to use in the robot and lift mechanism. Justify their use? (5)**

< Team should list all types of actuators they will need for making the complete system. Teams have to mention: (i) actuators that are going to be used in building the bot and (ii) actuators that they need to interface with lift mechanism. You can also draw some diagrams/figures to illustrate your answer.

Answer format: Bulleted form

1. Actuator1 and its use

2. Actuator2 and its use etc. >

**Power Management**

**Q6. Explain the power management system required for a robot and lift mechanism in Nutty Squirrel theme implementation. What are the aspects that you should look into for designing the power management? (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>

**Design Analysis**

**Q7. How are you planning to design the robot to detect the presence of Obstacles, Nuts and Lift structure? (4)**

< Teams should mention the actuator and sensor they will be using for detection purpose. Explanation of how the robot will detect the Obstacles, Nuts and Lift while going from base arena to top arena and vice verse. You can also draw some diagrams/figures to illustrate your answer.

Please provide the answer in your own words. Answer format: Text

Word-limit: 200 words>

**Q8.** **Teams have to design a mechanism for picking and placing the Nuts in Deposit zones.**

1. **Choose an option to position the mechanism on the robot and why? (4)**
2. **Front 2. Back 3. Right/Left 4. Other position**

< Justify your choice for placement of the mechanism. Word-limit: 100 words. >

1. **Explain the design of the mechanism and how it is mounted on the robot. (4)**

< Explain and draw figure(s) of your mechanism and show how you are planning to mount the mechanism on/around the robot. You can also draw some diagrams/figures to illustrate your answer.>

1. **What challenge/s do you expect to face while designing the picking and placing mechanism of the Nuts and how you will overcome them? (2)**

< Answer format:

Challenge:

Solution:

Challenge:

Solution

etc. You can also draw some diagrams/figures to illustrate your answer.>

1. **Explain the design and working of the lift mechanism. (4)**

< Explain and draw figure(s) of your lift mechanism and show how you are planning to make the mechanism. You can also draw some diagrams/figures to illustrate your answer.>

1. **What challenge/s do you expect to face while designing the lift mechanism and how you will overcome them? (2)**

< Answer format:

Challenge:

Solution:

Challenge:

Solution

etc. You can also draw some diagrams/figures to illustrate your answer.>

**Testing your knowledge (theme analysis and rulebook-related)**

**Q9. Answer the following questions related to the sensors**

**a. What is the principle of operation for: (i) the color sensor and (ii) Sharp Sensor (iii) IR Sensor? Also, for each sensor mention the threshold value for sensing. (15)**

Colour sensor

**Algorithm Analysis**

**Q10. 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. >

**Q11. What path planning algorithm you are planning to use and how it is going to affect the theme implementation? (5)**

< Explain in detail the way path planning helps in attaining the best solution. Discuss the path planning algorithm). Justify your choice. What is the step by step procedure you should do for proper implementation

Answer format: Text

Word-limit: 300 words

>

**Programming**

**Q12. How do you plan to synchronize the actions of robot and lift mechanism? (5)**

< Explain the controlling, detection of the robot system and lift mechanism. You can also draw some flowcharts/figures to illustrate your answer.

Answer format: Block Diagram, Description >

**Challenges**

**Q13. What are the major challenges that you can anticipate in addressing this theme and how do you propose to tackle them? (5)**

< Answer format: Bulleted form

1. Challenge 1

2. Challenge 2

3. Challenge 3, etc. >

**Cost Analysis**

**Q14. What is the approximate cost of theme after considering individual component?**

**(You may include flex printing cost as well, list it separately)**

Flex:1000

Aluminium clamps and bars: 250

Nuts and bolts:150

Ply:400

Color paper printing and thermocol:90

Channel slider: 400

Stationary:100

Acrylic board:200

Shaft and pully:200

**Rules and Scoring**

**Q15. Nutty Squirrel theme consists of the following formula for scoring as mentioned in Judging and Scoring section of Rulebook:**

**Total Score = (600-T) + (CD\*50) + (CDP\*100) – (ID\*20) – (IDP\*40) + B – P**

**What will be your strategy to earn maximum points in a run? (10)**

< Answer in not more than 200 words>