

Survivor - The International Challenge

A lonesome figure, stands upon a cliff, overlooking the mammoth tower in the horizon. The dark castle was the foothold of the alien invaders hell-bent on conquering and destroying this world, as they had done on all the others they had landed on. The conquerors were a heartless race, who believed in draining a world of all its resources and then moving on.

Resistance had been futile and all attempts to dominate the alien invaders had failed miserably. Almost all of this world's heroes had fallen in battle and the future, at the present, looked bleak. The merciless conquerors were way more advanced than this world's inhabitants and all those not considered worthy of being slaves were thrown out to the waste-lands, thousands of miles away from the castle. The slaves were mind-controlled into working heavy machinery which slowly drained their own world dry.

The wastelands were separated from the castle by a treacherous path. To get into the castle from the wastelands would require a massive effort. A vertical fall, almost impossible to survive was the first task. An ancient temple, filled with challenges and mystery followed. None had scaled the landscape and lived to tell about it.

The metallic beings of this world had only one aim set in their minds. The destruction of the orb, which was the soul of the outsiders. It was rumored the freedom of their home lay within this black sphere. In the dark castle, the aliens had found a secure location which would keep the orb safe, at least until the explorers had drained this world of its last drop of life and moved on.

We come back to our friend, who has been standing there for a while now, thinking about what has taken place not too long ago. A non-organic being himself, he watched a while ago, how his daring compatriots had attempted to scale the perilous journey to the dark castle, and succumbed to their deaths. The valley had become a sort of a graveyard, with the graves of all those who were brave enough to think beyond the wastelands, contained within. Then, as if it were his destiny, he leapt off the cliff without a single thought. This would be the moment of his reckoning!

Techfest 2005 presents Survivor - The International Challenge

Entries for Survivor are invited from any student from across the world. The participants would be classified into 2 categories - India and Rest of the World for the qualifying round. The teams clearing this round shall attend the finals to be held in Mumbai, India during Techfest 2005 (28th - 30th January, 2005). A few selected qualifying teams from the Rest of the World category will also receive to and fro airfare for the finals. The winning teams from both the categories combined would receive cash prizes of a total of US \$ 2500. Please see the links below for complete details of the contest.

Problem Statement

Make a wireless remote controlled machine, which travels up a slope to reach a platform 1 m high; then jumps off the platform to reach the ground; completes a task involving some blocks; and then follows a line in an autonomous fashion. The machine fetching itself more number of points at the end of the match is declared as the winner.

Eligibility

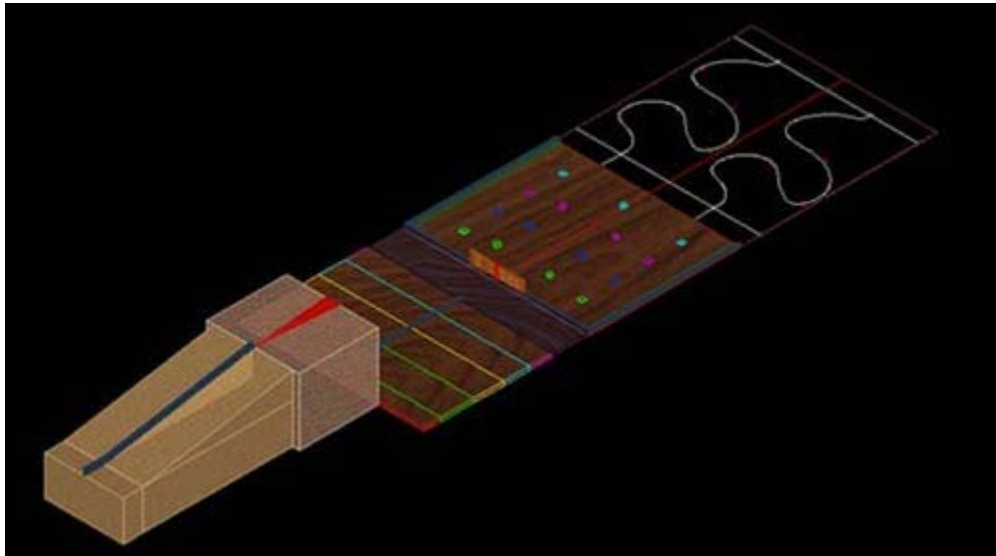
All students with a valid identity card of their respective institutes are eligible to participate in Survivor at Techfest 2005.

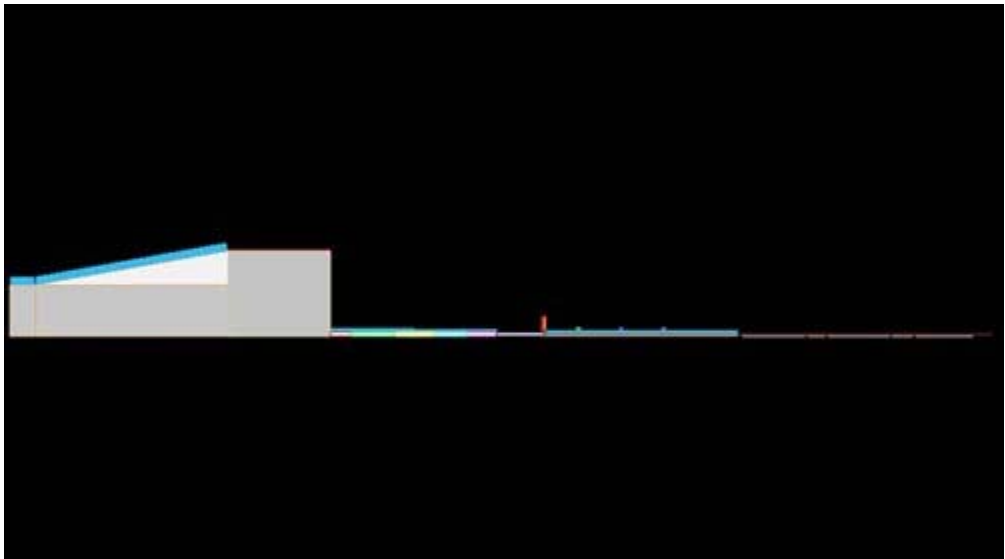
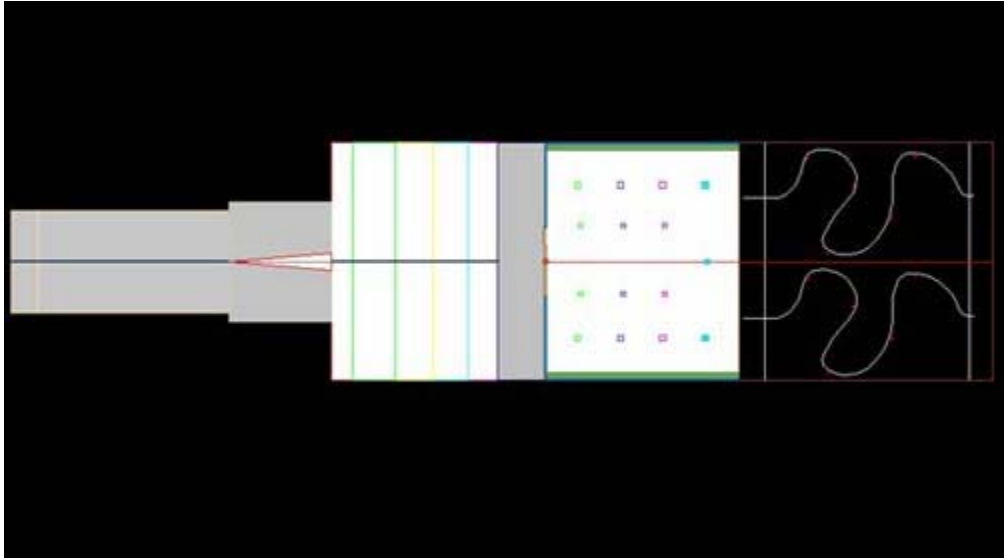
Team Size

A team can consist of a maximum of four students.

The Game Arena

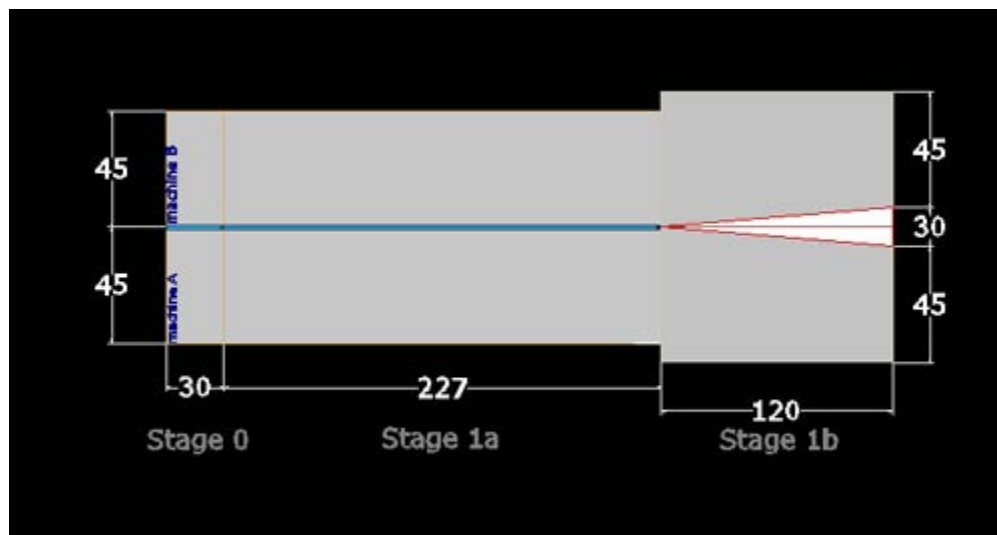
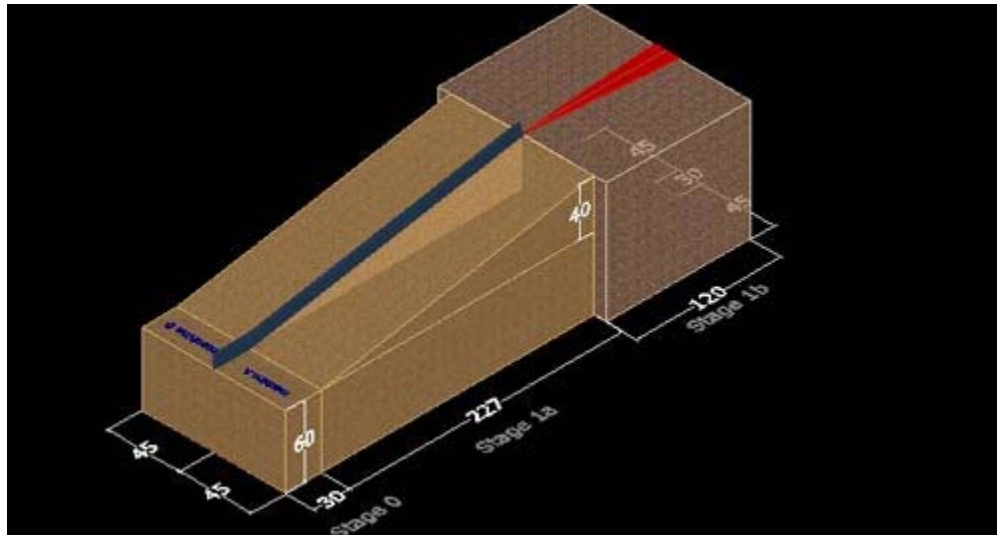
There is a platform of height 100 cm, and an incline leading up to it. There are two separate, identical tracks on the incline, leading to the top of the platform.





Stage 0

The starting platform is at a height of 60 cm. This platform is 30 cm long and 45 cm wide.



Stage 1a

The two tracks start at a height of 60 cm from the ground. No portion of the tracks has a gradient of more than 10 deg with the horizontal. Each track is 45 cm wide.

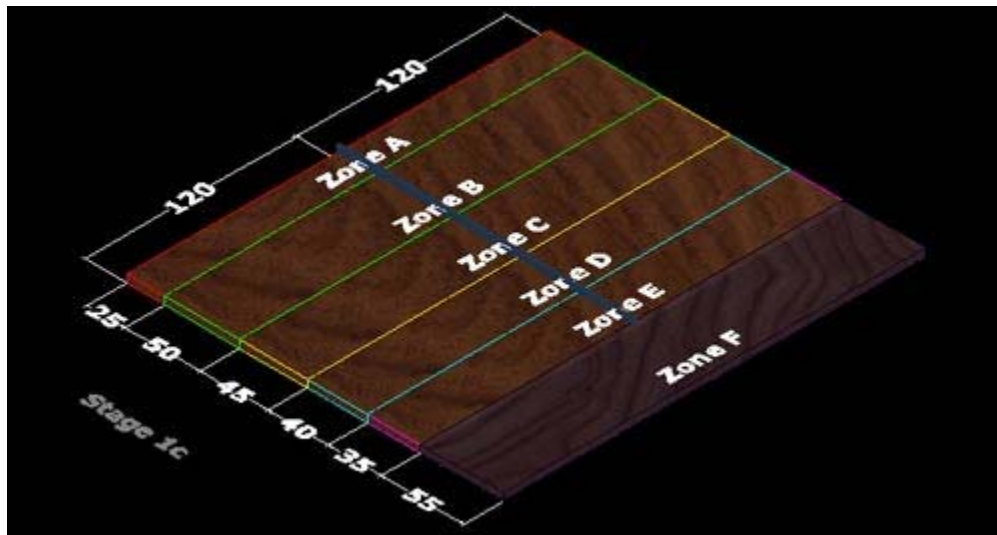
Stage 1b

The top of the platform is of length 120 cm and width 120 cm. There is a red zone at the centre, which has a maximum width of 30 cm at the end of the platform, running parallel to the length of the platform. This red zone is 3 cm higher than the rest of the platform. Machines are prohibited from entering this red zone. The two tracks run along either side of the red zone. The end of the platform marks the completion of Stage 1b.

The rest of the arena is horizontal and starts from the foot of the platform.

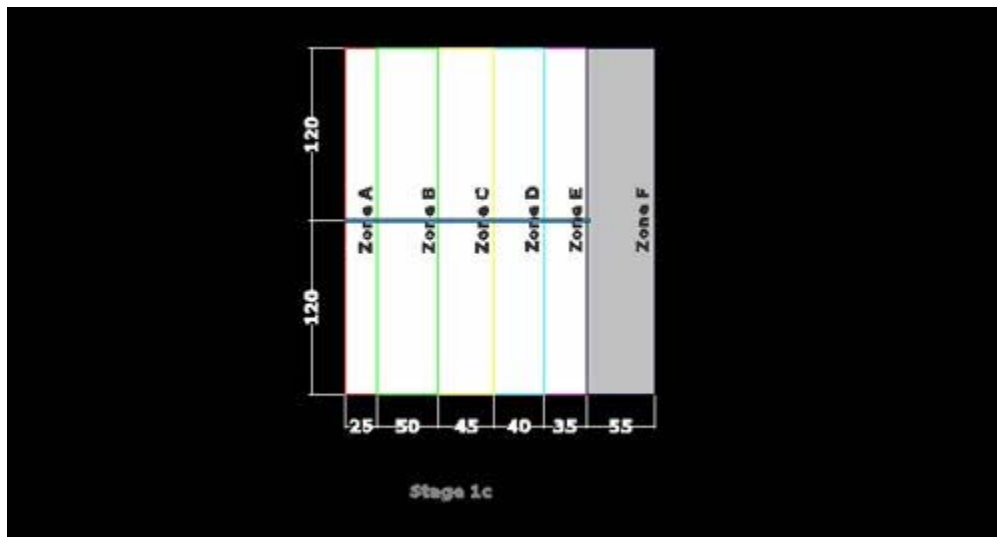
Stage 1c

The rest of the arena starts at the foot of the platform. There are 6 parallel zones, placed horizontally next to each other in this stage. The zones are parallel to the width of the platform and extend horizontally up to 250 cm from the foot of the platform. The length of each zone varies as shown in the figure.



The description of the zones in the increasing order of their distance from the foot of the platform is as follows:

- Zone A - length 25 cm
- Zone B - length 50 cm
- Zone C - length 45 cm
- Zone D - length 40 cm
- Zone E - length 35 cm
- Zone F - length 55 cm



The width of all these zones is 240 cm.

Coir Flooring



This horizontal portion is covered with compact coir mat of thickness 3 cm and density 80 mg/cc. The mat is covered with a Herringbone type woven coir rug of thickness 1 cm.



More details about coir mats can be found on

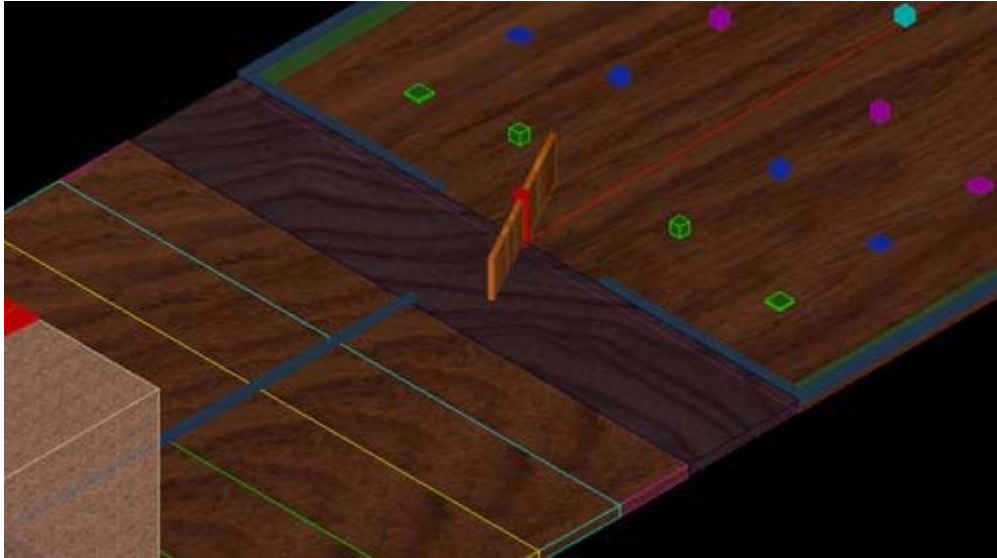
http://www.expressrugs.co.uk/acatalog/Home_Page_Coir_10.html

<http://www.fibreworks.com/coir.htm>

<http://www.pooppallycoir.com/rugs/rug.htm>

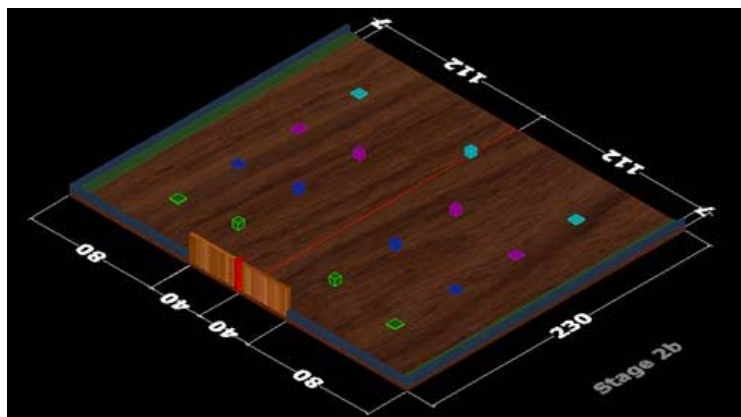
Stage 2a

At the end of the 6th zone, there is a rectangular gate, 80 cm wide, able to rotate about a vertical axis passing through its centre. Adjacent to the gate, there are walls extending till the edges of the arena.



Stage 2b

The portion of the arena after the gate is 240 cm wide and 230 cm long; and is made of plywood. Referring to the figure, there is a red centre line marked parallel to the length. 7 blocks are kept in this stage. There are two zones of width 7 cm at a distance of 112 cm from the centre line on either side of the centre line. The outer sides of these zones are bounded by walls 30 cm high. There are wooden cubes of side 5 cm, placed at 30 cm from the centre line. One of the sides of the cubes is parallel to the centre line. The seventh cube is placed on the centre line 190 cm away from the gate. There are square placeholders, each of side 7 cm, marked 35 cm beyond the cubes away from the centre line. The placeholders are aligned parallel to the centre line and lie on the same line perpendicular to the centre line on which the cubes are placed. The placeholders are 35 cm inside the outermost zones described above. Refer to the diagram for more information.



Stage 3a

Stage 2b is followed by a zone 240 cm wide and 30 cm long.

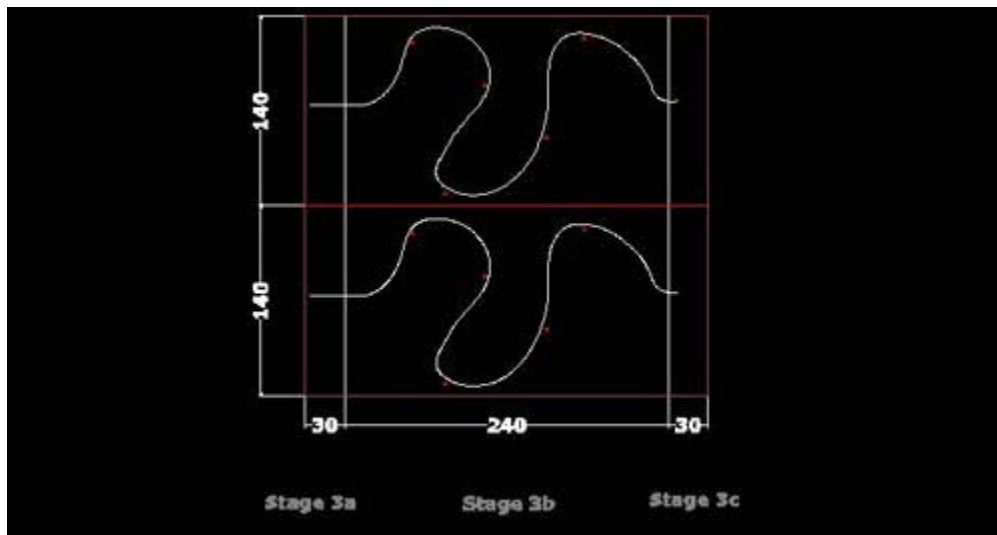
Stage 3b

Stage 3a is followed by a zone 240 cm wide and 240 cm long.

Stage 3c

Stage 3b is followed by another zone 240 cm wide and 30 cm long.

The arena in Stage 3a is painted black with two parallel white lines starting as shown in the figure. The arena in Stage 3b is also painted black with two white curved lines on it as shown in the figure. The curved lines are identical and each is divided into 5 approximately equal sections, each section identified by a red mark approximately 2.5 cm away besides the white line at the starting of each section. At each check point, there is a tennis ball placed. The white line is approximately 2.5 cm wide. The arena in Stage 3c is also painted black with the two white lines ending in this zone as shown in the figure. The shape of the line is as shown in the diagram below.



Machine Specifications

- The machine should fit within a box of dimensions (25x25x25) cm at any and every given point of the game. The external device which is used to control the machine manually is not included in the size constraint.
- The machine must use only mechanical power or mechanical power converted from a source of electrical energy. Chemicals, compressed gas and rockets, fuels, combustion power methods are strictly prohibited.
- All the machines have to be necessarily controlled by some wireless control mechanism till the line following stage. In these stages, autonomous mechanism can also be used. Wire control is not allowed at any stage of the matches. The machines should be strictly autonomous in the line following stage.
- The machine must have onboard source of power. External source of power is not allowed. The total of the rated voltages of the onboard batteries should not exceed 54 volt. This will be checked before the game starts.

Game Rules

- The match begins from the start of the track on the ridge. The machine has to climb up the track to reach to the top of the platform 1 m high.
- The machines are not allowed to enter the red zone or cross it to the opposition side on the top of the platform. Jumping off from the platform, from the red zone or from the opponents side of the platform during stages 1b and 1c will attract disqualification.
- The machines have to jump off the top of the platform onto the coir flooring below (Stage 1c).
- After landing on to the coir flooring (Stage 1c), the machines have to reach the gate, through which they enter Stage 2a of the arena.
- In Stage 2a of the arena, 6 blocks are placed at a distance of 30 cm from the centre line, 3 on each side. The first pair of blocks is positioned at 40 cm from the gate and the following two pairs at another 50 cm each from the previous pair.
- The 7th block is placed on the centre line at a distance of 190 cm from the gate.
- The machine either has to place these blocks in their respective zones or in the corresponding place holders. The blocks should be fully inside the specified zones or the placeholders to earn points.
- In Stage 2b, the blocks have to be properly positioned in a zone or a placeholder. The whole of the block should lie inside the respective zone or placeholder for the points to be awarded to the team. The decision of the judge is final and binding.
- The machine should be directed to the zone of Stage 3a and brought to a stand still at an appropriate position within the zone. Then the remote control mechanism on the machine should be switched off and the control unit should be handed over to the judges for inspection. It will be checked by the judge that the remote control mechanism is not working after it has been switched off.
- After the machine comes to a standstill on Stage 3a, one team member can switch on the autonomous switch through the control unit or manually. This the only time during the match that a team member is allowed to touch the machine. The machine can be repositioned or realigned inside Stage 3a by the team member after it has come to a standstill. The handling time is also included in the total match time and no extra time will be allocated in Stage 3a or the whole match.

- In Stage 3b, the machine must follow the white line in an autonomous manner. The machine has to displace the tennis ball(s) placed at the check point(s), in the same sequence as of their positions on the white line. For each tennis ball the machine displaces in the correct sequence, corresponding points are awarded.
- If a machine clears all 5 check points in Stage 3b, by displacing all the tennis balls in the correct sequence, then the machine must stop in the zone for Stage 3c. Successfully stopping in this zone finishes the game.
- During the whole duration of the match the machine should not get outside the arena. In case the machine gets out of the arena, it will be disqualified.
- The time limit for each match is 15 minutes. The match ends when either both machines complete Stage 3c or either of the machines is disqualified or the time limit of 15 minutes is reached. At the end of the match both machines will be judged on the basis of points earned.
- The machine should not be made using Lego parts, assemblies from toys etc. However the remote control systems from toys can be used. However, standard kits like the Basic Stamp kits may be used.
- The wireless remote control should be so chosen that it does not interfere with the remote control of the other team during a match. If a team uses non coded, common frequency radio control from normal toys which can be controlled by other similar remote control units, the team has to use two different frequency remote controls which can be readily changed from one to another before the match (This is an inexpensive option recommended.). More complex wireless systems (multi-channel RC) can also be used but it has to be ensured that no interference takes place during the match. This is of great importance and should be necessarily ensured.
- In case of a tie between two teams in a match, the teams are required to play rematch (es) till, one of the team wins a rematch or one of the teams withdraws from the competition.

Points Structure

- Traveling up the ridge, to reach to the top of the platform - 100 points.
- Landing on the coir flooring after jumping off the platform. For deciding the number of points obtained on the basis of landing; the distance of the end of the machine, closest to the foot of the platform, in Stage 1c after the first impact with the ground, will be taken into consideration.
- The landing zones and the corresponding points are:
 - Zone A - 50 points
 - Zone B - 100 points
 - Zone C - 120 points
 - Zone D - 140 points
 - Zone E - 160 points
 - Zone F - 200 points
- Each block in the next stage (Stage 2b) has specific points associated with it. The first pair of blocks on either side has a value of 20 points each. The next pair has a value of 10 points each. And the third pair has a value of 30 points each. The last block on the centerline has a value of 40 points.
- Placing a specific block in the place holder successfully - full points associated with that block will be awarded. Placing a specific block in the outermost zones successfully - half of the points associated with that block will be awarded. For example, if a machine places a block worth 20 points in the placeholder successfully, it earns 20 points, and if the machine places the same block in the outermost zone, it earns 10 points.
- Successfully halting in Stage 3a and not entering Stage 3b without the autonomous mechanism running - 10 points
- In Stage 3b, displacing each tennis ball in the correct sequence - 30 points. The machines must be running in an autonomous manner in Stage 3b and Stage 3c for any points to be awarded for these stages.
- Successfully reaching the Stage 3c zone after completing Stage 3b and stopping in this zone to a standstill - 30 points.
- In a single match, points can be earned only once from any single block.
- In a single match, a team can earn points of any stage or any part of a stage only once.
- Penalty for entering the red zone in Stage 1b - 20 points.

General Rules

Sensors and Electronics

The teams can use sensors (if they so desire) to sense any physical parameters. Interference due to flash lights/arena lighting/daylight should be taken into consideration. For the autonomous robot machine, the participants may/may not use sensors and microprocessors. Standard kits like the Basic Stamp kits may be used.

Power Supply

The power supply of the machines has to be onboard. No external power source is allowed. The total of the rated voltages of all the batteries onboard should not exceed 54 volts. The power source of the control pad used by the operator is not included in the total voltage limit. 220 +/- 2% volt 50 Hz AC power supply will be provided at the arena. No special demands shall be entertained. Please do not demand heavy equipment like compressors.

Safety

The machines you build will be first checked for size and safety. The machine should not cause electrical power breakdowns. The robots must not contain any combustible, corrosive, or otherwise dangerous materials. No explosive compressive or expansive, either internal or external is permitted. There is a risk of compressed containers rupturing and creating shrapnel. Any robot whose strategy or operation is considered dangerous can be disqualified by the judges at their discretion.

Breakdowns/Timeouts

There is no provision for breakdown or timeouts in a single match. Your machine must be sturdy enough to participate in several rounds, leading to the finals.

Fouls/Penalties:

Team members are not permitted to touch either their machines or those of their opponents once the game begins. The penalty for doing so is disqualification. The only time a team member is allowed to touch the machine is during Stage 3a. No addition or removal of any part(s) is allowed in any of the stages.

The robots are not allowed to dismember themselves or leave parts on any part of the arena.

Machines damaging any part of the arena will be disqualified.

Machine Names

The name of your machine must be prominently displayed on the machine.

Sportive and Friendly Games

Intentional damage to the opponent's machine is not allowed. Goodwill and friendship between competitors may evaporate if, for example, one opponent uses lightening bolts to destroy the electronics of the competitor.

Scratching a Team

Any team that is not ready to play at the time specified will be scratched automatically. This applies to Eliminations, Prelims and Finals rounds. 15 minutes will be allowed for the final adjustments.

Demonstration to Judges

Machines will have to be demonstrated to judges (who will evaluate the machines for other prizes) at a time and date specified in the schedule which will be put up. Any team that does not turn up at the specified time will not be considered for the above special prizes.

Demonstration of Machines at Final

The Finals will be conducted in front of a large audience. Teams which have lost in the Prelims will be required to demonstrate their machines (one minute per machine) to the audience at that time. A group photograph of all the machines/participants will be taken. The date, time and venue will be specified at the time of competition.

The organizers will not provide any system like microprocessor kits, computers etc. at the venue.

The organizers reserve all rights to change any or all of the above rules as they deem fit.

The decision of the judges and the organizers will be final and binding.

The whole game is based on points fetched in a specified time.

Structure of Competition

This will be stated at a later date. Registered participants will be notified by email.

Qualifying Round

- All teams have to register their machines at www.techfest.org.
- The contest will comprise of a qualifying round based on video eliminations for the finals to be held at IIT Bombay, Mumbai, India. For the qualifying round, all teams will be classified into 2 categories - India and Rest of the World, only for the qualifying round, and not for any subsequent rounds.
- For the video eliminations, the teams must send a parcel (e submissions acceptable on special request) containing the following to the address mentioned below. Contents of the parcel to be sent:
- An abstract of not more than two A4 sheets covering essentially the principle used by the machine, the approximate time taken to complete the task and the projected final cost of the machine.

A Compact Disc (C.D.) containing the video of the machine in action. It should essentially contain the following:

- A portion of this tape must be an uninterrupted and unedited recording showing the machine jumping off a 1 m high platform onto a floor with 4 cm thick coir flooring. Then the machine has to travel up to a point (turn point), marked at a distance of 2 m parallel to the length of the platform, from the foot of the platform, starting from where it lands, take a U-turn and travel back to the foot of the platform. The machine should be radio controlled all this time. A video timer must be visible during this uninterrupted recording. There should be a measuring tape placed along the height of the platform and also from the foot of the platform to the turn point.
- A detailed look at and explanation of the machine, including close-up shots and shots from various directions.
- Participants are essentially required to have a narration (in English) also along with the video.
- A signed letter from the Dean/Head of your institute granting permission for you to participate in Survivor at Techfest-2005.

Address:

Techfest 2005,
Student Gymkhana,
IIT Bombay, Powai,
Mumbai 400076
INDIA

Tel-91-22-2576 4045, 91-22-98202 54064

Fax-91-22-2572 3480

The following will be the criterion for selection in qualifying round.

- Completion of the tasks stated in point 3.b.i.
- Approximate time taken to do the same.
- Uniqueness and design of the machine.

The contents of the parcels (the description of your machine and the video) would be kept strictly confidential.

The last date for receipt of parcels from outside India is 10th December, 2004, while that from within India is 20th December, 2004.

The short-listed teams from outside India will receive a notification e-mail latest by 20th December, 2004 and those within India by 31st December, 2004. The lists of the same will also be available at www.techfest.org.

Return Airfare will be provided to 2 members of few selected entries from the Rest of the World category who qualify for the finals to be held in Mumbai, India. Judges and organizers decision will be final and binding on this issue.

Other international teams who qualify for the finals but are not awarded the airfare are welcome to participate in the competition but at their own expenses. Accommodation and other facilities will be provided to all team members at a nominal charge.

The results of the qualifying round will have no contribution towards the final competition to be held from 28th - 30th January 2005.

Important Dates

Deadline for receipt of parcel from outside India	10th December 2004
Deadline for receipt of parcel from within India	20th December 2004
E-mail notification to the short-listed teams from outside India	20th December 2004
E-mail notification to the short-listed teams from within India	31st December 2004
The final competition	28th - 30th January, 2005

All changes that will be made in the problem statement at any later stage shall be intimated to the participants through e-mail and indicated on the webpage in RED. Please keep yourself updated regularly.

Prizes

First Prize	US \$1000
Second Prize	US \$750
Third Prize	US \$500

Special prizes: US \$ 250 to be awarded on judges discretion.

Contact

For your queries concerning problem statement and other general information about the contest, please contact survivor@techfest.org.