SCIENCE OLYMPIAD

Robot Arm-C

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Basics, Robot Arm

- First, MAKE SURE YOU AND YOUR STUDENTS READ THE RULES YOURSELVES!!
- Goal, move a bunch of pennies to center of a target **without stacking**!
- Stationary Robot base, arm or arms to pick up and move objects
- Scorable Objects only include pennies this year.
- Location and points defined by a standard 40 cm FITA archery target
- Extra points for flipping pennies, with penalty for incomplete documentation, or partial knowledge of your documentation
- Three minute limit to accomplish task
- Best of two tries this year

Power, Robot Arm

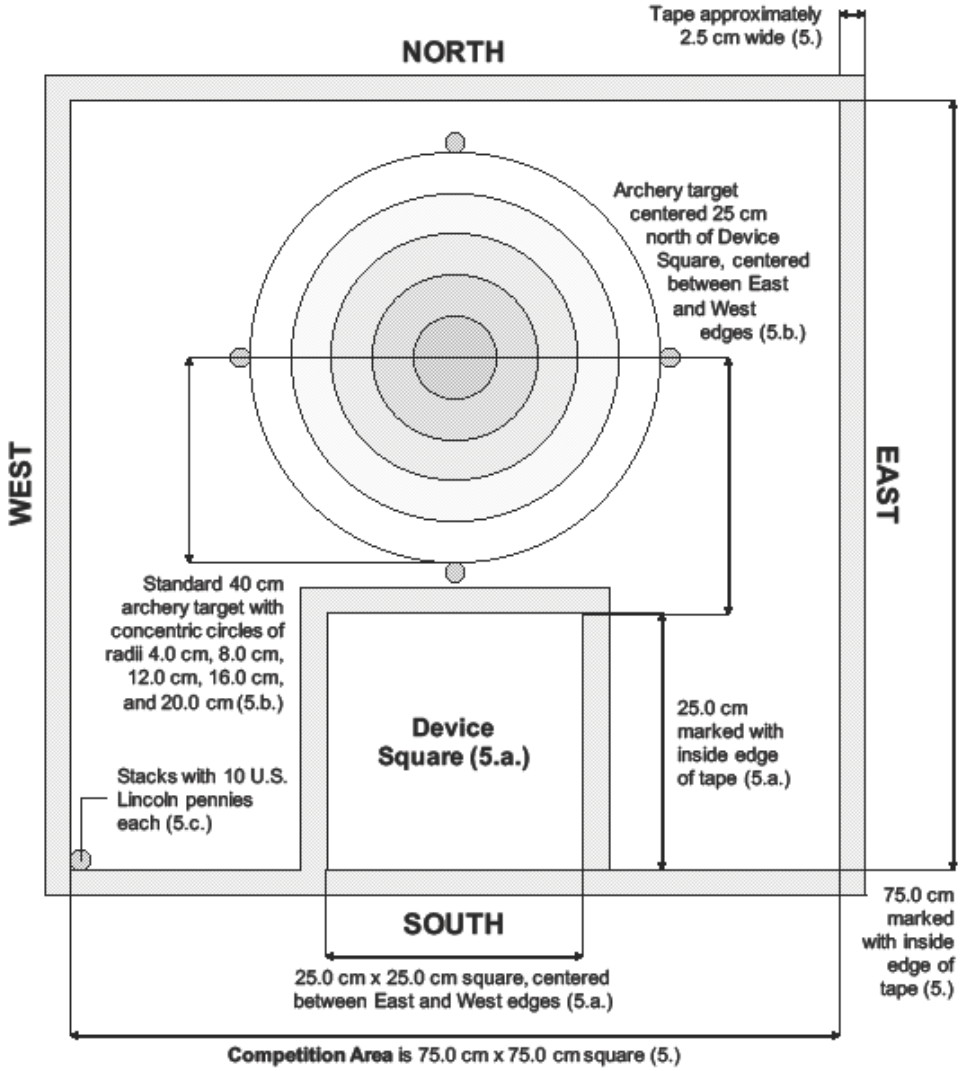
- Battery power only
- 14.4 volt maximum in any given circuit
  - No you may NOT step down 120V AC wall current
  - No you may NOT step up the 14.4 V
- No stored pressure device this year
- Motion may be generated only by electrical, elastic, fluidics, gravitational energy, hydraulics or pneumatics, NO operator powered motion.

Building Specifications, Robot Arm

- Must fit in a 25 cm by 25 cm square, LESS THAN 100.0 cm high.
- SOME modification of a kit is required, make it OBVIOUS to the densest, pickiest event supervisor
- Remote control, wire, radio, sound, or IR are allowed, see: https://www.soinc.org/sites/default/files/uploaded_files/Remotecontrolgeneralrules150730.pdf
- Note, physical connections part of general rules are prohibited in this event.
- Multiple arms allowed

ROBOT ARM

Layout for the Competition – 2017



Competition, Robot Arm

- Competition time
  - 2 minutes to set up,
  - Time starts on **Go** of supervisor "1, 2, 3 Go"
  - 3 minutes to complete task
  - 2 minutes to score and reset board
  - Time starts on **Go** of supervisor "1, 2, 3 Go"
  - 3 minutes to complete task a second time
- Time stops on
  - Three minutes
  - Students say "science"
  - The competitors impart energy directly into the Arm, Base, or pennies (This means you cannot use a syringe as part of your controls!)
  - Team steps into playing field after being warned once
  - Any part of robot touching inside the robot square at the beginning leaves Robot Square
  - **Any part detaches from the Device**

Scoring, Robot Arm

- Only pennies flat on board with nothing under and no pennies over count!
- Pennies center of target count more
- Flipping them
- Up to 29.13% penalty for incomplete documentation
- Ties are broken by 1) Best non-scored run; 2) Shortest Run Time of best single run; 3) Shortest RunTime of non-scored run.

Thoughts on Design

- You only have three minutes, you want to be fast enough to complete the task.
- Precise control is critical, you need your robot to be STIFF!
- Intuitive control helps the student under competition pressure.
  - I've only seen one student consistently succeed with joy sticks
  - I've seen MANY students succeed with master slave systems
- Clever end effectors can be a big game changer, but you can't drop them this year!!
- Yes you can spend a fortune on these arms, no you don't have to, I've seen arms costing less than $100 do very well with clever modifications and technique.

Internet Resources

- www.scioly.org Look under the *Forums* under the *Build Events* for the Robot Arm discussion thread and in the *WIKI* for build advice from last cycle.
- https://www.soinc.org/robot_arm_c for the event page on the NSO website
- https://www.youtube.com/watch?v=CKJfhAwcfkU Winning design from last cycle, this is a master/slave control system, master is small arm the student is manipulating.
- https://www.servocity.com a source for components