

Design competition rules

Participating teams will compete against one another in a round-robin competition, with each match consisting of two games, one played as black/red, and one played as white. Games will follow standard Trax rules (unlimited size of playing area) with the exception that illegal moves will result in immediate loss of game. If there are more than 7 entries, the teams will be split by random draw into pools of between 4 and 7 teams, with the top 2 (plus ties) teams progressing to the next round until there is a single pool.

The top two teams from the round-robin will then play off in a final match. If multiple teams come second, a further round robin will be used to determine the top two. If there is a further tie, the team who won the least number of moves on average will be considered the better team, and progress to the final. In the final play-off, the best team from the preliminary rounds will select the preferred starting colour. After the first game, teams will alternate colour. The winner of the design competition will be the first team to win at least 4 games, with 2 more wins than their opponent. If the score reaches 7 games each, the teams will be considered equal, and declared joint winners.

Designs must be implemented on a stand-alone FPGA board (i.e. not plugged into a host computer chassis or connected to any other external processor). Development boards containing any of the low to mid-range FPGAs are allowed. There is no restriction on the use of hard or soft core processors in your design.

- Altera devices: any Cyclone, and Arria FPGA.
- Xilinx devices: any Spartan, Artix-7, Kintex-7 and Zync up to Z-7020.
- No Stratix or Virtex devices may be used.

Designs must communicate with the host programme using the RS232 protocol, with a baud rate of 460800, 8 bits with no parity, and 1 stop bit. Communication is in the

form of text strings, terminated with a new line. The following commands must be implemented:

- "?": Before a game is started, the player should respond with the team name (up to 16 characters).
- "-W": A new game is being started, and the player is playing white. Any existing game should be reset (whether completed or incomplete). The player should respond with the first move using Trax notation.
- "-B": A new game is being started, and the player is playing black/red. Any existing game should be reset (whether completed or incomplete). There should be no response to this command.
- "--": A new game is being started, and the FPGA sent this is not a player. There should be no further response until a "-W" or "-B" command is received.
- A Trax move in standard notation: This is a move from the other player. The response must consist of a legal move using Trax notation made within 1 second. Failure of this will result in forfeiting the game.

Trax notation records the location and orientation of the primary tile played using a 3 part code:

- Alphabetic characters are used to indicate the column, counting from the left of the overall position. "@" is used for the leftmost empty column, followed by "A" to "Z", then "AA" to "AZ". "BA", etc.
- The row is indicated by a number counting from the top of the overall position. "0" is used for the topmost empty row, followed by "1", "2", "3", etc.
- The tile played is represented by "+" for straight tiles, and "/" or "\" for curves according to the orientation of the curved paths on the tile.
- The first move of the game is either "@0/" or "@0+".

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Design competition team registration:

Please send an email to the design contest chair (D.G.Bailey@massey.ac.nz) with the following information:

- *Team title
- *Contact name
- *Contact email
- *Contact affiliation
- *FPGA device and board used
- *Names of team members (for certificate of participation)

At least one team member must be present with their FPGA to compete in the design competition.

Team members who present the design competition should register for the conference.