**Adventures Under the Sea; 4-H Robotics Challenge-**

**Developed by Katharine Estep, Erin Johnson, Claire Mackey, Nicholas Wideman, Connor Wilkerson, and Alyssa Wozniak**

**2018 University of Kentucky BAE305 Class Project: Dr. Joe Dvorak-Instructor**

**Philosophy**

Teams will design a robot to travel through an under the sea adventure. The adventure will consist of challenges that feature multiple obstacles and pathways to accomplish the tasks. The tasks are non-destructive, friendly, and encourage learning and problem solving strategies.

**Scenario**

“You are a guppy fish that has wandered too far away from his family and you need to find your way back home.

To find your way back to your family, you must first travel through the coral reef. This is where the distance sensing will occur as your robot will have to find its way out of the reef (maze) by sensing where there are breaks in the walls. There are 45 and 90 turns.

Upon escaping the coral reef, you must follow the single winding current(line) to make it back to your family. As you move along the current, you will pass through some areas that are dangerous where you must use caution, meanwhile other areas are safe. Where the current becomes red, the water is infested with sharks and you must swim slowly and stealthily to avoid detection. Where the current becomes green, you are in safer shallow waters and can swim as fast as you want!”

**Course Dimensions and Preparation**

The maze will be constructed in a 4’ x 8’ area and corners may be either 90 degrees or 45 degrees (or a combination of both). Robots must be able to navigate through different tasks. There will be a practice maze identical to the Challenge maze for teams to utilize.

* The maze will have one start/end box with the equipment to complete each task located at different points on the board.
* The robot must complete each task and return to the start/end box in order to complete the challenge.
* Each team will be ranked on the number of points accumulated from each completed task. The point values for each task are listed below in the Scoring Sheet section.
* In the event multiple teams accumulate the same amount of points, teams will be ranked by the quickest time to complete the challenge.

**Robot Design and Dimensions**

Robots would benefit from being be able to perform the following:

* Move forward and backward.
* Turn in all directions.
* Detect the difference in color between red and green, and yellow.
* Detect walls.
* Implements required to complete these tasks may be added to the robot.

**Basic Rules, Procedures, and Guidelines**

Participants agree to the following basic rules:

* Teams must design and build a robot that is capable of completing multiple tasks.
* Each team will have a total of three minutes to complete the challenge course.
* While a robot is completing one task, penalties will not be given if the robot goes over or through another part of the course.
* The robot must start at the starting block and end at the stopping block at the end of the track.

**Adventures Under the Sea; 4-H Robotics Challenge: Scoring Guide**

* The highest score a team can achieve is: 10 points
* In the result of a tie, the team who completed the course in the shortest amount of time wins.
* Programming the robot to complete the following tasks will result in the following point values:
  + Task 1: Complete the maze
    - Successfully completing the maze: 5 points.
    - Making it around triangle: 3 points
    - Completing the two 90 degree turns: 2 points
    - For each dead end hit for more than 5 seconds: -1 point
* Task 2: Following the red line:
  + Making it to the end designated “finish” : 1 points
  + Following red line to end : 2 points
  + Staying only within green: 2 points
  + Each time touching blue: -1 point
  + Each time touching white: -2 point