

# 2021 Virtual 4-H Agrobotics Challenge

## Theme - Cattle Round-up

The **2021 Virtual 4-H Agrobotics Challenge** hosted by Grayson County 4-H will be conducted via Zoom starting on **Friday, May 14th through Saturday, May 15th** depending on the number of team entries. Grayson County 4-H is providing a competitive event for youth to showcase their skills and knowledge within the robotics project.

**Regular Entry** (February 11<sup>th</sup> to March 1<sup>st</sup>)

Cost to enter is \$30 per 4-H team and \$60 for non 4-H teams.

**Late Entry** (March 2<sup>nd</sup> to April 15<sup>th</sup>)

Cost to enter is \$50 per 4-H team and \$75 for non 4-H teams.

**Challenge Game Piece Kits** – Order during registration for \$75 per location (not team).

Teams can pay by credit card or by mailing checks to Grayson County 4-H, Attn: Agrobotics, 100 W Houston A-G-1, Sherman, Texas 75090. Make check out to the Youth Advisory Board. Credit card details will be included in the confirmation e-mail.

### Competition Format for Virtual Play

The competition will be held on the virtual platform Zoom.

- Only one competing location will be allowed into a judging room per time slot.
- All teams at the competing location will participate during their assigned timeslot. The team order will be at the discretion of the school/4-H club.
  - If a competing location has teams in multiple grade divisions, the teams may be assigned different time slots.
- Each team must finish all their rounds and sign off on their score sheet, before the next team can start.

The livestream will use Facebook or YouTube. It will be the responsibility of the contest facilitator to set up the livestream and determine the specific livestream link for the public to view. Streaming details will be sent to registered teams by Wednesday, May 12<sup>th</sup>.

The Zoom event will be scheduled by the contest facilitator according to the day and time selected by the judging panel. Current plan is to start on Friday, May 14<sup>th</sup> and finish on Saturday, May 15<sup>th</sup>, depending on the number of registered teams. Regular registration will close on March 1<sup>st</sup>. Details will be finalized at the close of late registration on Fri. April 15<sup>th</sup>.

### Team Requirements for Virtual Play

For this challenge registered teams will be required to:

- Build the challenge game board on the floor surface of their choice using masking/painter's tape.
- **Stationary Device** with a camera that has a view of the complete game board, the driver and spotter at all times until completion of the match.
- **Mobile Device** with a camera (mobile phone, tablet, etc...) that can be moved according to the judge(s) direction by a competition volunteer.
- **Speaker** connected to stationary device, so teams can hear judges clearly.
- Secure two **competition volunteers** to work with the remote judge(s) during the competition.

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### Virtual Match Play and Technical Interview

- Team size of two to four members allowed.
- Each team may only use Lego MindStorm branded parts with the Lego MindStorm NXT or EV3 brick and sensors
- Each team may use one tablet, mobile phone or laptop loaded with LEGO commander app for remote control via Bluetooth (*additional apps can be added if submitted through the FAQ page*)
- Team members must compete within the division of the oldest team member.
  - Junior – 3<sup>rd</sup> to 5<sup>th</sup> grade
  - Intermediate – 6<sup>th</sup> to 8<sup>th</sup> grade
  - Senior – 9<sup>th</sup> to 12<sup>th</sup> grade
- Teams are not required to be members of Texas 4-H.
- Teams will be allotted **30 minutes** Zoom slot for their round in the following areas:
  - **Match Play:** A minimum of 4 rounds which are at least 4 minutes each. The three best rounds will be used for the team score.
  - **Technical Interview:** Following the last match, the team will answer technical interview questions from the judges. (*max of 4 minutes*) *Suggested to use designated mobile camera, not stationary camera.*
- A minimum of 2 drivers must be used and the drivers must alternate between matches.
- Only two team members will be allowed around game board during a match which will be called the “driver” and the “spotter”.
  - The driver (*remote control app will be used for some tasks*) must
    - Stay in their area and is prohibited from touching the robot and/or game pieces
    - Announce the start of an autonomous task and put down the remote control until the autonomous action is complete (robot returns to robot zone). Autonomous action immediately terminated when driver touches remote control.
    - Announce the start of driver mode if in the process of completing an autonomous task. The Rider (Driver) must have the Horse (robot) must come back to the Horse Stable to restart the task for bonus points to be considered
  - The spotter
    - Must stay in their designated area and may interact with the robot when it is in the robot zone (horse stall area).
    - May interact with animal game pieces when they are located in the corral area as long as the robot is not in the corral at the same time (note: spotter must remain in their area at all times).
    - May assist in modifying the horse (robot) when it is in the horse stable.
    - Is allowed to interact with cattle when they are within in the corral.
    - Stray animals must be identified without the help of the spotter. These game pieces cannot come back to the corral.

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### Game Board Layout

Game board must be laid out as shown on the game board directions page at the beginning of each round. The playing surface should measure **84 X 84 inches, not including the player area.**

### Grazing Land Area - Quadrants A1 to A7 and B1 to B7

#### Stray cattle

(1 cow pen holder per quadrant, total of 3)

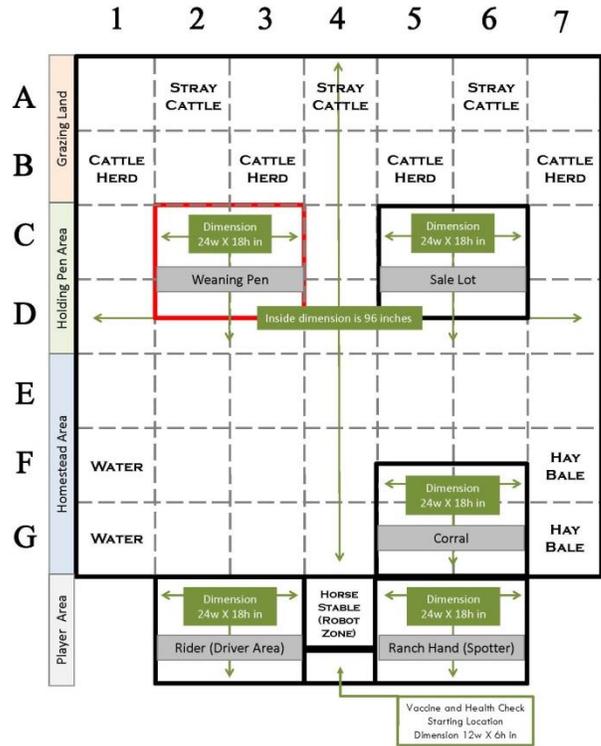
Game pieces will be randomly chosen and placed in the stray cattle locations on the game board by the competition volunteer (*Quadrants A2, A4, and A6*) The competition volunteer cannot reveal the location of the animal types to the team prior to or during the round.

The mouth opening of the “stray cattle” should be pointed away from the driver and ranch hand at the start of each match

#### Cattle Herds

(3 cow pen holders per quadrant, total of 12)

Game pieces will be randomly chosen and placed in the cattle herd locations on the game board by the competition volunteer (*Quadrants B1, B3, B5, and B7*) The competition volunteer cannot reveal the location of the animal types to the team prior to or during the rownd.



### Holding Pen Area - Quadrants C1 to C7 and D1 to D7

**Weaning Lot** - Deliverables include hay bale (1), water (1), cattle with red insert (5), and ping pong balls (10).

**Sale Lot** - Deliverables include hay bale (1), water (1), cattle with black insert (5), and bangle bracelets (5).

### Homestead Area - Quadrants E1 to E7, F1 to F7, and G1 to G7

**Corral** - Deliverables to this area include cattle (12). *Quadrants F5 & F6 and G5 & F6*

**Hay bales** (miniature straw bales) will be located in the center of *Quadrants F7 and G7*

**Water** (dryer balls) will be located in the center of *Quadrants F1 and G1*

### Player Area and Robot Zones

**Rider (Driver Area)** – area for a team member using the remote control to maneuver their horse (robot)

**Horse Stable (Robot Zone)** – area for Rider to autonomously condition the horse to complete tasks

**Ranch Hand (Spotter Area)** – area for a team member to manipulate features of the horse (robot) when it is in the Horse Stable (Robot Zone) or manipulate games pieces when they are in the Corral.

**Vaccines** (Ping Pong Balls) will be located between the **Rider** (aka the driver) and **Ranch hand** (aka the spotter)

**Health Check** (Bangle Bracelets) will be located between the **Rider** (aka the driver) and **Ranch hand** (aka the spotter)

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#### Challenge Tasks

#	Task	Points per Item	Total Points	Bonus Points	Description
1	Sort the Herds	10 x 12	120	100 points if all cattle are moved autonomously	Move and sort the herd to correct holding pen. Spotter can be used to classify cattle in the corral. <i>Limit of 6 cattle can be moved to the corral at a time.</i>
2	Sort Stray Cattle	100 x 3	300		Move stray cattle to correct holding pen. Spotter can NOT be used to classify animals. Strays cannot go past the holding pen area. <i>(Sensor Required)</i>
3	Deliver Hay Bale to Holding Pens	10 x 2	20	75 points bonus if completed autonomously	Deliver one hay bay to each holding pens (weaning pen and sale lot) <i>Note: Hay will be located in center of quadrant at the beginning of play</i>
4	Deliver Water to Holding Pens	10 x 2	20	75 points bonus if completed autonomously	Deliver one water to each holding pen (weaning pen and sale lot) <i>Note: Water will be located in center of quadrant at the beginning of play</i>
5	Vaccinate Animals in the Weaning Pen	20 x 10	200	100 points if 10 animals are vaccinated	Vaccinate animals by dropping vaccine into cattle only after animals have reached the weaning pen. <i>(Robot cannot vaccinate in grazing land or corral)</i>
6	Health Check of Sale Lot Animals	20 x 5	100	100 points if 5 animals are health checked	Health check of cattle in the sale lot. <i>(Robot cannot medicate on the grazing land)</i>
7	Return Cattle to Grazing Land	10 x 4	40	75 points if all cattle are moved autonomously	Return the cattle with white inserts to the grazing land. <i>Limit of 2 cattle per quadrant.</i>
	<b>SUPER BONUS</b>			<b>500</b>	If a team can clear the board in the allotted time and have placement of all pieces correctly placed. Autonomous bonus points are not required to receive the super bonus.
<b>Total Points Available</b>			<b>800</b>	<b>1,025</b>	<b>1,825</b>

#### Challenge Descriptions

In this virtual robotics challenge each team will operate a **horse** (aka the robot) with a **rider** (aka the robot driver). The rider will be used to perform all the tasks with the help of a **ranch hand** (aka the spotter). The horse (robot) can be manipulated only when it is in the **horse stable** (aka robot zone) by the ranch hand (spotter). The rider (robot driver) and the ranch hand (spotter) must stay in their assigned locations during the entire challenge.

#### Grazing Land Area - Quadrants A1 to A7 and B1 to B7

Cattle will be randomly placed in herds (represented by 3 Holstein Cow Pen Holders) and as stray cattle (represented by 1 Holstein Cow Pen Holder) in the grazing land at the beginning of each match.

- 5 cattle will have white inserts placed in the bottom of the pen holder (return/stay in grazing land)
- 5 cattle will have red inserts placed in the bottom of the pen holder (deliver to weaning pen)
- 5 cattle will have black inserts placed in the bottom of the pen holder (deliver to sale lot)
- Cattle shall have NO other identifying features for sorting purposes

#### Sorting the Herds:

Cattle will be randomly placed on the game board each match in the designated quadrants by the competition volunteer. Each herd could be three different cattle types (white, red, or black). The rider and horse with the help of the ranch hand are to round up the cattle herds from grazing lands and take them to the corral area for sorting. The rider and horse can only deliver a **max of 6 cattle** to the corral at a time for verification. The ranch hand will determine which holding pen the cattle need to be placed in (weaning pen or sale lot) or if they need to return to grazing land. The ranch hand must wait until the horse has left the corral before sorting can begin.

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#### **Stray Cattle:**

There will be three cattle placed as strays at the beginning of each match by the competition volunteer. The rider and horse **without** the help of the ranch hand are to round up the stray cattle from **grazing lands** to be sorted to the correct pen. The stray cattle **may not** enter the homestead area at any point; cattle must be directly taken to the correct holding pen or left in the grazing land by the horse and rider. *(Sensor Required)*

**Feeding and Watering:** Cattle need to be fed hay and watered in their holding pen (*weaning pen and sale lot*). Deliver one hay bale and one water to each holding pen.

**Vaccinating Cattle:** Cattle (with red insert) delivered to the Weaning Pen need to be vaccinated. The rider and horse with help from the ranch hand are to deliver two vaccinations (ping pong balls) to each animal in the holding pen. Vaccination is considered “successful” if the ping pong balls are inside the cow pen holder.

**Health Check:** Cattle (with black insert) delivered to the Sale Lot need a health check. The rider and horse with help from the ranch hand are to deliver one health band (bangle bracelet) to each animal in the sale lot. Health Checks are considered “successful” if bracelet is around the mouth of the cow pen holder.

**Return to Grazing Land:** Once cattle have been properly sorted cattle (with white inserts) are moved back to grazing lands. To prevent overgrazing of the grasslands small herds must be formed. Two cattle (*cow pen holders*) can be placed per grazing land quadrant. *It does not matter which quadrant is used.*

#### **Virtual Judging and Scoring**

At the conclusion of the round, the competition volunteer will work with the remote judge(s) to identify the game pieces and their location on the game board.

Under the direction of the judges, the competition volunteer (only) is allowed to touch game pieces and the game board once a round is complete. If a team member touches a game piece or the game board (*excluding the driver / spotter area*), it will result in a score penalty for the round.

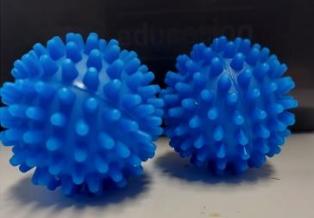
The team will review the identification of all game pieces once the competition volunteer has finished his/her review with the judge(s). If a team would like to challenge the score, the judge(s) must be notified of the review and be allowed to observe any challenged areas of the game board for the score to be modified. Once the next round starts all scores are final.

**Final scores** will be the top three match play rounds, plus the technical interview score.

<b>Deductions</b>	<b>#</b>	<b>Points</b>	<b>Max</b>
Any animal left in homestead at end of match, <i>excluding the corral area</i>	15	10	150
Spotter touching game pieces while robot in corral	1	5	unlimited
<i>*unlimited penalties per round</i>			
Driver touching remote control while robot on autonomous run	1	5	unlimited
<i>*any time driver is in autonomous mode and returns to driver controlled mode without announcing it to the judges</i>			

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Game Pieces Included in the Kit

Image	Game Piece	Materials
	Hay Bale (2)	Decorative Straw Bale
	Water (2)	Plastic Dryer Balls w/Spikes
	Vaccine (10)	Ping Pong Balls Vaccine 1 – Red/ Vaccine 2 - Green
	Health Check (5)	Bangle Bracelets
	Cattle (15)	Cow Pen Holders
	Game board	Masking Tape: Mark Game Board Boundaries