Isaac's Duel

Phase 1: SensorGate

Tinkercad is a simulation software that allows delegates to experience the magic of Arduino on the web. You will be expected to know how to wire and connect components accurately whilst also demonstrating finesse over coding. We will provide each team with concepts that they will have to implement on tinkercad. **Be warned though this is a time-sensitive round. Only the fastest delegations to complete the set of designs accurately will qualify for the next stage.**

Delegates will be working in **teams of 2**, the teams will be provided with a challenge that they will have to complete on the web based version of tinkercad before the round starts, this challenge will include the use of **logical circuits**, a selection of **sensors and actuators** as well as the use of **written Arduino code** within the simulator. Each challenge will have at least one solution, however it may be possible to complete the challenge with different designs and code. All components available on the tinkercad website will be allowed with no limit unless specified otherwise before the beginning of the round. The teams will be given a set amount of time, specified before the round starts to finish the challenge, this is a time-sensitive round and the speed at which you complete the challenge will be considered in determining the qualifying teams.

Note: The use of block-coding as well as the use of generative AI or plagiarism via using someone else's design or code is prohibited and will result in immediate disqualification.

This round will test every field of knowledge that the average robotics enthusiast is expected to be well versed in. Therefore, it is recommended to have a beginner-to-intermediate level of knowledge of the following components:
- Capacitors
- Resistors
- LEDs and other Diodes
- Buzzers
- Potentiometers
- Various basic Sensors (e.g: ultrasonic, moisture)
- Arduino UNO R3 (as well as coding)
- Breadboard and Wiring

As well as practice the code used to control the sensors, actuators and microcontrollers that you will have to use to finish the challenge.

Note: This is not an exhaustive list and we urge delegates to learn outside the scope of these components.

Cap : 2 Delegates

Phase 2: BattleBots

The best of the best will qualify to the next phase. Taking place on the second day delegates will be expected to apply their skills with creativity and boldness. Your task? Construct an **IR remote-controlled battlebot** and pit it against rival teams. You will get **2 hours and 30 minutes** to construct the robot at the start of the day. After which a tournament style battle will ensue. Mastery of IR remotes and receivers is vital, for they are your voice on the field. Knowledge of DC motors, motor drivers, and basic chassis design will form the muscles and bones of your machine. All of it will be unified through Arduino programming, the neural core from which every action is born.

Contestants will be provided with a kit consisting of the components required to create an IR-remote controlled robot. ***Basic code for the IR remote will be provided***. Contestants will be expected to **plan**, **design**, **construct**, **code** and **test** their own individual robots within the 2 hour 30 minutes timeframe, the kits will be provided at the start of the round. Alongside these kits, the contestants will also receive offensive weapons that are to be mounted on their bots. Once the battlebots have been completed, they will be pit against each other in a **knockout style tournament**. The robots will **duel 1 on 1** with each other based on random allotments, those that qualify will then be matched with other qualifying bots until only 1 is left.

Note: The robot must be built and finished within the timeframe, additionally all work must be done inside of the specified premises.

For this round, it is crucial to be well-versed in both **hardware and software**. Perfecting your design to not only be agile and responsive but also durable while maintaining software reliability. The dynamics of IR based controls are absolute essentials for standing a chance in this high-stakes round, alongside motor control (i.e. tank-steering w/ the use of motor drivers). This round will push your innovative thinking, engineering prowess and robotic knowledge to see who comes out on top. **Chassis design, sensor calibration, software redundancies and raw power** are all factors that will come into play when the battlebot duels begin.

For this round, it is suggested that contestants revise their understanding of components such as:
- IR Transmitters and Receivers
- DC Gear Motors and Motor Drivers
- Arduino UNO R3
- Cells and Batteries

Note: This is not an exhaustive list and we urge delegates to learn outside the scope of these components.

Cap : 2 Delegates

Perk:

Teams that win Isaac's Duel will receive the "Sabotage" perk, a strengthening advantage that allows them to immobilize any one team of their choosing from a module round of their choice for **45 minutes** of their initial time. The affected team will be required to leave the module location and may only begin once those 45 minutes have fully elapsed. To make use of this ability, you must provide its token of ownership to the Executive Council before a module round begins. This power may be used only once. Wield it carefully, for once time is stolen, it can never be reclaimed.

Study Resources

Resources for Round 1	Basic Guide Arduino 101 Crash Course
Resources for Round 2	Simple Cardboard Battlebot Creating a Remote Control Car Interfacing an IR Sensor and Remote
Information for Round 2	Components List Rules of Procedure