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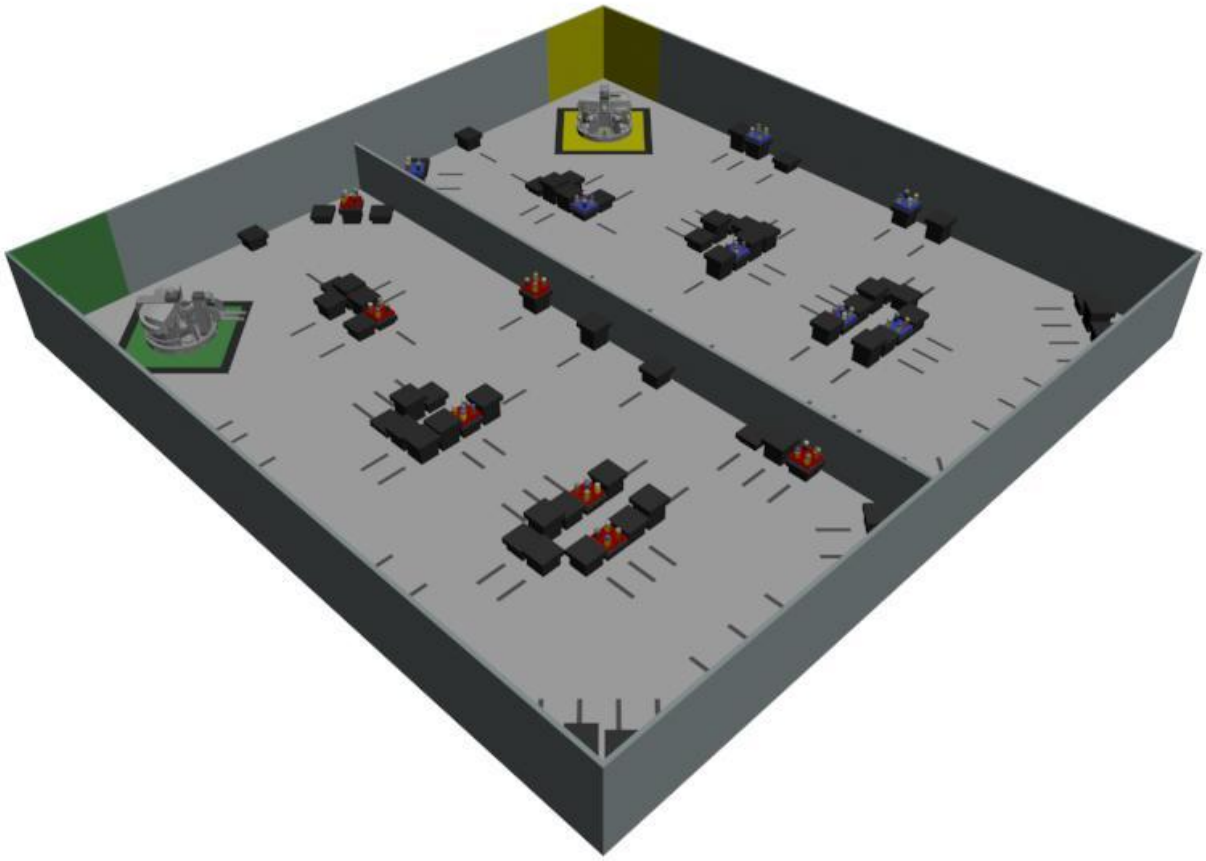
Test Project Proposal: Lost in the Black Forest : Forklift Version
WSC2013_TP23_AA_EN



Submitted by:
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Member Country: Canada

INTRODUCTION

The **'Lost in the Black Forest'** task requires competitors to:

- Manage the Mobility and Autonomous Object Management System of a 'School Yard Monitor Robot'
- Children (Small Disks) have left the school yard to play in the trees of the Black Forest. The School Yard Monitor Robot must bring these Children (Small Disks' back to the school yard.

CONTENTS

This Test Project Proposal consists of the following documentation / files:

DESCRIPTION OF PROJECT AND TASKS

The Two Lost in the Black Forest Courts each provide:

- Two Side by Side **Independent School Yard / Black Forest Environments**
- The Children in the Green School Yard are Positioned in Trees On **RED Child Carriers**
- The Children in the Yellow School Yard are Positioned in Trees On **Blue Child Carriers**
- 5 to 6 Teams of Competitors are expected to share the pair Independent School Yard / Black Forest Environments in each court during the 'Daily AM Shared Court Access Open Work Periods'
- All Teams of Competitors can expect to have 'Evaluation Task Runs' in BOTH of the Independent School Yard / Black Forest Environments present in their Assigned Court and will need to prepare to retrieve BOTH **RED** and **Blue Child Carriers**.

Note:

- Competitors should consider that the Black Forest Environment shown on the cover page of this document represents the most difficult (number and type of trees) Black Forest Pattern possible.
- The Competition Leipzig Black Forest Patterns will be set by the Mobile Robotics Expert Jury Panel based on the options presented in this document.

This task is designed to have use of the Laser Scanner as an available to the Competitors option.

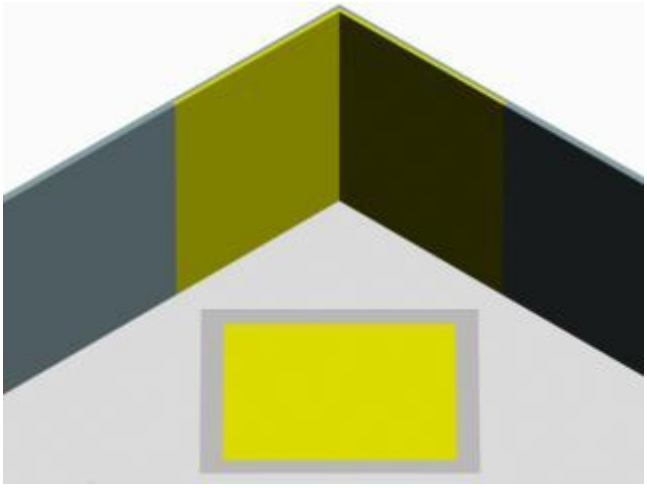
- A Laser Scanner placed On Top of the Robot and aligned with the Robot's Centre extends a Horizontal Laser Beam out that is approximately 26 to 28 cm's above the court floor.
- The court conditions above support the Laser Scanner maintaining constant contact with the Four Walls of the Independent School Yard / Black Forest Environment in which it is operating.
- The Centre Court Divider is 30 cm tall.
- The Black Forest Trees are 5,7,9,11 and 13 cm tall
- The Children are Standard Fisher Price Children

- The Child Carriers are 110 by 110 by 25 mm with an Under the Carrier Open Space of 110 by 90 by 15 mm
- The Child Pockets in the Carriers will be either 3 mm or 5 mm Deep and have a Dia. 2mm Greater than a Standard Fisher Price Child's Base.

  Note: The Expert Jury Panel will determine the Child Pocket Depth during the Task Approval Voting Process.

Independent School Yard / Black Forest Environment Elements

The School Yard



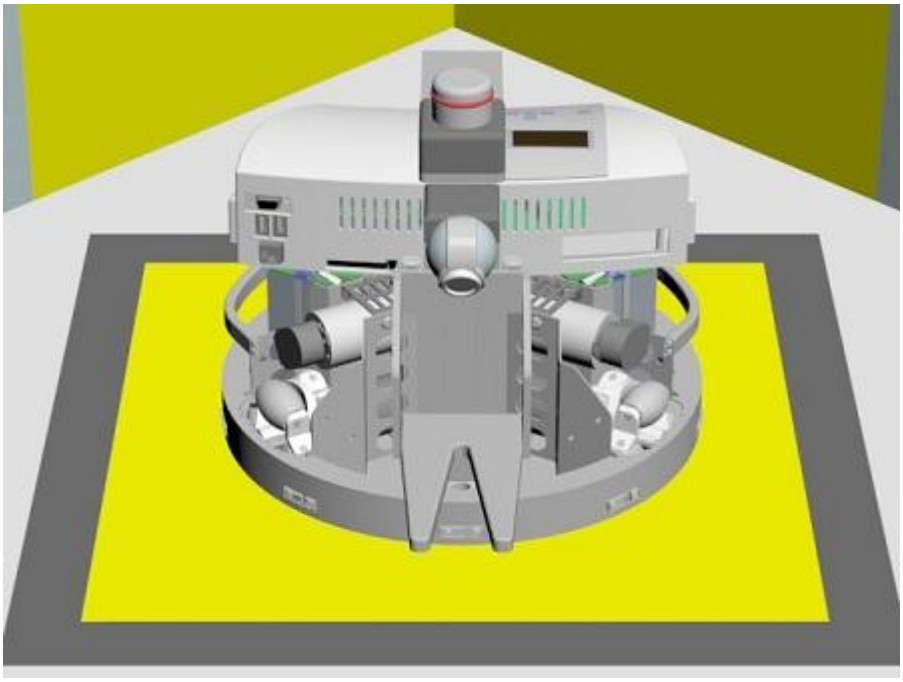
The School Yard Area is a 500 by 500 mm space.

This area includes a 50 mm Tape Line all around the School Yard Perimeter.

The School Yard Area will be either a Green or a Yellow Vinyl Sheet.

The Court Corner Walls will have either Green or Yellow vinyl sheets representing the Green and Yellow Schools.

The Robot Start Position

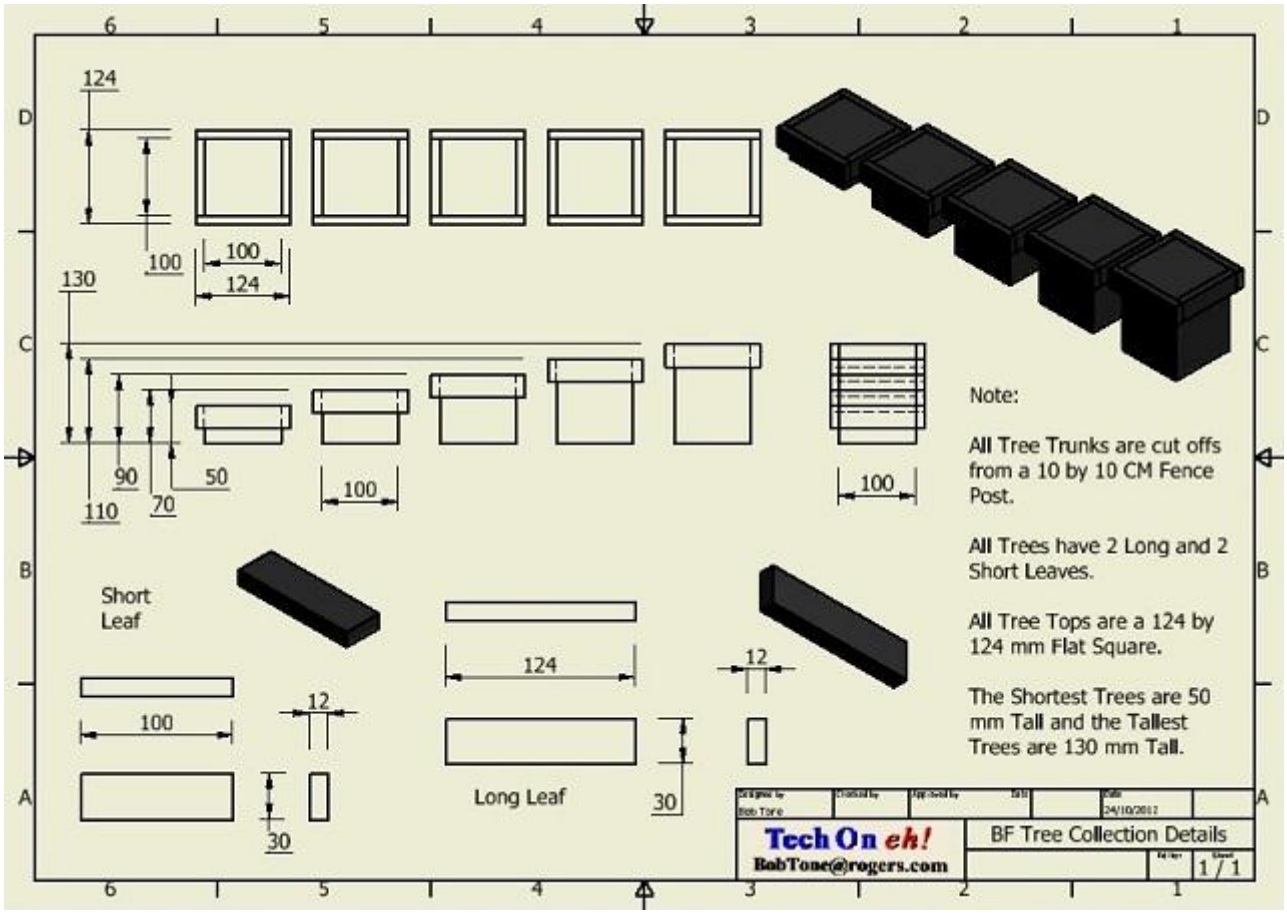


Robots start in the School Yard Areas directly in front of the schools.

The Robot MUST be 100% Inside the School Yard Fence (Tape Line).

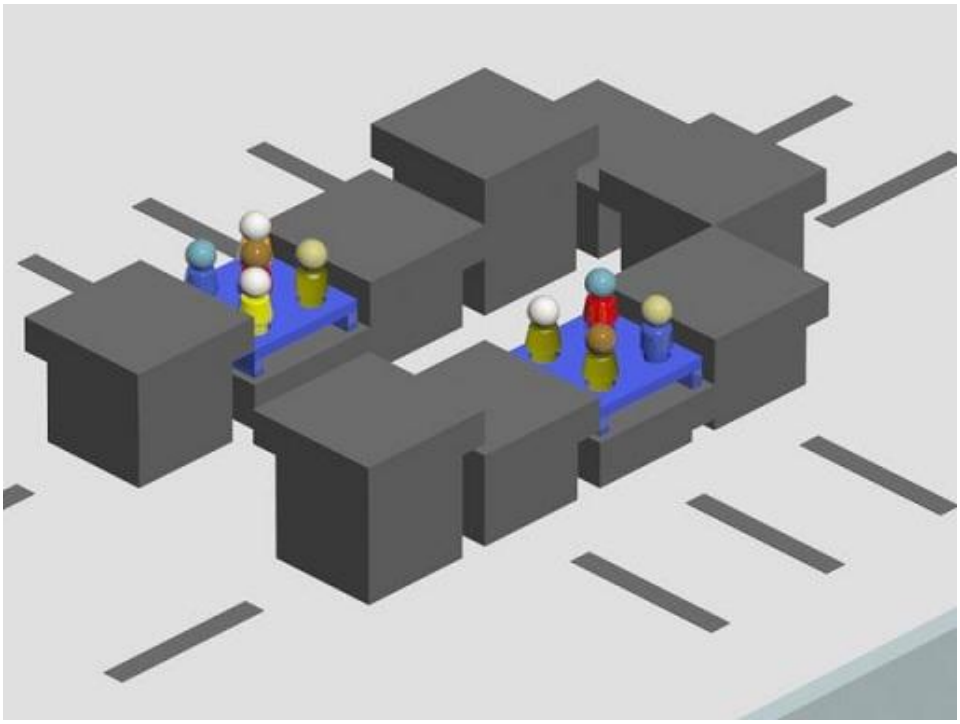
The Start of the Task Robot Orientation is a Competitor Decision.

Black Forest Environment / The Black Forest Trees



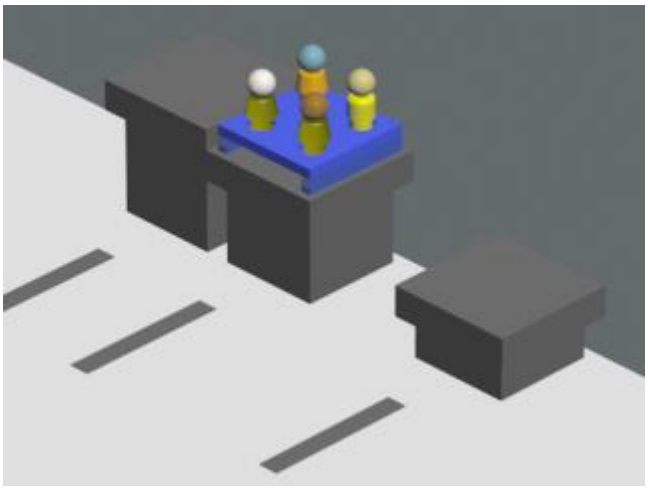
Placement of Children in the Trees

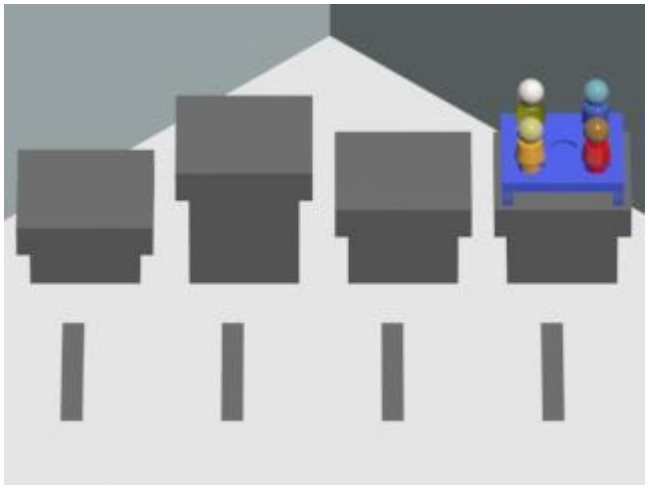
- In the Pockets of Child Carriers Only
- Child Carriers will always be placed in the Centre of the Tree Top
- ALL Trees will have a 25 cm long Tape Line positioned 5 cm in front of the tree
- One edge of the Tape Line will be aligned with the Centre Point of the Tree

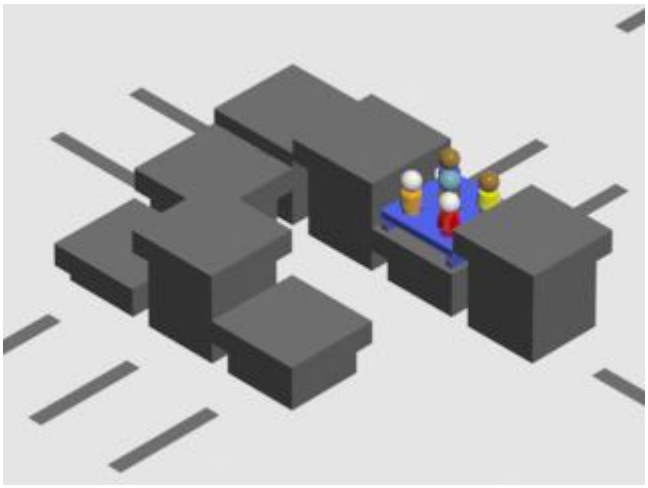


The Black Forest

- Trees will be placed in the Black Forest as Individual Stand Alone Trees and as Clusters of Trees involving various numbers of Trees in each Cluster.
- The Majority of Trees will have NO Children in them.
- All Forest Paths the Robot is expected to travel along will provide a Minimum Opening of 50 cms.
- The Competition Forest Patterns will be set by the Mobile Robotics Expert Jury Panel in Leipzig.







Marking

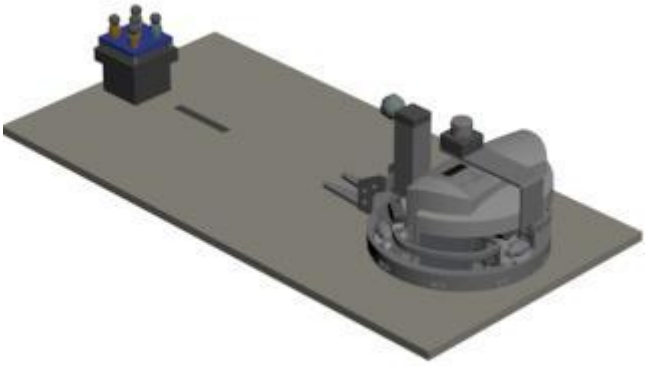
Marking will take place in two stages.

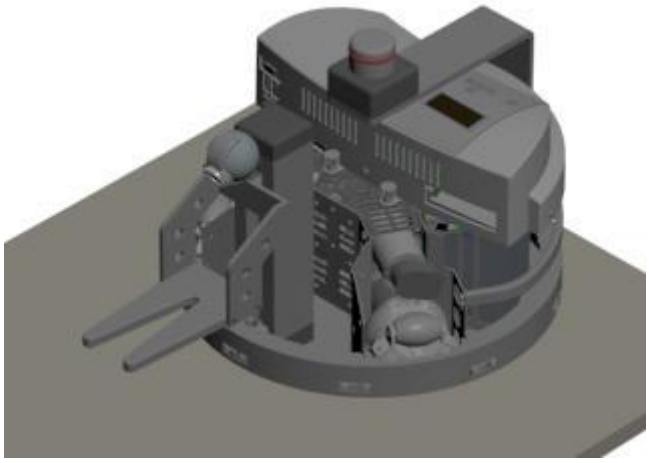
Stage One: Isolated Autonomous Object Management involving the Forklift / Child Carriers / a Variety of Trees with the Forklift Object Management / Robot Minimal Mobility Performance being marked in each Team's own Workspace. Value 40% of the Overall Mark

- Teams will have a Robot Performance Testing / Practice Space in their Assigned Workspace.
- Autonomous Object Management Marking will take place during the AM Competition Sessions.
- Autonomous Object Management Marking will take place on the Robot Testing / Practice Space in each Team's own Practice Child Carriers / Trees.

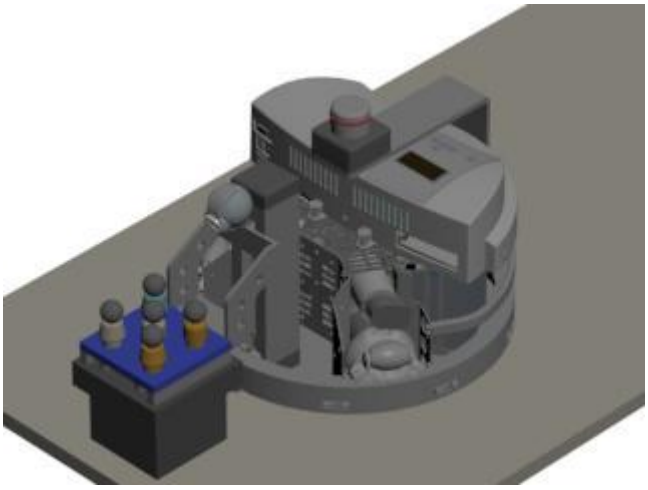
Note: If the Competitor provided items are deemed to not be incompliance with the Competition Standard then an alternate set of Testing Elements will be provided and used for the CBRCOMS Performance Specific Marking Process.

Forklift Object Management / Robot Minimal Mobility Performance Marking Sample

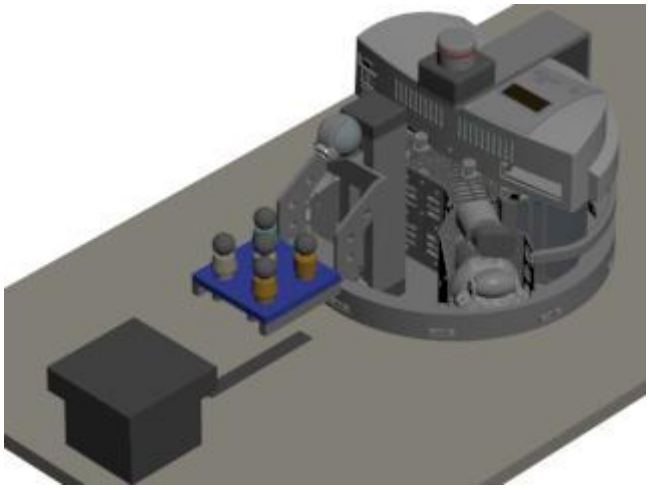




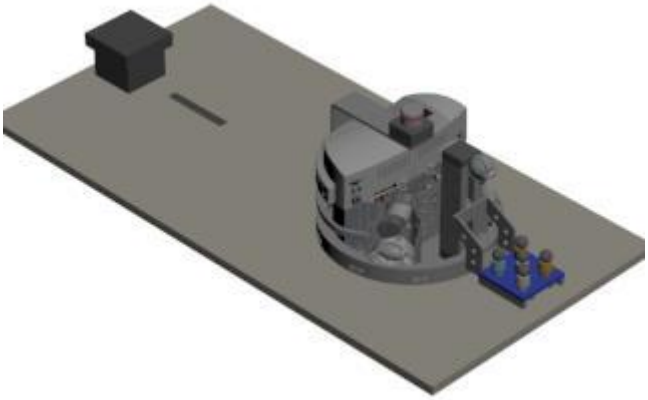
Robot Positioned Directly Opposite a Tree with a Child Carrier On the Tree Top



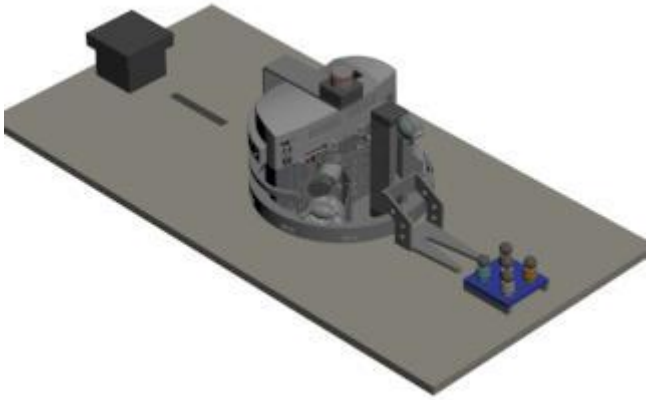
Robot Moves Forward and Positions the Forklift Under the Child Carrier



Robot lifts the Child Carrier Off the Tree and moves away from the Tree.



Robot Turns 180 Degrees and Travels to the End of the Practice Space



Robot Places the Child Carrier on the Practice Surface and backs away clear of the Child Carrier

Stage Two: On the Court School Yard Monitor Robot Complete Task Performance. Value 40% of the Overall Mark

Marking

- All Marking will take place **AFTER an Evaluation Task Run has been COMPLETED**.
- The Mark Value on a Per Child Carrier and Child Basis will depend on the Number of Child Carriers and Children in the Black Forest and the Overall Number of Evaluation Task Runs available per Task.
- 70 % of each Evaluation Task Run's Marks will be awarded based on the Number of Child Carriers returned to the School Yard.
- 20 % of each Evaluation Task Run's Marks will be awarded based on the Number of Children returned to the School Yard.
- 10 % of each Evaluation Task Run's Marks will be awarded based on the Time Taken to Return a Complete Set of Child Carriers and Children to the School Yard.

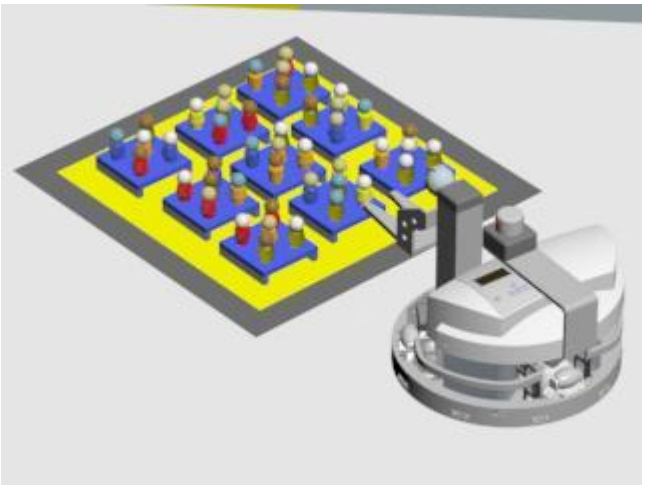
  Note: Time Marks will be calculated in the CIS based on the following formula: Overall Best Qualified Team Task Run Time / Individual Team's Qualified Time X Total Individual Task Run Time Marks available

Note: The Number of Time Marks available per Task Run will depend on how many Evaluation Task Runs can be scheduled per Team.

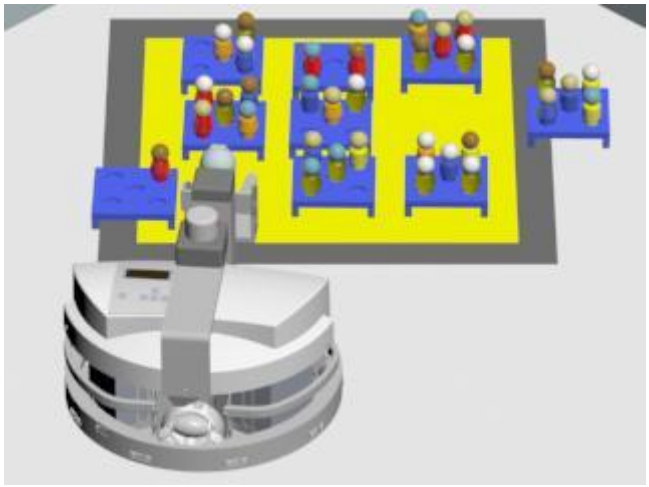
Child Carriers and Children must be 100% in the School Yard to for a Team to be awarded a mark.

The sample to the right displays a Perfect Task Completion Result in the Maximum Difficulty (9 Child Carriers and 45 Children) Task Pattern.

ALL 9 Child Carriers and 45 Children have been successfully returned to the School Yard and this Team would qualify for a Time Mark.



The sample to the right displays a Partial Task Completion Result in the Maximum Difficulty (9 Child Carriers and 45 Children) Task Pattern.



Marks are awarded for:

- 7 Child Carriers 100% in the School Yard
- 28 Children in the School Yard

Marks are NOT awarded for:

- 1 Child Carrier 100% Outside the School Yard
- 5 Children On a Child Carrier but Outside the School Yard
- 1 Child Carrier only Partially in the School Yard
- 12 Children who have Fallen Off the Child Carriers

This Team would NOT qualify for a Time Mark.

INSTRUCTIONS TO THE COMPETITOR

Competitors are expected to demonstrate True Fair Play and Co-operation at all times but most particularly when they are sharing the court spaces during the AM Work Periods.

Given the Child Carriers in the Side by Side Black Forests are Different Colours (**Red** and **Blue**) Competitors can use Camera Based Colour Analysis to locate Children in the Black Forest.

Competitors must prepare to have Task Evaluation Runs in BOTH sides of the Black Forest Court.

EQUIPMENT, MACHINERY, INSTALLATIONS AND MATERIALS REQUIRED

Competitors are responsible to bring to the competition site and to use exclusively during the competition the Robot provided to them 6 months prior to the competition for use during their competition preparation activities.

Competitors are expected to bring ALL of their Competition Equipment in a container no larger than One Cubic Meter.

The Forklift, Laser Scanner and Camera Image Management are the focus of this Task.

MARKING SCHEME

Marking is based on **Four Criterion**:

Criterion One: Forklift Management in the Workspace. Value 40%

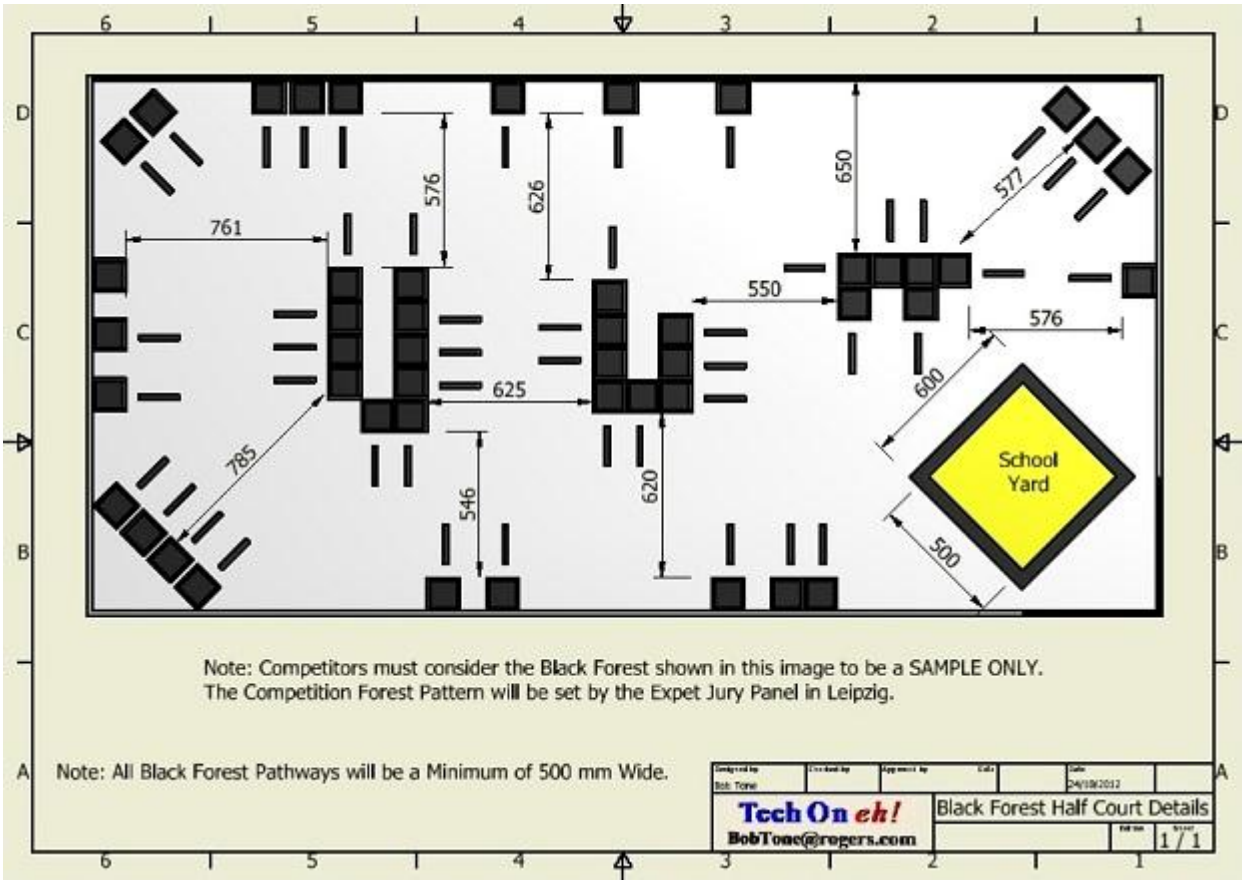
On the court Performance Value 60%

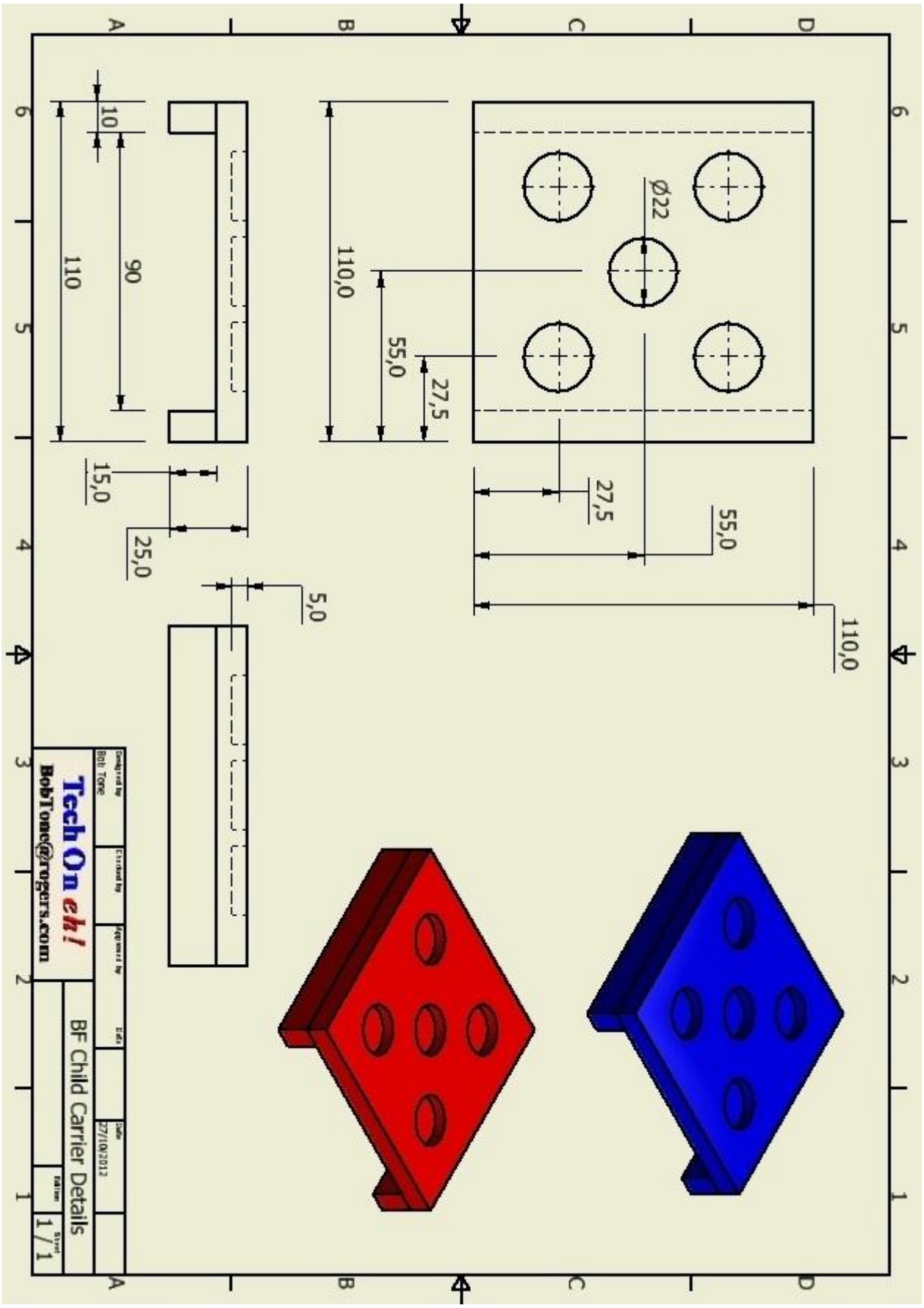
Criterion Two: Delivery of Child Carriers to the Designated School Yard Area. Value 70% of the Marks available per Evaluation Task Run.

Criterion Three: Delivery of Children to the Designated School Yard Area. Value 20% of the Marks available per Evaluation Task Run.

Criterion Four: Time Mark (Awarded only if Criterions 1 and 2 have been completed 100%) Value 10% of the Marks available per Evaluation Task Run.

Sample Black Forest Court Layout

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