



**MONTGOMERY COUNTY FAIR & RODEO**

# ***FARM TO FUEL***

**AG ROBOTICS**



**Montgomery County Oil:** The oil industry in Montgomery County, Texas began in the early 1900s with the discovery of oil. The Conroe Field, the first oil well in the area, was drilled in 1931 and produced significant amounts of oil. The industry continued to thrive, with numerous companies setting up operations in the area. The discovery of the Conroe Oil Field in the 1950s led to a boom in the local economy, making Montgomery County one of the leading oil-producing counties in the state by the 1970s. However, the industry faced challenges such as oil price crashes in the 1980s and 2010s, leading to a decline in oil production and a slowdown in the local economy. Despite these challenges, the oil industry remains an essential part of the local economy, providing jobs and revenue to the area.



**Crater Lake Blowout:** The Conroe Oil Field in coastal Texas experienced a catastrophic blowout in 1933, resulting in a fire that burned for several months and caused significant damage. However, the incident ultimately led to the development of directional drilling, a technique that allowed operators to control the well and contain the blowout. This breakthrough marked a turning point in oil drilling, leading to improvements in safety and efficiency. Today, the site of the blowout is marked by Crater Lake, a reminder of the powerful forces at work in the industry and the ingenuity of those who work to harness them.



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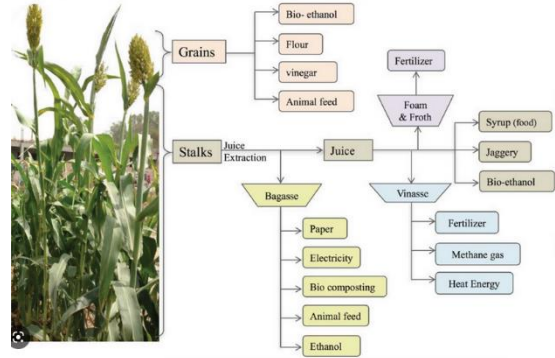


**Iron Roughnecks:** The oil and gas industry employs roughnecks to perform physically demanding tasks on drilling rigs. Technological advancements, such as robotic automation, have revolutionized the industry, improving efficiency, accuracy, and safety. The Iron Roughneck is a versatile and reliable machine that automates the process of making tubular connections, minimizing hazards, saving time, and reducing accidents. It can perform tasks in harsh weather conditions, making it ideal for drilling in remote and challenging locations. Robotic automation has transformed the industry, and further technological advancements are expected to improve safety, productivity, and reduce costs.





**Ethanol/Bio-fuels:** The production of bio-energy fuels like ethanol has increased in the United States over the past two decades due to new renewable energy standards. Bio-energy fuels help reduce the demand for non-renewable fuels and create a more sustainable production process. The by-products of ethanol production, such as distillers' grains, are nutritious animal feed that can replace traditional feed sources, reducing environmental impact. The use of by-products from bio-energy production can create a more efficient and sustainable energy production process while supporting other industries like agriculture.



**Solar Farming:** Solar energy in Texas has seen a significant increase over the last decade, with 13,947.06 Megawatts of solar installed in 2021, enough to power around 1,682,330 homes. Texas ranks second in the nation for solar energy potential.



The growth in solar energy has led to the development of several solar farm projects, such as the Blue Jay solar farm project in Grimes County, which spans over 2,700 acres and features over 658,000 solar panels. These solar farms help meet increasing energy demand sustainably and reduce reliance on traditional energy sources. The trend is expected to continue with increasing investments in solar power infrastructure and technology.

**Wind Farming:** Wind turbines are structures that convert wind energy into electricity, and they have evolved from their initial use as windmills for grinding grain or pumping water. They work by harnessing the kinetic energy of wind to turn a rotor, which powers a generator that produces electricity. Wind energy is a sustainable resource that is created as a byproduct of the sun's heating of the earth's surface, and it is constantly replenished. Wind turbines can help reduce dependence on fossil fuels and contribute to a cleaner, more sustainable future.



**Texas A&M & Chevron Bio Diesel:** A collaboration between Texas A&M AgriLife and Chevron to develop Diesel Nut, a type of oilseed crop that can be used to produce a biodiesel fuel alternative.



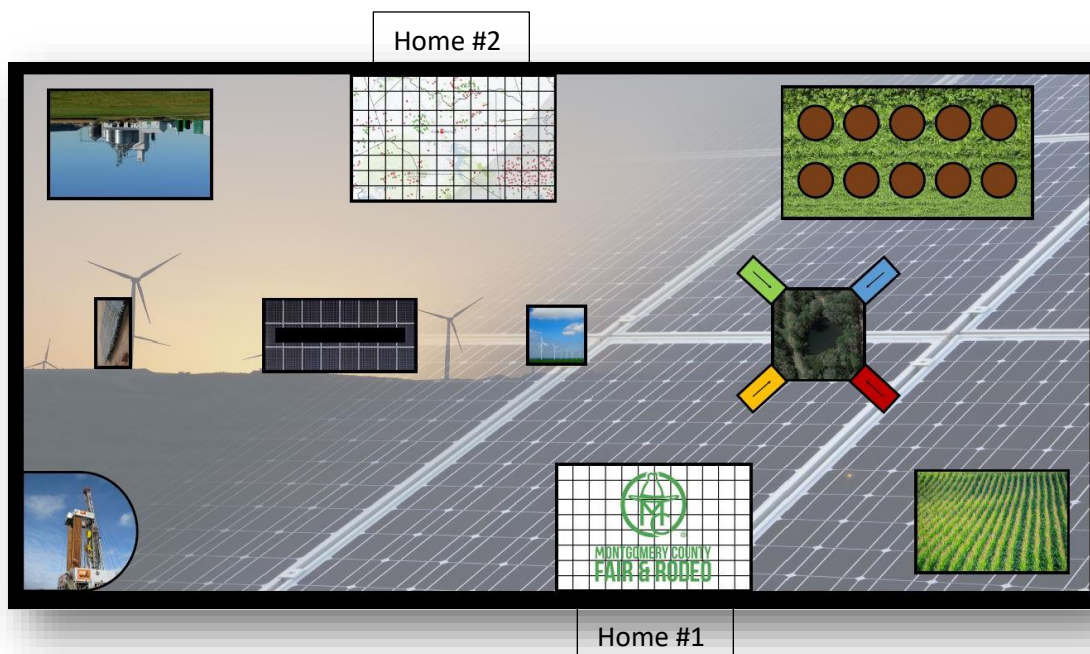
The project aims to increase the production of sustainable biofuels and reduce the carbon footprint of the transportation sector. The collaboration includes research and development efforts, as well as community outreach programs to raise awareness about the benefits of biodiesel fuel. The article highlights the potential impact of Diesel Nut in providing a reliable, domestic source of renewable energy and supporting rural economies.

# AGROBOTICS GAME DESIGN AND OBJECTIVES

## GAME THEME




Farm to Fuel



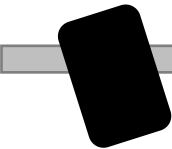
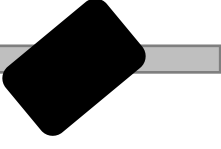
## GAME MAT LAYOUT


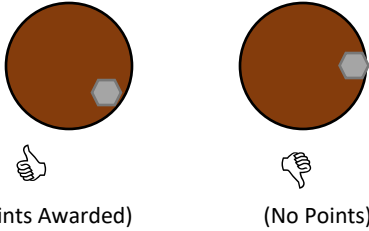


The area where the robot can be launched from is called the PLAYER ZONE. The area located outside that is collectively called the GAME ZONE.

1. HOME Locations
  - A. Home #1: Montgomery County Fair & Rodeo Logo
  - B. Home #2 (if Objective 1 is completed: Montgomery County Grid)
2. GAME ZONE

OBJ. #	OBJECTIVE	DESCRIPTION	POINT VALUE
<p><b>1.</b></p>	<p><b>PLACE THE OIL DERRICK</b></p> <p>The oil derrick is a red 3D printed figure.</p> <p>The oil derrick will be located in the resource tray.</p>	<p>The robot must leave Home, transport the Oil Derrick to the Montgomery County Grid completely inside the black line.</p> <p>Once this challenge has been completed, the Montgomery County Grid can be used as second HOME.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>👍 (Points Awarded)</p> </div> <div style="text-align: center;">  <p>👎 (No Points)</p> </div> </div> <p>Points will be awarded at the end of the match.</p>	<p>50 points for successfully completing the challenge.</p> <hr/> <p>50 points maximum</p>
<p><b>2.</b></p>	<p><b>DIRECTIONAL DRILLING</b></p> <p>The Drill is represented by four (4) 3/8" x 3" wooden dowels: Green, Yellow, Blue, and Red</p> <p>Wooden dowels will be located in the resource tray.</p>	<p><b>Prerequisite:</b> Objective 1 must have been successfully completed.</p> <p>The robot must place each of drill bits inside the corresponding colored box with the arrow facing Crater Lake. (Red to Red; Yellow to Yellow, etc.) The drill bit should be placed in the same direction at the arrows facing Crater Lake. All parts of the drill bit must be completely on or inside the black.</p> <p>Points will be awarded at the end of the match.</p> <div style="text-align: center;">  <p>👍 (Points Awarded)      👎 (No Points)</p> </div> <p>Points will be awarded at the end of the match.</p>	<p>100 points for successfully completing the challenge. (400 points possible)</p> <p>Bonus of 50 points for correctly placing all four (4) drill bits – All or nothing</p> <hr/> <p>450 points maximum</p>

<p><b>3.</b></p>	<p><b>COLLECT AND DELIVER CORN TO ETHANOL PLANT</b></p> <p>Corn will be represented by twenty (20) foam cubes.</p> <p>Solar Panels will be located in the resource tray.</p>	<p><b>Prerequisite:</b> Objective 1 must have been successfully completed.</p> <p>The robot must deliver collect and deliver corn to the ethanol plant. The corn will be randomly placed in corn field to the right of the Montgomery County Fair Logo (Home #1). The Ethanol Plant is located to the right of the Montgomery County Grid (Home #2). Corn must be completely in or on the black line to be consider delivered</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>👍 (Points Awarded)</p> </div> <div style="text-align: center;">  <p>👎 (No Points)</p> </div> </div> <p>Points will be awarded at the end of the match.</p>	<p>5 points for each corn container successfully placed.</p> <hr/> <p>100 points maximum</p>
<p><b>4.</b></p>	<p><b>INSTALL THE SOLAR PANELS</b></p> <p>Solar Panels will be represented by three (3) 2"x3" wooden rectangles with magnetic backs.</p> <p>Solar Panels will be located in the resource tray.</p>	<p><b>Prerequisite:</b> Objective 1 must have been successfully completed.</p> <p>The robot must install the solar panel so the solar panel racks vertically. Two corners on the 2" (shorter) side need to be above the bar to be considered vertical. The panels must not be support by anything else expect the magnetic backing attached to the solar panel rack.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>👍 (Points Awarded)</p> </div> <div style="text-align: center;">  <p>👎 (No Points)</p> </div> </div> <p>Points will be awarded at the end of the match.</p>	<p>100 points for each solar panel install correctly (300 points possible).</p> <p>100 point bonus if all 3 solar panels are correctly installed – All or nothing</p> <hr/> <p>10 points maximum</p>

<p><b>5.</b></p>	<p><b>IRON ROUGHNECK</b></p> <p>Roughneck pipe are represented by three (3) 6" ½ inch PVC pipes.</p> <p>The oil well is represented by a 1 ¼ inch PVC pipe the is hanging off the robotic table, on the left side.</p>	<p><b>Prerequisite:</b> Objective 1 must have been successfully completed.</p> <p>The robot must collect and place the three (3) Roughneck Pipes into the oil well. The pipes will be on a wooden sled in the GAME ZONE on the oil pipe square.</p> <p>Points will be awarded at the end of the match.</p>	<p>150 points for successfully placing each pipe into the oil well (450 points possible)</p> <p>200 point bonus for placing all three pipes successfully into the oil well – All or nothing</p> <hr/> <p>650 points maximum</p>
<p><b>6.</b></p>	<p><b>BUILD A WIND TRUBINE</b></p> <p>The wind turbine is represented by three (3) 1.5 inch wooden blocks with the image of printed a wind turbine.</p> <p>Wind Turbine blocks will be located in the resource tray.</p>	<p><b>Prerequisite:</b> Objective 1 must have been successfully completed.</p> <p>The robot must deliver the turbine blocks to the Wind turbine square in the middle of the game mat. Blocks must remain vertical, in the correct order to form a “standing” windmill and on the mat. The images must be all facing the same direction to collect points.</p> <p>Points will be awarded at the end of the match.</p> 	<p>50 points for each successfully placed block. (150 points possible)</p> <p>50 point bonus for placing all three block correctly. – All or nothing</p> <hr/> <p>200 points maximum</p>
<p><b>7.</b></p>	<p><b>PLANT PEANUTS</b></p> <p>Peanut are represented by 3/8" hex nuts</p> <p>Peanuts will be located in the resource tray.</p>	<p><b>Prerequisite:</b> Objective 1 must have been successfully completed.</p> <p>The robot must deliver/plant one (1) hex nut into each of the brown circles located to the left of the Montgomery County Grid. Hex nuts must be completely in or on the black line for pointed to be awarded.</p>  <p>Points will be awarded at the end of the match.</p>	<p>20 points for each peanut successfully placed.</p> <hr/> <p>200 points maximum</p>



## MONTGOMERY COUNTY FAIR AG ROBOTICS RULES OF PLAY

### EQUIPMENT LIST:

Unlimited Quantity	Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor building pieces (excludes brick, motors, and sensors)
Unlimited Quantity	Backup rechargeable batteries or sets of AA batteries
1	Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor brick/hub
Unlimited Quantity	Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor motors
Unlimited Quantity	Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor ultrasonic sensor
Unlimited Quantity	Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor touch/force sensor
Unlimited Quantity	Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor light or color sensor
Unlimited Quantity	Lego® Mindstorm® EV3 gyro sensor
1	Laptop computer or tablet with programming software (Lego® or non-Lego® is acceptable)
1 or 2	USB Cable (for robot-computer connection)
1	Original Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor Build Plans (paper or digital)
Unlimited Quantity	Power strip (3-prong, grounded) *
1	25 ft. (max) extension cord (3 prong, grounded) *
1	Plastic container or cardboard box for transporting robot to and from game area
1	Ruler or tape measure
Unlimited Quantity	Pencils and notepad with blank paper for design and note-taking purposes
1	Desktop calculator, handheld calculator, or a scientific calculator
1	Protractor

\*No two-prong extension or powers strip plugs allowed. Computer power cords are allowed to be two-pronged\*



WiFi is limited and only available to log into Chromebooks, Internet use/search is not permitted during the contest.

**Bluetooth Connectivity.** Bluetooth connections can be made and utilized during the programming phase. It is not allowed during the competition phase while the robot is on the playing field.

#### Contest Schedule.

Registration	8 a.m.
Orientation	9 a.m.
Coaches Meet w/ Team	9:20 a.m.
Programming & Practice	9:30 a.m.
Working Lunch	11:00 a.m.
Competition Starts	12:30 p.m.
Final Round	1:30 p.m.
Team Clean-up/Packing	2 p.m.
Results & Awards	2:30 p.m.

*\*Schedule is tentative and subject to change\**

*\*Lunch is to be provided by team or exhibitor\**

## RULES OF PLAY

**\*\*\*RULES OF PLAY MAY BE ADJUSTED BETWEEN INITIAL RELEASE AND CONTEST DATE BASED ON QUESTIONS AND CLARIFICATIONS RECEIVED PRIOR TO THE CONTEST.\*\*\***

1. This is considered a BLIND Contest; it will consist of eight (8) tasks; all tasks and Game Mat will be announced the day of contest.
2. Team will have 3 hours to build and during the “Programming & Practice” portion of the contest schedule. No prior building or coding is allowed, kits will be inspected the day of the contest.
3. The game mat will fit inside a standard robotics game table frame (inside dimensions = 45”x93”).
4. The PLAYING FIELD is the area outside of HOME.
5. The RESOURCE TRAY is a plastic tray that will be placed on the outside of the game table and will hold game pieces for the challenge. Game pieces in the RESOURCE TRAY may not be accessed until the match begins.

**NEW**


6. Robots must be launched from HOME throughout the match. The robot and any piece it is pushing, pulling, or holding must start behind the inner black line of HOME before autonomously launching into the PLAYING FIELD. This must take place each time the robot is launched.

**NEW**

7. When exiting the HOME to complete a task in the PLAYING FIELD, the robot and any piece it is pushing, pulling, or holding must completely be outside the outer most black line of the HOME prior to an Task being accomplished.

**NEW**

8. When returning to the HOME (*for point delivery*) two primary wheels (aka wheels which are motorized and directly attached to the hub) and any piece it is pushing, pulling, or holding must completely pass the inner black line of the HOME before points will award, regardless of if the robot is in possession of the item.

9. Each match will be 3 minutes long.
10. Time begins when the announcer says **“BEGIN”** and continues until the announcer says, **“TIME”**. Robots must complete all challenges autonomously. At least one part of the robot must be touching inside the border of HOME before attempting a task. The robot must completely exit HOME completing the task.
11. Any structures built by the team or game pieces cannot be placed onto the PLAYING FEILD by human players but is permitted to be placed by the robot so long as it is done autonomously and is permitted by challenge rules.
12. No containers used by game officials to store game pieces can be used by the team/robot.
13. Players may retrieve their robot at any time during the match without penalty. When retrieved, the robot must return to HOME. Judges will not assist in any retrievals.
14. Possession is defined as a piece that is not touching the playing surface and is under the control of the robot.
15. Items in possession of a robot may be retrieved once any part/piece of the robot has broken the plane of HOME boundary.
16. If the robot is in possession of a game piece in the PLAYING FIELD, and the robot is retrieved by the player, the game official will return the game piece(s) to its original location/state.
17. A player is not allowed to touch any game piece except when the piece is completely inside the HOME boundary, OR if the robot is deemed in HOME AND in full possession of a game piece(s), **see rule 8**. Once the piece is deemed inside HOME, contestants may remove the game piece from the game table/robot and store it in the RESOURCE TRAY.
18. In the event of a major game piece mechanical malfunction, the judge may stop, reset, and restart the match. The table judge in coordination with contest Challenge Design Committee will make the determination on restarting the match.
19. If a contestant intentionally touches a game piece in the PLAYING FIELD, the team will be given a 50-point penalty per occurrence. Judges will issue one warning for the first offense. In such cases, the piece will be returned to its original starting position by contest officials as quickly as possible.
-  20. Teams that may experience equipment loss and/or malfunction(s), will need approval form the contest chairs to replace equipment with supplies from leaders, volunteers, parents, or AST/CEA.
21. Coaches will be permitted to meet with their team for a 10-minute time period prior to Build Time. This time should be used to help team members develop a plan and foster positive youth development. Any “coaching” or “advisement” from coaches and/or parents from the sidelines after the 10-minute time period is not allowed and may result in disqualification of team(s).
22. No cell phones or other types of communication devices (smart watches included) are allowed in the pit or contest areas. Exceptions include the approved items listed in the Participant Rules. During the Build Time and Robot Challenge, contestants are not allowed to communicate with spectators (including coaches and parents).
23. Once a task has been completed it cannot be repeated in order to score additional points for that same task.

24. Teams will have two (2) preliminary Rounds in which to earn points. The sum score of the two matches will determine teams that qualify for finals. The top three (3) teams in each division will advance to the final match.
25. After the match, no one is allowed to touch the PLAYING FIELD until the Judge has recorded the condition of the field, the team has reviewed the scorecard, and it has been signed by the team Captain.
26. At the conclusion of the match, it is the responsibility of the team captain to review the score sheet with the judge, verify their score and then sign/initial at the bottom signifying agreement of the final match score. If a team member questions the team's score, he or she must discuss this with the judge prior to signing the score sheet and leaving the table. Scores are final after this point and cannot be contested. The contest tabulator will review the score sheet and will correct any mathematical inaccuracies.
27. Finals will consist of two additional matches. The two scores from the final round will be added to the preliminary scores. Finalist teams will be ranked based on their total scores. Judges' results are final.
28. All competing team members are allowed around the game table during competition, and any member may touch the robot when necessary.
29. Tie-breaker procedures will be based on Teamwork scores.
30. Teams not competing must remain at their tables or staging area.
31. Good sportsmanship is always expected. This is crucial during practice times. Practice time on the game table may be restricted as build time progresses.
32. Teams must clean up their pit area prior to the awards ceremony.