



ROYAL ROBOTICS
Lynnwood High School
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Mini – Golf Training Challenge

Objectives: Design a Lego/NXT robot using Autodesk Inventor program. Build the robot per design. Show understanding of mathematics necessary for design and programming. Program robot to complete 6 mini-golf holes autonomously. Show understanding of the engineering process. Compete effectively and have fun.

Rules:

- 1) Teams will consist of 4 or 6 persons. Teams will be chosen in the following manner: participating members will choose a partner. These partnerships will be placed on a team by the training committee. The committee will try to balance teams with experienced and new members. Teams will be chosen on September 15th at the parent meeting, but may be added to if we get new members.
- 2) Training meetings will be scheduled on Monday and Wednesday after school from 2-4 beginning September 21st through December. See attached calendar for all dates, location, topics, etc. Teams may choose to meet on their own time to do more planning or work on this project. Participants must arrange their own transportation home, although carpooling with other students is encouraged.
- 3) An Inventor drawing consisting of all main parts of an assembly must be submitted for approval before any building can happen. (Connectors or hidden parts are optional and do not have to be included).
- 4) Robot design limitations: Robots are limited to three motors. Robots are limited to four sensors for each hole, although the sensors can be exchanged and repositioned between holes (but these changes must be documented with separate drawings). (*There are limited sensors available so teams may need to share*) Attachments for different holes can be made, but must be documented with separate drawings. All Lego pieces are acceptable for use on the design. Lego pieces must be used as manufactured, not modified in any fashion. Basic parts will be made available to teams, but they may bring in additional parts. Non-Lego parts might be acceptable, but must get approved by Tech Training committee prior to being added to the design. These parts may be modified. (*For example, the practice robot has a plastic ball used as a 'skid'.*) No team is to make special purchases for parts, all parts should be either from the provided kits or found at home. All decisions of the tech training committee regarding parts are final.
- 5) A log book is required for each team. It must list all team members. It should include design decisions made by the team, including why. It can include preliminary sketches. It must include all math done for design or programming purposes. It must include approved Inventor drawings. It should include programming notes explaining how each program works and why.
- 6) Every person on the team must help with programming the holes. Each participant should be in charge of at least ONE of the programs. Teams will be allowed TWO trials on the hole before scoring will begin. When teams are doing a scored trial, they must have the tech training committee observe. Teams can do a trial on a hole at any time after the LabVIEW training sessions are completed.
- 7) Scoring and awards: A golf hole is considered complete when a robot using an autonomous program moves the golf ball from its starting location to the "hole" without any assistance from the team beyond touching the run button at the start. (teams may have an operator that provides a sound signal, when using the sound sensor). Each regular hole (1-5) has a maximum score of 8 points. The team score will be the number of trials they use to complete the hole successfully (not counting the two test runs allowed) up to 8 tries. If a team does not complete a regular hole, they will receive 8 points. The bonus hole (#6) will be 8 points less the number of tries and this score is deducted from the total score. So if a team succeeds in three tries they would have a score of -5 to deduct from their prior score. If a team does not complete the bonus hole they get a zero score for it. Lowest score wins. There will be prizes for low score on each hole, low score overall, teamwork, best design/drawing, and best programming.
- 8) Teams are expected to follow all safety guidelines and FIRST's philosophy of gracious professionalism.