Proposal for a new SciOly trial event: "Game Agent"

(see attached draft of rules)

Why: Machine Learning is a very hot topic in many areas of study, especially engineering. Reinforcement Machine Learning is a subset that creates an Agent in code to learn from experiences. Likewise, video gaming is very popular.

What: So, combining the two, this SciOly event asks the students to create an RML Agent to win a game.

When and Where: We'd like this event ready to test this year in time for teams at the Camas invitational to compete, thus the materials need to be ready no later than the first week in October.

How: this is the harder question to answer:

- First, a game needs to be created that necessarily must be solved by an RML Agent. It must be too difficult to solve with a hard-coded algorithm.
- Second, a process to test solutions must be designed that can be done quickly, yet allow for differences in solutions. And, the team's solutions must be able to be scored reasonably quickly.
- Third, since this is new, an example solution must be generated so students have some idea of what a possible solution looks like, yet that encourages students to try other methods.
- Fourth, teaching materials and links must be generated for coaches.

Plan of activities:
There is a group of about 15 people, including CS college students, SciOly coaches, and HS students willing to work on this project this summer and fall. It appears that we can make this deadline of early October for a first draft of this event.

- Ron Wright develops the first draft of one game using Godot 4.2 and example solution and documentation. The current game under development has two levels:
  - Easy: the Agent must move the "player" from the starting point to the "launch console" that is moving due to "radiation effects" . This is a simple 2d-like task, something like the standard "snake" game.
  - Hard: The Agent must enter various parameters into a "console" then launch a rocket in an attempt to land safely at the destination site on the other side of a mountain.
  - Both levels are 3-D. graphics are currently rudimentary, but playable by a human using the keyboard.
- The advisory group provides feedback along the way
  - Scott McComb, Lei Jiang, Adam Weber and David Rossi.

- Members of the larger group clean up the game, and possibly generates a second game
    - Add to the game Ron is working on, especially the graphics, but also some mechanics
    - Helps decide how solutions are tested, especially the upload mechanism
    - Helps to build the support documents
    - Perhaps build a second game
    - After Camas Invite, this group analyzes the results and improves the game and solution process
- the WSU CS Capstone project students assist development and create another game
    - Firstly, this team creates a solution to the game as if they are competitors, due **by the end of October**. This is used to provide errata to the SciOly teams working on their solutions.
    - Second, this team looks at the team's solutions from the Camas Invite, and helps decide parameter and process adjustments
    - Third, this team creates at least one more full game and scenario, of a different game genre, for possible future use in SciOly
    - Finally, this team also generates a possible stand-alone competition and game that can be promoted outside of SciOly and any other currently established platform.
- **December 2024** test of trail event at Camas Invite
    - The event is tested at this MS SciOly Invite, Ron will run it, with help
    - We are testing at this event since it tends to draw teams from all over the Western US.
    - if it appears to be going well, then this could possibly be tested at other events.
- Refine and test in a classroom setting at Wahkiakum HS
    - These students are not in SciOly, their school is too small to do SciOly, RonW has easy access to these students, and they are interested.

Regional and State, tournament day considerations

If we want to recruit students interested in Machine learning to Science Olympiad, we can open it to both MS and HS student teams and support this trial event at Regional and State. Potential consideration for tournament support:

- Only allow teams to try it who have pre-signed up and who have acknowledged receipt of the Target Game by the day after Regionals. They would be welcome to get it earlier if they wanted to .
- Provide 12 computers with Godot 4.2 and the Target Game running in Windows in the test room.
- Teams would impound their thumb drive before the day starts like other impounds. The only file on their thumb drive is their Game Agent file ... named in this format:
    - {team #} { first names of the two members}
    - for example, if John and Dinah were from the Battleground Bobcats team # C43, they would title their file:
        - "C43_John_Dinah"

    - Also, in the comment section at the header of their file should be their full team name and school and their team members' names.
- Teams would sign up for any of the first three sessions of the competition day.
- No need to have teams from the same club during the same hour. ... This would allow for 36 teams, and roughly 10 minutes to reset the computers before the next group comes in. In the remote chance that more than 36 teams sign up, we would increase the number of computer stations. I would want to save the entire afternoon for scoring.
- All teams take the written test during their session while their Agent is cranking out a solution - max 20 minutes.
- Ron would prefer to have at least one assistant for each of four computer stations.
- And, for those teams who turn in their thumb drive at impound and who don't want to take up any event time running their Agent against the actual test environment, we can score them right away. .. effectively giving them a bonus.