Shaastra Ultimate Robotics Championship

Theme: Diamond Hunting

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SAFETY GUIDELINES

FOREWORD

Our Goal “NO ACCIDENTS”. Safety is the most important aspect of our event. This is the first year of this event so in order to conduct it yearly we need to make it safe and Safety begins with Teamwork, so be a part of this team with us. Keeping workplace safety will ease the development of robots and help us to take action against accidents.

OBSERVANCE OF A STATUTE

Every participant of SURC must follow the Laws and Rules of their respective Institution regarding robotics and must abide by the “Health and Safety Guidelines” defined by their Institutes. Participants must develop the robots under the supervision of a University Instructor as the safety of the staff and the audience is our first priority.

SAFETY MEASURES

Due to operator’s mistake or reckless run of the robot, many accidents can take place like falling of heavy parts or sharp object flying which can cause damage to the arena or to the people present in the arena. So the following examples/measure should be taken care of:

- Sharp/movable parts must be covered so they do not come off from the bot.

- Personal protection like wearing gloves, safety goggles or helmet should be considered.
- Besides the operator, an emergency staff should be present there in case of emergency so that he can turn off the bot if an accident takes place.
- Wires of optimum thickness, rechecking of fuse, isolated and covered battery these points should be considered.
- As operational measures, prohibiting disapproval reconstruction and using suitable battery charger etc., should be considered.

OTHER:

In addition to above, various dangerous events could be triggered by the unique feature of each robot. Please take effective safety measures according to the characteristics of an individual robot.

DIAMOND HUNT

The birth of a diamond began over 3.2 billion years ago; deep underneath the earth's surface with pressures 50,000 times the typical atmosphere and temperatures boasting up to 1,300 degrees Celsius. These extreme situations create unique crystalline lattice structures which we refer to as a girl's best friend and no doubt why they are one of the most valuable mineral in the world.

When I think of 'Blood Diamonds' I think of Lord of the Rings and the morals lost in many characters in order to gain the priceless possession. Sadly the similarities between the movie and some African war zones are uncanny.

Here in our event, the Diamonds are buried inside Land and Sea, teams have to dig out the diamonds as fast as possible and secure it in their locks as the other teams are also in search of it and within no time you can lose it. It's

your chance to become the next De Beers and create your own monopsony in the market by exploring, mining and securing the Diamond.
Diamond mining is not an easy task but remember
"Diamonds are created under extreme Pressure and conditions".

Team Members:

- Each team should consist of maximum 5 members including the instructor.
- Team members must be enrolled in a University/Polytechnic at the time of the International Contest.
- More than 1 PG student is not allowed in the team.

Arena Specifications:

- The dimension area of arena is 13 m × 14 m divided into 2 parts as shown in Figure 1&2
- It consist of a manual bot start zone, manual zone, slope surface, rugged area, water container, sand container, autonomous bot start zone, grid, autonomous zone, maze, common zone of manual and autonomous bot, wooden cuboidal box with 3 drawer
- Manual bot start zone(yellow color), has dimension 1m × 1m (Figure.1)
- Manual Zone : Wooded surface and brown color rugged area
- Autonomous bot start zone : Green colored area, having a dimension of 1m × 1m with grid (Figure.5)
- Grid: Total grid area is 7m × 5m grid, the squares of the grids have dimensions of 0.50m X 0.50mm. The width of black grids lines is 30mm.
- Slope surface : It has a dimension of 3m base,0.50m height and max 10° angle slope for reaching the rugged area, there are 4 same slope surface (Figure.3)
- Rugged area : (Figure.4)

  - Dimensions : 4m × 6m
  - It is divided into 2 parts with the base above 0.5m from ground
  - The rugged area will not be having surface obstruction of dimensions more than 10 cm in any axis.
  - The radius of curved objects will not be less than 3 cm.
- Water container: (Figure.4)
  - Sky blue colored area
  - The dimensions of water pit: 1m * 2m * 0.15m
  - The water is not transparent, hence you cannot see the diamond from outside
  - Maximum number of diamonds available is 5
  - It is common for both the teams
- Sand container : (Figure.4)
  - Yellow colored area
  - The dimensions of sand pit : 1m * 2m * 0.2m
  - It will contain soil which is easy to dig
  - Maximum number of diamonds available is 5
  - It is common for both the teams
- There is a discontinuity of grid line in the border of red and blue area, after one row of square grid in front of the maze exit gate .As shown in the Figure 5. This discontinuity cover up by a wooden cuboidal block of dimensions 0.05m × 0.5m × 0.008m, and center of 30mm black grid line as shown in the Figure.6&7
- Autonomous zone : Orange color zone, 3.5m × 5m and red color zone 3.5m × 3m with grid(Figure.5&9)
- Maze : Orange color zone, dimension 3.5m × 5m with grid and height of the wall is 0.5m; there is an exit gate dimension 0.7m × 0.5m at a distance 0.20m from corner age of maze wall(Figure.5&8)
- Common zone : Blue color zone 3.50m × 2m with grid(Figure.9)

- Wooden cuboidal box with 3 drawer : Dimension of cuboidal is 0.50m × 0.50m × 0.42m, dimension of drawer is 0.50m × 0.40m × 0.10m .Each drawer is 0.03m apart vertically (Figure.10&11)

Manual Bot specifications:

- Only one person is allowed to control the bot
- The manual bot should be within 600*600*600 mm and 30 kg, afterwards it can expand provided the condition that it does not damage the arena. The bot is not allowed to leave any part on the arena, if found so then team can be disqualified
- Teams are not allowed to use readymade LEGO kits however they are allowed to use readymade mechanism kit or power boards
- Manual bot is also not allowed to split into 2 or more parts
- It should have an onboard power supply
- The external remote control used to control the bot is not included in the size constraint

Auto Bot specifications:

- The Autonomous bot should be within 500*500*500 mm
- The bot should be completely autonomous without any human interference.
- Autonomous bot is not allowed to split into 2 or more parts.
- The bot can expand itself provided the condition that it does not damage the arena. The bot is not allowed to leave any part on the arena, if found so then team can be disqualified.
- Teams can use readymade sensor kits and power boards. LEGO kits are not allowed.
- The bot should not start by any human interference, it should start by the manual bot or by the sense of the diamonds on it.

Gameplay:

Once the game is started, the team has to complete the following tasks in the given order.

Setting of the bots:

- Team will have 1 minute to set up the bots on the arena, after which the game will start.
- If the team fails to set up the bots in the given time then they can set it up during the game.
- Only 3 persons are allowed from each team inside the arena to set up the bots.

Manual Bot Tasks:

- The manual bot starts from the manual zone and has to climb up the slope towards the pits along the rugged surface.
- The manual bot will discover 2 pits on its way uphill, sand pit and water pit respectively.
- Manual bot has to dig in the sand for the diamonds and search for diamonds in the water pit.
- Each mine will be common for both the teams containing 5 diamonds each.
- The manual bot of each team has to collect 3 diamonds in total and transfer it to the autonomous bot.
- The manual bot has to come down the slope and reach the common area where it has to push the door to open up the exit door of the maze.

Autonomous Bot Tasks:

- Autonomous Bot has to collect the diamonds and start its operation only after receiving the diamonds.
- Autonomous bot has to solve the maze which will be present on the autonomous zone.

- After exiting the maze, the autonomous bot has to enter the common area.

Combined tasks:

- The manual bot has to collect the missing piece of the grid placed at some arbitrary location on the arena and place it at its respective location to complete the grid of autonomous bot.
- There is a cabinet with 3 shelf, where the diamonds have to be placed.
- Autonomous bot has to reach near the cabinet and manual bot has to open the shelf in order to place 1 diamond in each shelf.
- After placing all the diamonds in the shelfs, the Problem Statement is completed.

Rules and Regulations:

- In any circumstances, bots should not crash, disfigure or damage the arena or the fellow competitive bots.
- During the progress of the round, only the co-ordinators are allowed into the arena. Participants are permitted to interfere with their bots only when co-ords have called time.
- Only one person in a team is allowed to control the manual bot, and once the bots enter the round/arena human interference is strictly prohibited without coordinator's approval.
- Time can be called if judges agree that it will be dangerous for the track or for the robot. penalty will be applied to the team's run when they call time.
- Both robots should be made so that they will not harm any team members, referees, coordinators, audience, equipment and the game field. Explosives, Combustible fuel driven engines, high pressure pneumatics. Power generating chemicals are all prohibited. In case of using a laser beam, it must be less than or equal to class 2 laser.

- The robot must have a structure that is easy to check for its safety by the coordinators in the video or in the test run.

Deciding the winner:

- The first team to secure the Diamond shall be the winner.
- If both teams secured the Diamond at the same time or neither of the two teams secured the diamond within the given time limit then the winner will be decided by the following priorities:
    1. Total score.
    2. Time taken by the autonomous bot in completing its tasks.
    3. Dimensions of the bot.

Disqualification:

A team will be disqualified if it commits any of the following actions during the match:

1. The team fails to obey the instructions given by the coordinators.
2. If the team has made false start for 4 times in the same match.
3. The team performs any acts that are not in the spirit of play.
4. The team damages the arena or opponent's robot intentionally or unintentionally.
5. Use of radio waves which interfere in the operation of other bots.

Certificate Policy:

- Top three teams will receive certificate of excellence.
- All the teams who clears the first round will receive certificate of appreciation.

Special Competition:

Team Photo and Team Video Contest

- Teams will have to upload a team pic with their robots on facebook Shaastra page and the pic receiving maximum likes will be rewarded.
- Teams can also send a video to the coordinators and the best video will receive a reward.
- The reward can also be an advantage in the event.

Others:

- The rules and regulations not provided in this rule book will be subject to discretion of the coordinators.
- The dimensions, weights etc of the arena, facilities are subject to a margin of plus or minus 5%. However the dimensions and weights of the robots given are maximum and cannot be tolerated.
- Notification of any correction or addition to this rule book will be made on the official web site.

Figure.1: top view of arena

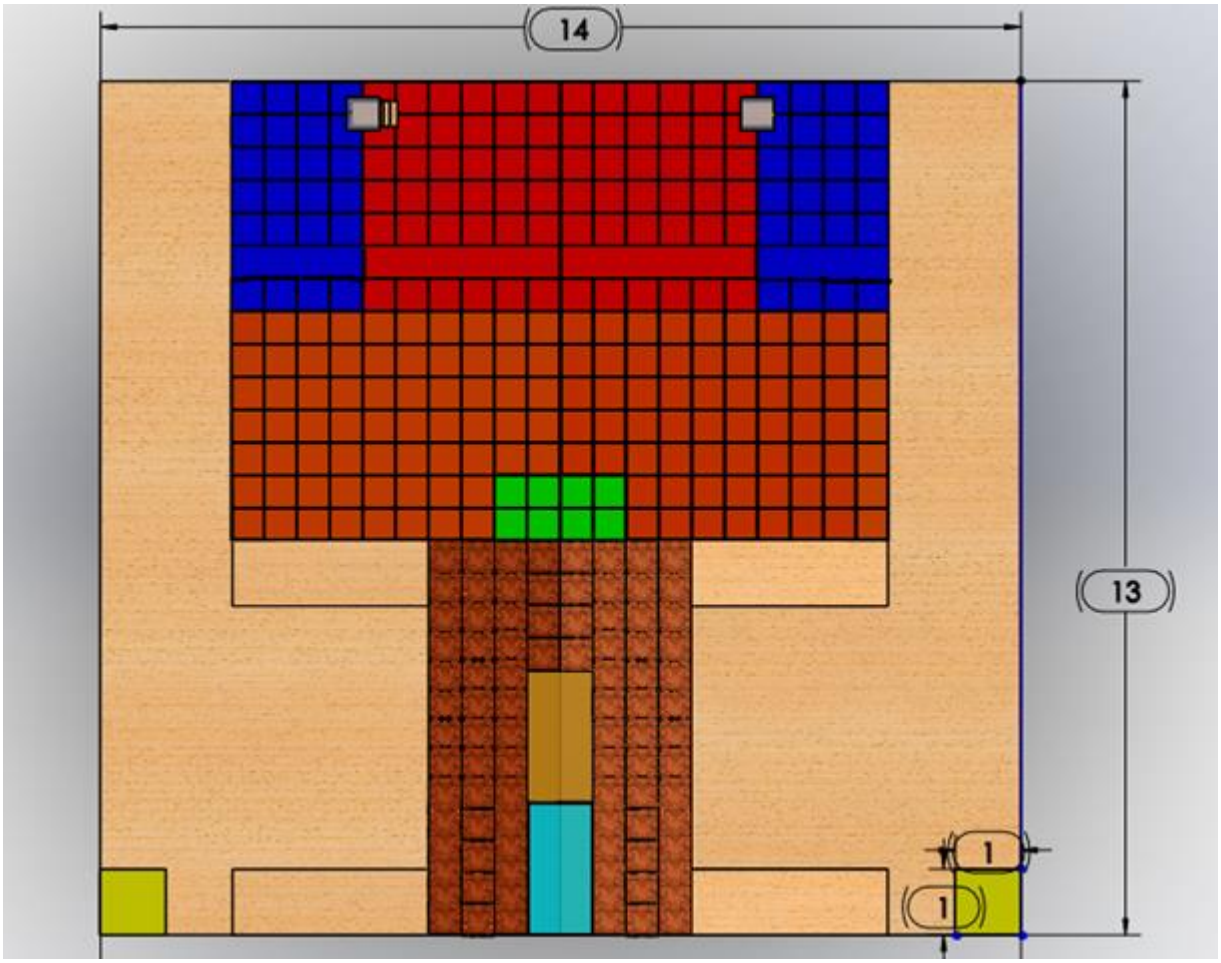


Figure.2: Isometric view of arena

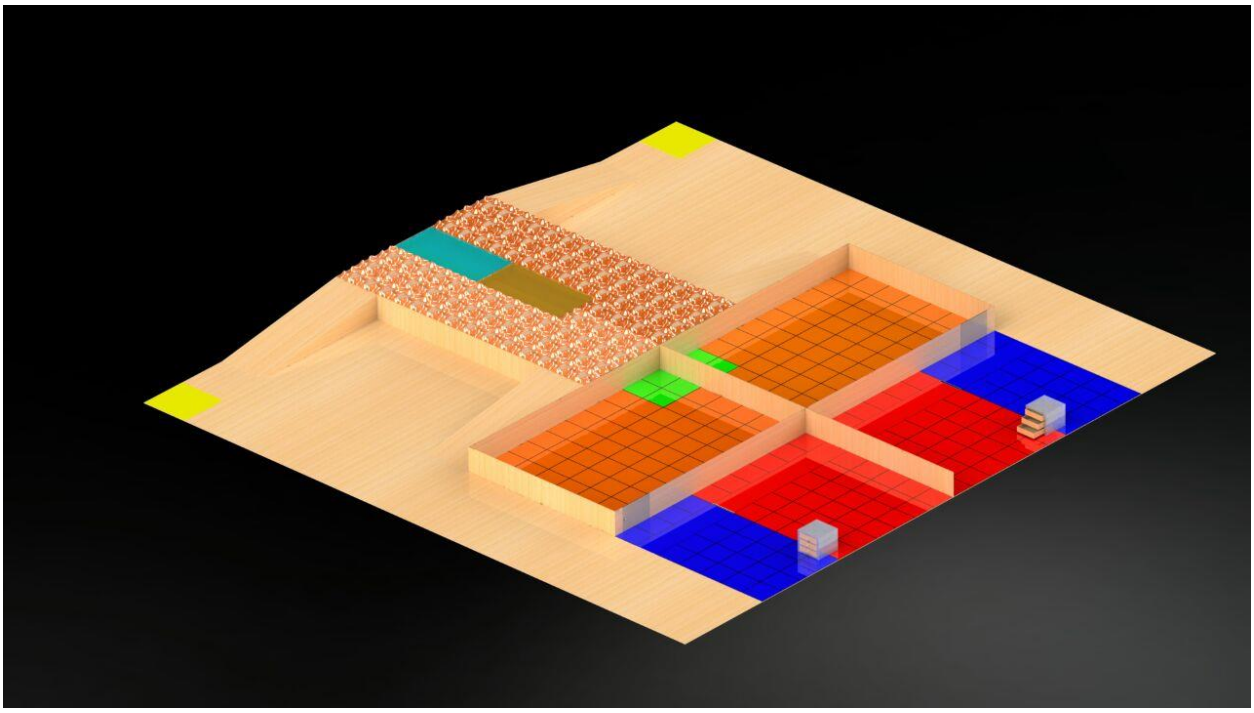


Figure.3: Slope surface

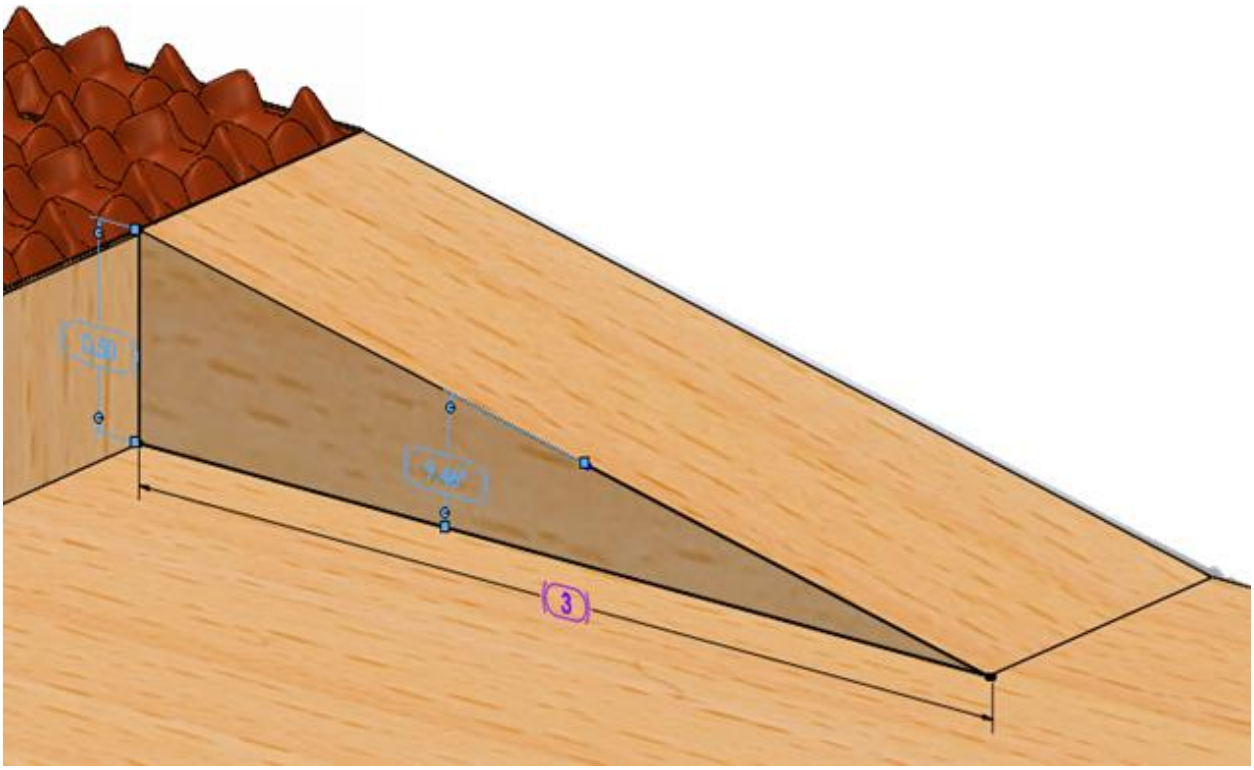


Figure.4: Rugged area, water container & sand container

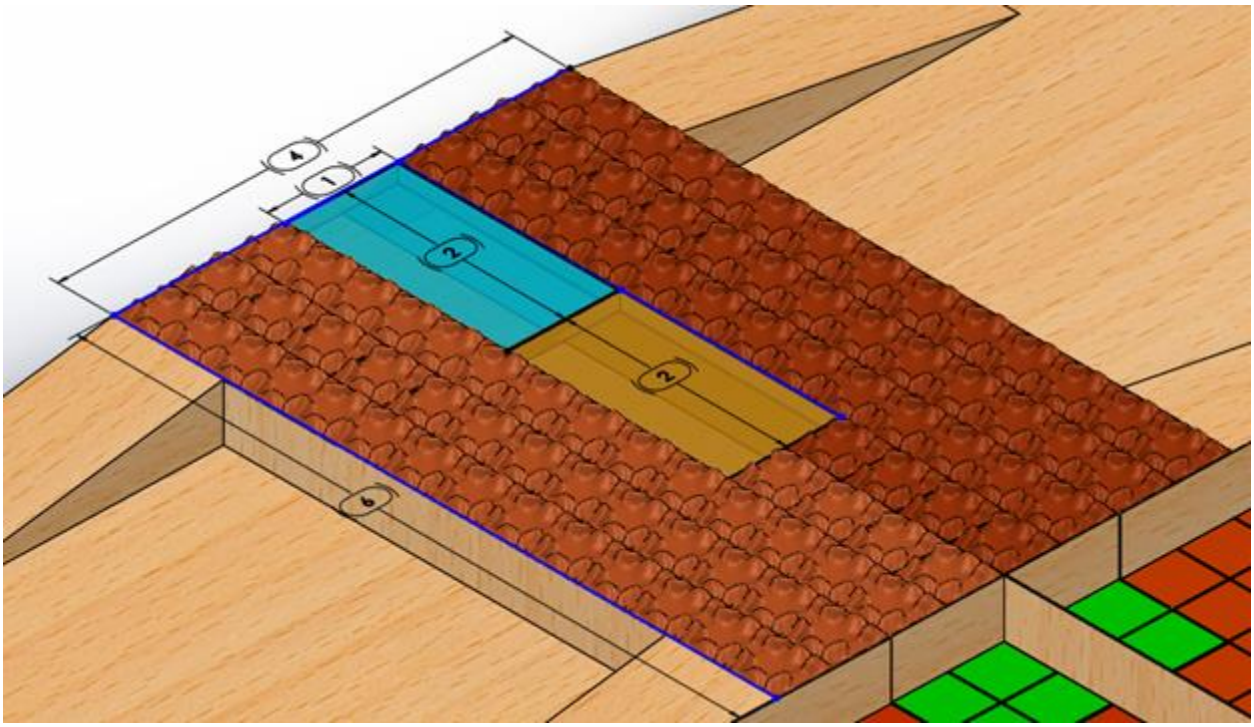


Figure.5: Autonomous bot start zone, maze area & position of the discontinuity

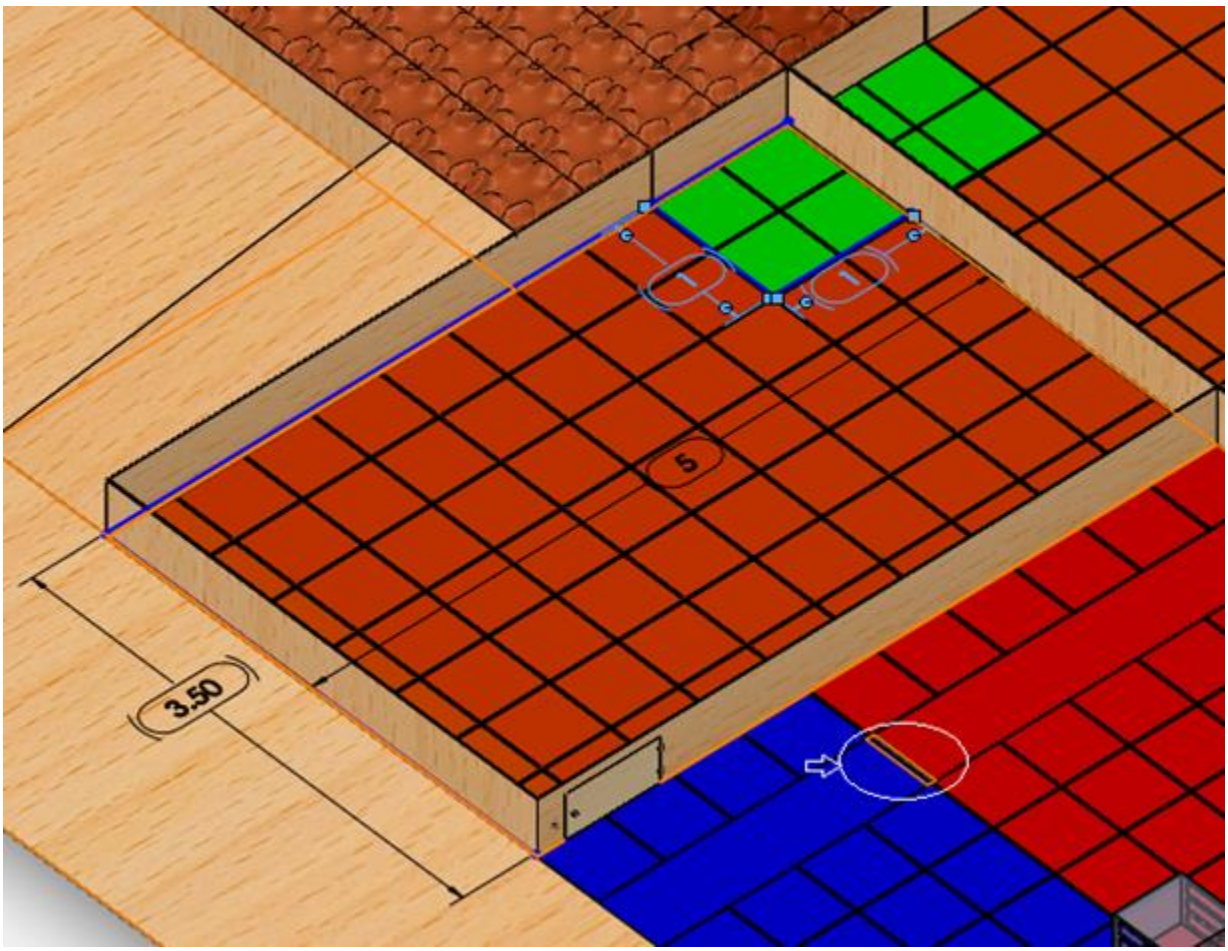


Figure.6: dimension of discontinuity

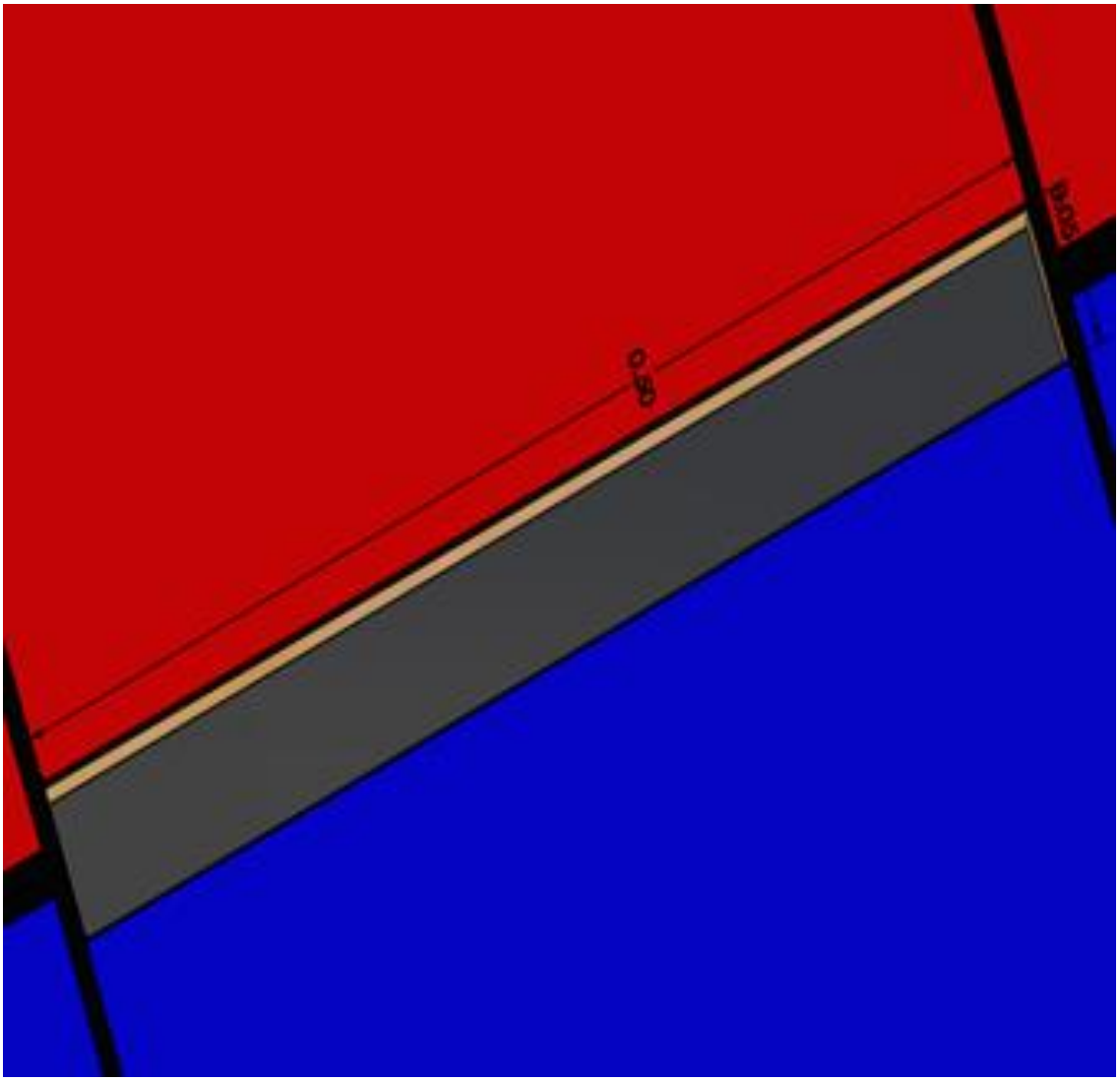


Figure.7: Discontinuity cover up

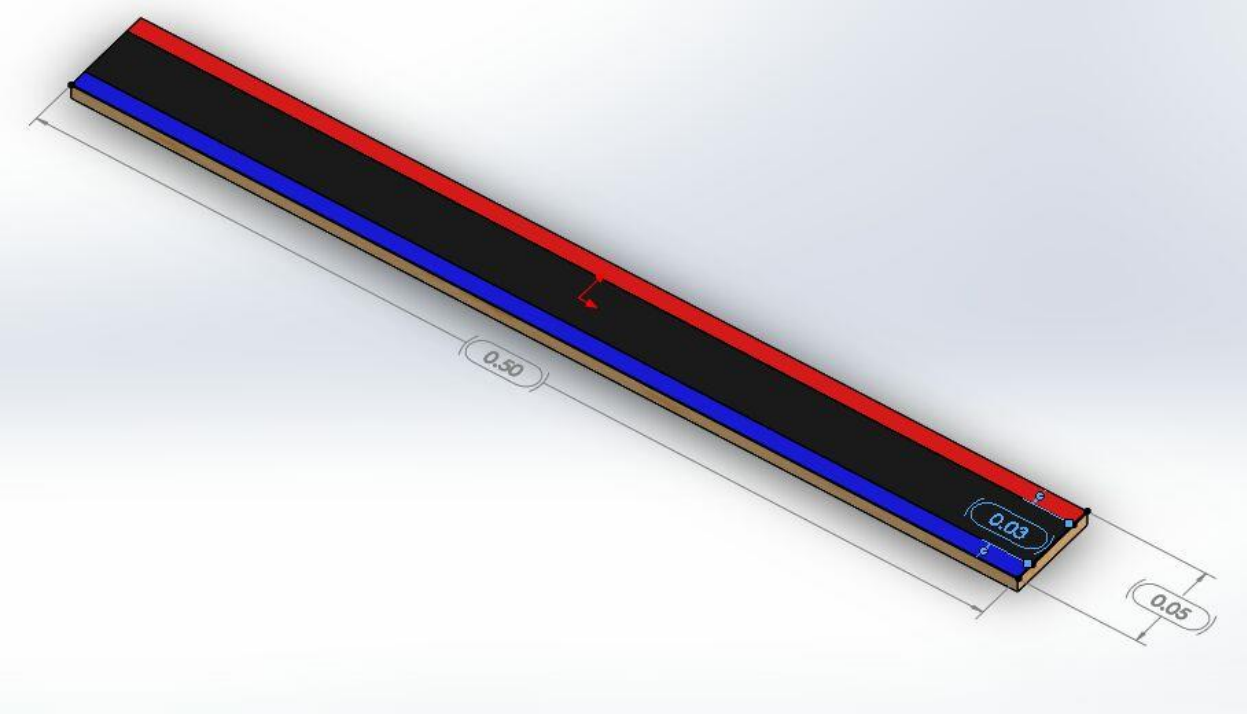


Figure.8: exit door of a maze

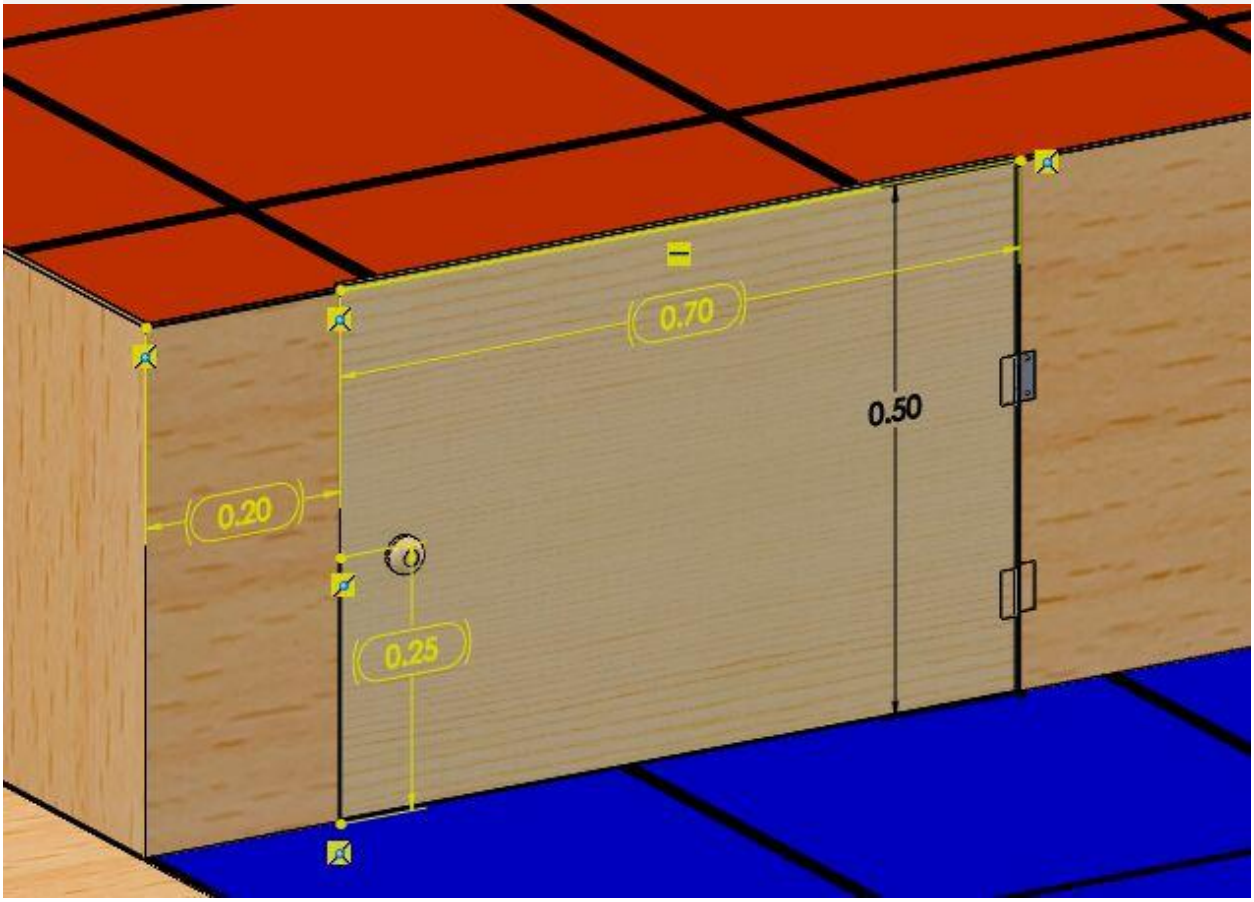


Figure.9: Autonomous zone & Common Zone of manual and autonomous zone

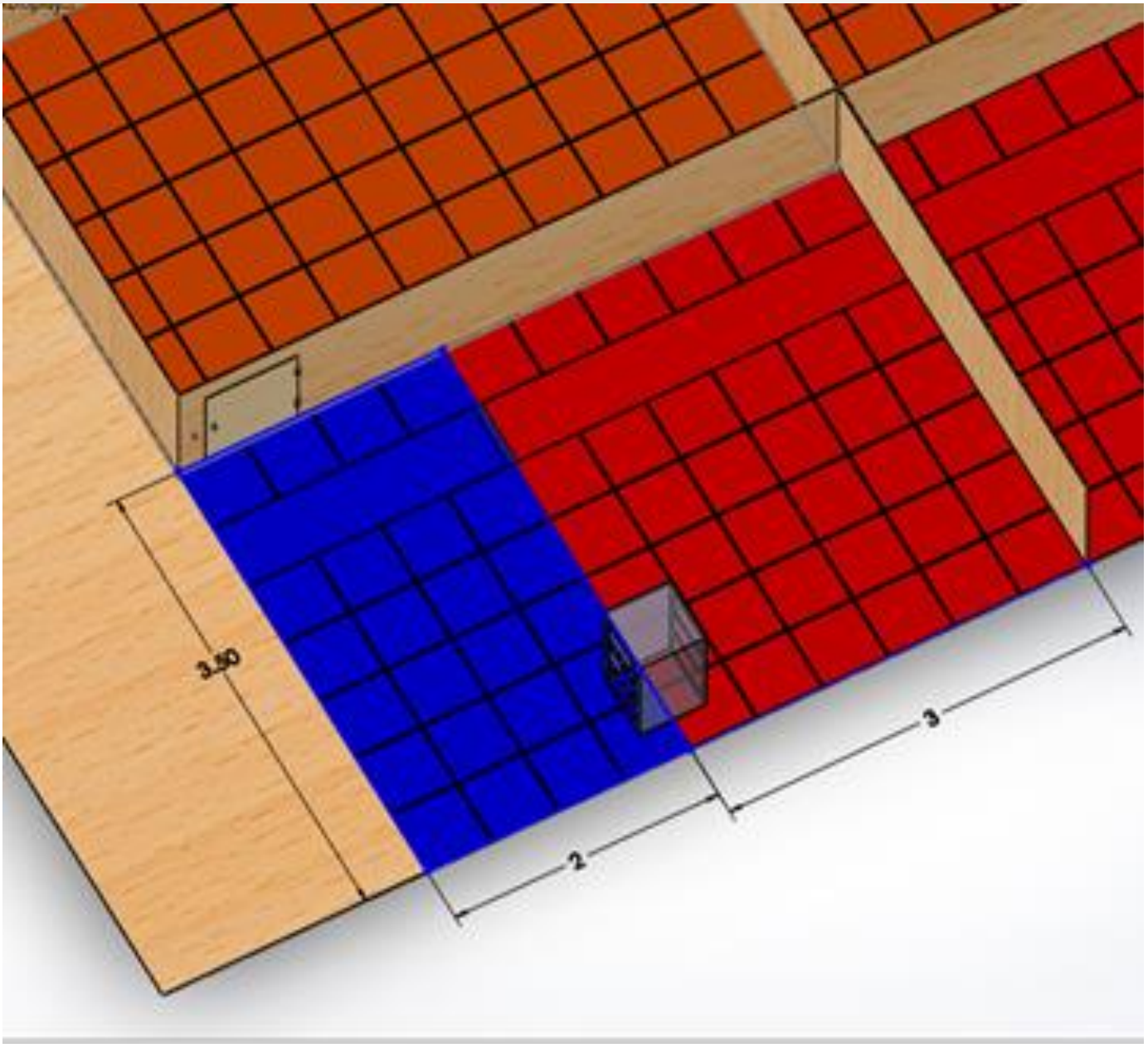


Figure.10: Top view of wooden cuboidal

Box with 3 drawers

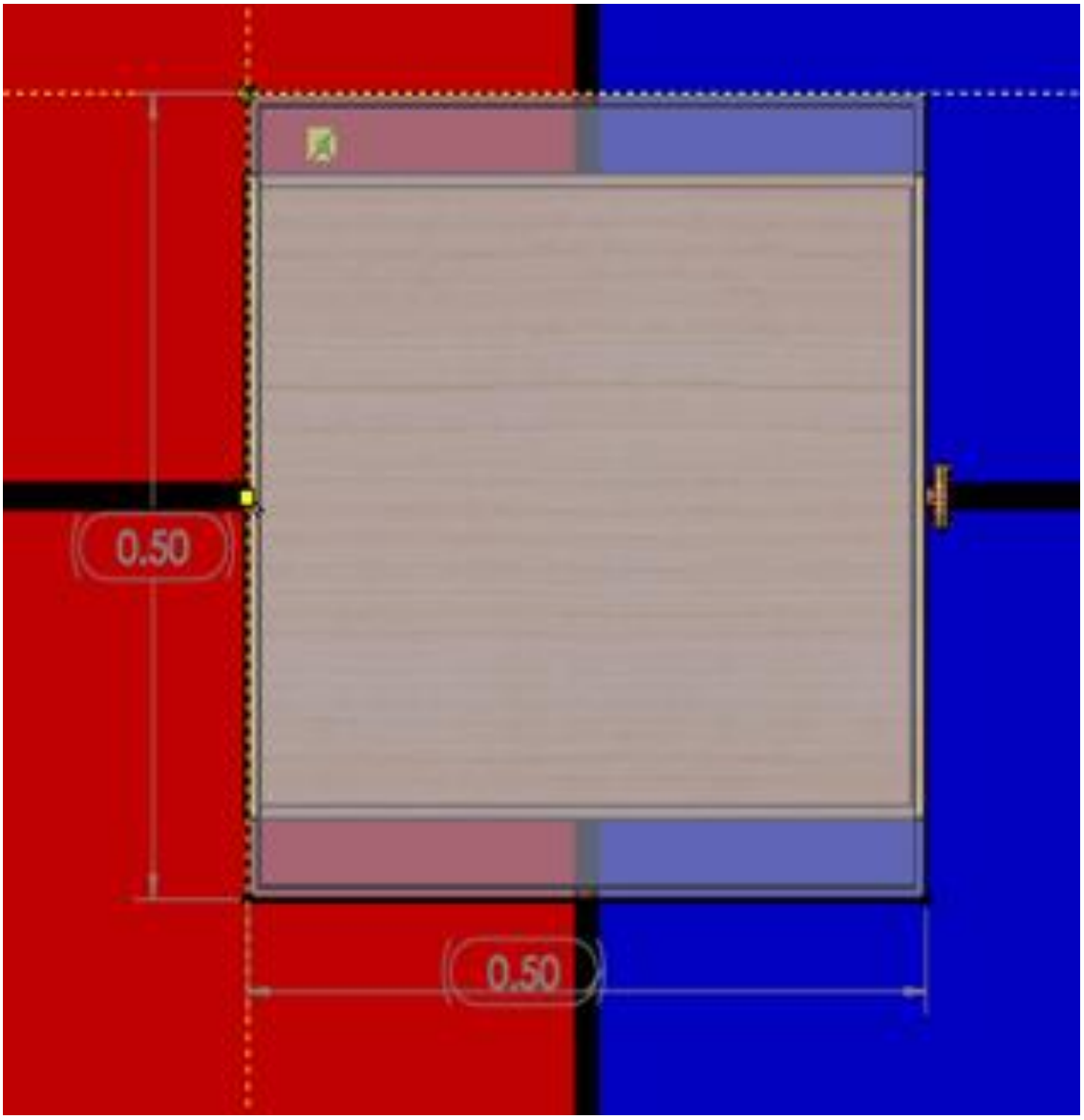
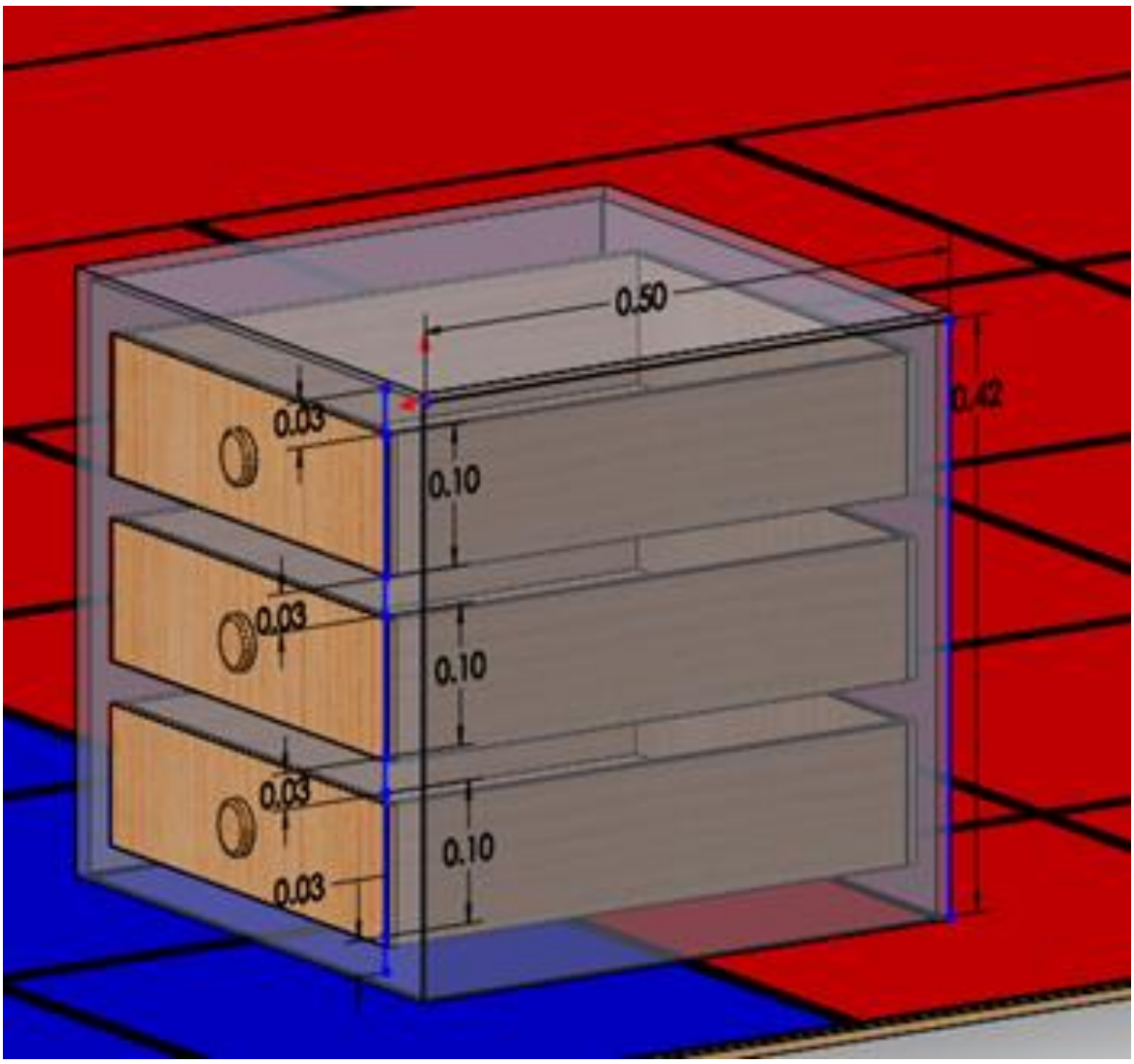


Figure.11: Isometric view of Wooden cuboidal box with 3 drawer



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