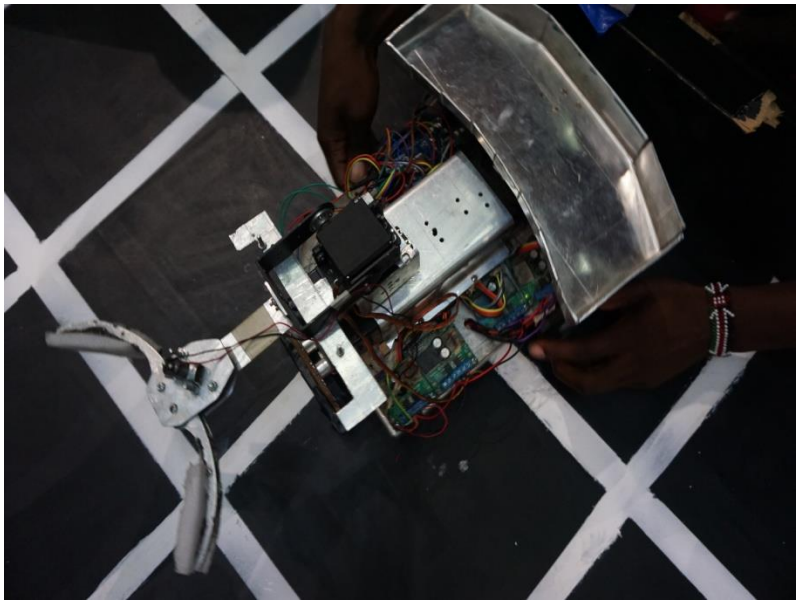
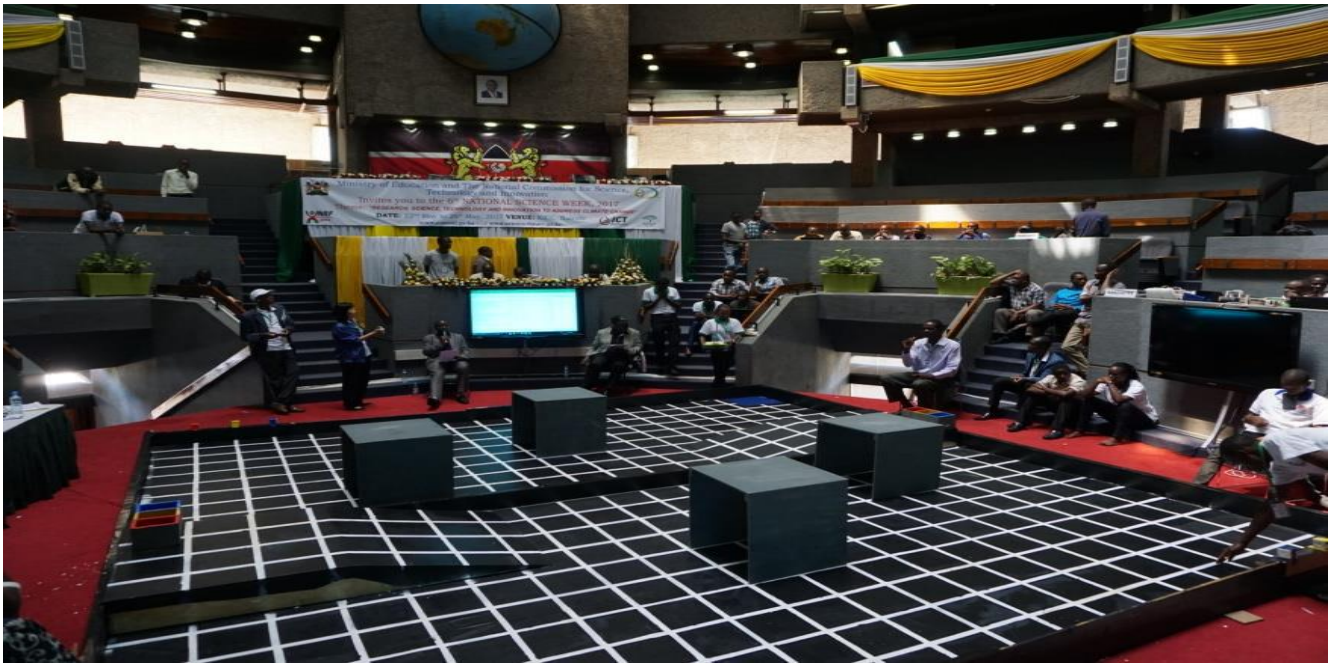
ROBOKEN

2019





1.0 OUTLINE OF THE CONTEST

In Kenya over the past years, there has been a shortage of housing for public servants and the general public. It is due to this that the Kenyan government decided to come up with the "Big Four" agenda, with affordable housing as one of them. Since this agenda involves a lot of activities like storage of building materials, selection, mixing and laying out of bricks. To achieve this, a lot of precision is required in workmanship for best results. As such, technology may be adopted for efficiency to accomplish the job within the stipulated time.

Automated technology is appropriate for this application through the use of robotic technology. This year's robotics contest will be based on use of robots to achieve affordable housing agenda.
In this game, the robot must get to the construction site (team A – Blue field and team B – Red field), get to the material site marked MS2; pick the two mortars marked M1 and M2. Then transfer these to construction corner labeled C1 and place them to an area within C1, marked M1 and M2 respectively.
The robot then moves to brick zone where two bricks marked B1 and B2 are placed, picks and places them to corner marked C1, on mortars M1 and M2 respectively.
The game robot then picks joint brick J1 and places it into block P1. The robot then moves to material site marked MS2, pick two mortars M3 and M4 and places them on wall sections marked M3 and M4 respectively in construction corner marked C2.
The robot then moves to an area where bricks marked B3 and B4 are stored, pick them and places them on mortars M3 and M4 respectively.
Having accomplished all the tasks, it moves back to the start zone for parking and parks correctly.
The robot that clears all these activities within or in less than three (3) minutes will be declared the winner.
NB: The order of execution of tasks is at discretion of the team

2.0. THE GAME FIELD STRUCTURE AND SPECIFICATION

a) The field consists of a Game Area having the dimension of 6000mm x 6000mm and surrounded by a wooden fence with a height of 150mm and a thickness of 25mm. The game field is divided equally for two teams by a wooden fence with a height of 150mm and a thickness of 25mm.

b) White lines with a width of 30mm made of non-shiny sticker are drawn on the floor of the Game Area as specified on the design

c) The Game Area consists of a starting zone (500mm x 500mm);
   i. The starting zones Red and Blue are 500mmx500mm
   ii. The BRICKS B1,B2,B3 and B4 dimensions 150mmx60mmx60mm
   iii. The MORTAR M1, M2, M3 and M4 dimensions 150mmx60mmx20mm
   iv. The JOINT BRICK J1 dimensions 60mmX60mmX120mm
   v. Bricks B1 and B3 are placed horizontally on the ground where as bricks B2 and B4 are placed vertically.
   vi. Bricks B1 and B3 are green in colour and Bricks B2 and B4 are red colour.
   vii. Mortars M1 and M3 are green in colour and Mortars M2 and M4 are red colour.
   viii. Joint brick J1 is placed vertically
   ix. Corner C1 and C2 are raised 60mm from the ground with two orthogonal surfaces of 60mm x 200mm.
   x. Wall P1 is 260mm above the ground with a Groove of depth 60mm and a width of 70mm as illustrated in the diagram

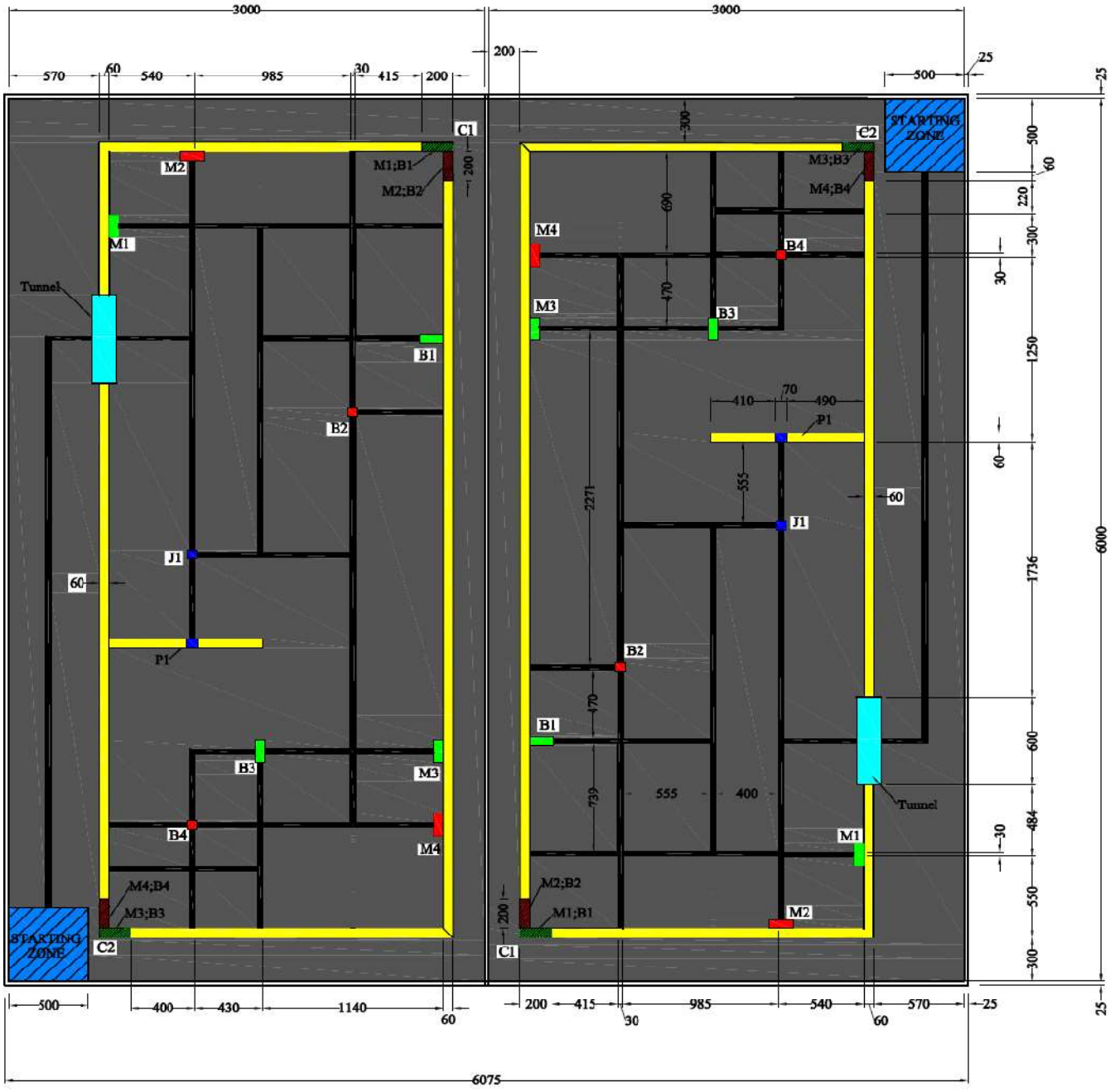
3.0 GAME PROCEDURE

a. Each match last for 3 minutes
b. In any of the following cases, the match ends immediately (even before three minutes).
    i. When a team is disqualified
    ii. When the referee judges that the game cannot continue

4.0 SETTING OF ROBOT

i. One minute is given for setting of robots before the game starts.
ii. At most two members of each team can engage in setting of robots.
iii. Any teams that fail to complete setting of the robots within one minute can resume the setting again once the game starts.

THE ROBOT GAMEFIELD SCALE 1:1



The Robot Game Field Objects

B1 & B3 Green in colour
Placed horizontally
150 x 60 x 60 mm - 2 pieces

M1 & M3 Green in colour
Placed Horizontally
60 x 60 x 20 mm - 2 pieces

B2 & B4 Red in colour
Placed vertically
60 x 60 x 150 mm - 2 pieces

M2 & M4 Red in colour
Placed horizontally
60 x 60 x 20 mm - 2 pieces

J1 blue in colour
60 x 60 x 60 mm –
1 Piece

Setting of the corners C1 and C2 platform. The dimensions of the green and red blocks are 200 x 60 x 60 mm

Platform for M1 & M3 - 2 pieces

(L)100 x (W)40 x (T)25 mm
(L) 25 x (W)40 x (Height) 50 mm
(L)100 x (W)40 x (T)25 mm

Platform for M2 & M4 - 2 pieces

(L)100 x (W)40 x (T)25 mm
(L) 25 x (W)40 x (Height) 100 mm
(L)100 x (W)40 x (T)25 mm

Partition Wall P1 240 x 60 x 240 (height) mm with a groove 70 mm length x 60 mm depth x 60 mm width

The tunnel placed at the entrance: 600 mm gap x 600 mm height and 150 mm width. It is made of wooden material of 25 mm thickness and 150 mm wide.

5.0 Deployment of the robots and team members at the start of the game

i. Game Robot must be started in the Start Zone.
ii. When starting the game robot, the team members who perform the starting action should not be in the game field.

6.0 COMPETITION TASKS

Once the game has begun, each team shall complete the following tasks:

i. The Game Robot must pick the mortar M1 and place it correctly in the CORNER C1
ii. The Game Robot must pick the mortar M2 and place it correctly in the CORNER C1
iii. The Game Robot must pick the brick B1 and place it correctly on top of M1
iv. The Game Robot must pick the brick B2 and place it correctly on top of M2
v. The Game Robot must pick joint brick J1 and place it correctly in groove P1
vi. The Game Robot must pick the mortar M3 and place it correctly in the CORNER C2
vii. The Game Robot must pick the mortar M4 and place it correctly in the CORNER C2
viii. The Game Robot must pick the brick B3 and place it correctly on top of M3
ix. The Game Robot must pick the brick B4 and place it correctly on top of M4
x. The game robot must park at the start zone

7.0 DECIDING THE WINNER

a. The first team whose Game Robot successfully accomplishes all the tasks as per the criteria in 6.0 shall be declared the winner.
b. If neither team achieves the above within 3 minutes, then the winner shall be decided on marks scored and time taken. The score shall be decided as follows

i. A team that moves up to the tunnel (3marks)
ii. A team that successfully passes through tunnel (3marks)
iii. A team that successfully picks the mortar M1 (3marks)
iv. A team that correctly places mortar M1 in corner C1 (5marks)
v. A team that successfully picks the mortar M2 (3marks)
vi. A team that correctly places mortar M2 in corner C1 (5marks)
vii. A team that successfully picks the brick B1 (3marks)
viii. A team that correctly places brick B1 on top of mortar M1 (5marks)
ix. A team that successfully picks brick B2 (3marks)
x. A team that correctly places brick B2 on top of mortar M2 (10marks)
xi. A team that successfully picks the joint brick J1 (3marks)
xii. A team that correctly places joint brick in groove P1 (10 marks)
xiii. A team that successfully picks the mortal M3 (3marks)
xiv. A team that correctly places mortal M3 in corner C2 (5 marks)
xv. A team that successfully picks the mortal M4 (3marks)
xvi. A team that correctly places mortal M4 in corner C2 (5 marks)
xvii. A team that successfully picks the brick B3 (3marks)
xviii. A team that correctly places brick B3 on top of mortar M3(5 marks)
xix. A team that successfully picks brick B4 (3marks)
xx. A team that correctly places mortal brick B4 on top of mortar M4 (10 marks)
xxi. A team that correctly packs at the start zone (7 marks)

8. RETRIES

i. A retry can be made only after the referees' permission
ii. Team members are allowed to touch the robots while preparing for a retry
iii. Retries of a robot or several robots at the same time can be made as many times a s necessary
iv. A retry of the robot is made at the start zone only
v. During a retry, a team can bring all the objects which are held by the robot back to the start zones

9. SPECIFICATIONS OF CONTEST TOOLS

a. The game field, the bricks, joint brick and the mortar shall be provided by the organizers

10. CAUTIONS IN ROBOT DESIGN AND DEVELOPMENT

i. Each team is recommended to build 2 robots: 1 Game Robot and 1 Spare Robot.
ii. Each robot must not be split into sub-units or connected by flexible cords.
iii. Wireless radio frequency is prohibited.
iv. The robots in the contest must be built by the team members from the same institution.
v. Game Robots
   a. Each Game Robot must perform its tasks automatically after it is started by a team member.
   b. In the Start Zone, the Game Robot must have its dimension no larger than 500mm in width,500mm in length and 1000mm in height. There is no limitation on the dimensions of the Game Robot after the game starts.
vi. Weights of the robots
   a. The total weight of all robots, equipments and other devices used in the entire contest must not exceed 50 kg. However, the back-up set of batteries of the same type, weight and voltage as the primary set of batteries, is exempted.
vii. Power sources of the robots
   b. Each team must prepare its own power sources.
   c. The voltage of the power sources used by each robot must not exceed DC 24V.
   d. The pressure of the compressed air power must be less than 6 bars.
   e. The organizer has the right to declare and prohibit any dangerous and inappropriate power sources.

viii. Safety rules

a. The use of explosives, fire or dangerous chemicals is prohibited.
b. If a laser is used, it must be of class 2 or less. In designing and preparing the laser, full care must be taken to protect all persons at the venue from harm during all procedures. In particular, the beams must be so oriented that they cannot shine into the eyes of the spectators.

11 VIOLATIONS

If a violation occurs, 10 points will be immediately deducted and if the violation still continues, 10 points will be deducted for every 3 seconds. Each time of deduction is considered as the number of violations. The team with three violations in a match will be disqualified. The violations are categorized as follows:

i. Any parts of any robots or the objects held by any robots move out of the game field or the space above it.
ii. Any parts of any robots or the objects held by any robots enter the opposing team area or the space above it.
iii. Any parts of any robots or the objects held by the robots cause obstruction
iv. The Game Robot hinders or cause difficulty for the opponent's Game robot

12. DISQUALIFICATION

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

i. The team damages or tries to damage the field, facilities, equipment or opponent's robots.
ii. The team performs any acts that are not in the spirit of fair play.
iii. The team fails to obey instructions or warnings issued by the referees.
iv. The team has made a false start for three times in the same match.
v. The team has made three violations in the same match.

13. SAFETY ISSUES OF THE ROBOTS

i. All robots must be designed and manufactured as to pose no danger of any kinds to any persons in the venue.
ii. All robots must be designed and manufactured as to cause no damage to any robots of the opposing team or the field.

14. TEAMS

i. Each participating Institution in the contest can be represented by one team only.
ii. A team consists of at least nine students, three instructors and a technician who all belong to the same institution. Two of the ten students of the team is entitled to participate in the match.
iii. In addition, other members of pit crews can adjust the robots in the pit area and can help to carry the robots to the field, but cannot participate in the match. The members of the pit crews must be students of the same Institution.
iv. Participation by post-graduate students is not permitted, However they can be allowed to make presentation