

## u3a Robot Challenge 2022 - Details

#### **General Information**

We would like to acknowledge the efforts of Cannock Chase u3a in organising the 2019 Robot Challenge of which the 2022 Gloucester u3a Robot Challenge is based.

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#### Challenge day scoring method

Because each of the individual challenges has different scoring methods (time measurements or points allocated) it is planned that the winner of each challenge will be awarded 10 points, second place 9 points, and third place 8 points so on down to one point.

Because the autonomous challenges are deemed to be harder and involve more of an effort to construct and program, these points will be doubled, 20, 18, 16 and so on. Team points from each challenge will be added together to find the overall challenge day winner.

Note: The more challenges a team takes part in, the more possibilities of winning the day overall winner prize.

#### The uses of attachments

Please note it is not necessary for all the attachments you plan to use during the day to be attached at the same time. You are allowed to remove one attachment and replace it by another in-between different challenges.



## **Remote Controlled Crazy Golf Challenge**

Navigate a real golf ball around an undulating course avoiding various obstacles, finishing by pushing the ball into a hole that is on a raised mound (approximately 6cm high) using a remote controlled robot. The robot can push, capture, guide or knock the ball but cannot pick it up. No penalties will be incurred if the ball gets trapped in the trees or lake, the only penalty is wasted time. The ball may be retrieved from the trees or lake and placed back on the course. The shortest time taken will be the winner, a bonus (45 seconds deducted) will be given for successfully depositing the ball in the hole. The time will be measured from the start to returning to the 19th hole.

Three attempts can be made within the maximum time of 5 minutes and the lowest score will be used





Note: The arena and the Ramp and raised Green short pile carpet, in appearance similar, to snooker table cloth.



The Ramp below is 48cm long, 40cm wide and 6cm high.

The raised Green is 55cm long x 40cm wide x 6cm high. The flat top section is 40cm square, the rise angle of both the ramp and mound is between 20 and 30 degrees.





## **Remote Controlled Target Challenge (Skittles)**

To knock down a maximum of 9 wooden skittles placed in a diamond shape approximately 1.5m from a firing line, using a provided wooden ball. At the start of each attempt the robot will be placed on the offset start position. A mechanism can be used to move the ball towards the skittles or simply use the momentum of the moving robot to push the ball. Competitors can place the ball anywhere behind the firing line including on any permitted attachment. Please note the robot cannot be driven beyond the firing line. The skittles will be reinstated after each attempt. A maximum of 3 attempts to knock down all the skittles can be made. Points will be awarded for each skittle knocked down. (Maximum 27 points). The robot will be replaced at the start position for each attempt.

In the event of a highest score being tied the team with the highest score in an individual attempt will be the winner. If this is also tied there will be a knock out play-off to find an overall winner of the challenge.

The skittles are 50mm at the widest point and approximately 200mm high, and each skittle weighs 125g. The balls are 75mm in diameter and weigh approximately 120g. The original set was bought from EBay.





## **Remote Controlled Egg and Spoon Race Challenge**

To navigate the robot holding an egg (pseudo egg) in a spoon around a course and dropping the egg into a receiving cup at the end of the course, in the shortest time. Time will be deducted (10 seconds) for successfully dropping the egg in a cup at the end of the course. Each time the egg needs to be picked up and returned to the spoon, a penalty of 5 seconds will be added to the overall time.

The course will contain various obstacles that will need to be negotiated. These will include chicanes, a roundabout which it is required to do a full 360 circuit before moving on to the parking area stopping and then reversing 90 into a second bay.

Note: The egg & spoon will be provided to make the challenge the same for everyone. The egg is made of rubber and is about the size and shape of a standard egg, it weighs 64 grams. The spoon is made Silicone covered plastic, it's a serving type spoon cut short, total length 180mm, see picture below. It will be necessary for the robot to have an attachment to hold the spoon horizontal, like a clamp, no restraint mechanism is allowed.



A "test" cut down serving spoon can be obtained from kitchen shops and Amazon.





The egg drop area is located at surface level and is approximately 200mm x 230mm x 2.5mm thick board with a chamfered edge. The receiving cup has an opening of 80mm (the egg is 65mm) and is 40mm high. Methods for dropping the egg will need to be considered, for example, by using a mechanical means or sudden movement of the robot.





The rocker is wider than A4 and is pivoted to have an angle that is calculated at around 8 degrees and is just biased one way on entry. The entry has no bump up, instead it is tapered with just a flap of the green grass. The balance point is shown in the diagram below, and as the robot crosses this point, the rocker will gently tip forward before continuing.

Beware about the exit, as this is a bump down of approximately 5mm, the thickness of the timber ramp, intended to shake the egg!

5mm Exit Bump 335mm Approx angle = 8 degrees 370mm Entrance 50mm Point





### **Remote Control and Autonomous Maze Challenges**

This Challenge can be undertaken either using remote control or autonomously. There has been a minor change to the 2019 Challenge to make it a little more interesting. For the two separate Challenges, the aim is for the robot to be navigated or to navigate itself around the course starting at the lower left proceeding to the turning area and returning to the start point in the shortest time. The boundary of the course is made of wood and is 64mm high.

Each competitor will be given 3 attempts and the shortest time taken of the 3 attempts will be used. The robot which completes a run in the shortest time will be the winner.

A maximum time of **3** minutes will be allocated to each attempt on the remote control challenge and **5** minutes on autonomous challenge.

Times will be recorded in both categories (remotely controlled / autonomously) separately, so in this event there will be 2 winners. Competitors are allowed to enter their robot into both categories.





### **Autonomous Line Following Challenge**

To navigate autonomously around a looped track. The track will be laid out on a contrasting flat surface, which will be a 20mm white line on a dark grey background. The track will be made up of straight lines with corners angled between 45 to 135 degrees. There are two crossovers at 90 degrees and two gaps in the line 5cm wide.

Points will be awarded for each corner successfully negotiated (+5) and bonus points (+10) for each successful circuit of the track (this means turning all corners successfully with none missed). A maximum time of 5 minutes will be allocated to the challenge. If the robot leaves the track or gets stuck at any point it will be returned to the start of the line where it was last on the track (return to line to be requested by competitor), but the timer will continue to run.

Successfully negotiating a corner is when the robot makes a turn and starts along the next adjacent line. If the robot strays away from the corner without turning but turns later and continues along the correct adjacent line, this will count as a successful turn.

See attached diagram of the track layout, the numbers in circles represent the points that can be accumulated by completing the prior section of line correctly.



Note: No penalties will be incurred for missing a corner or hitting the perimeter wall.



## Gallery

Note: The following photos are of the 2019 arenas to give you a better impression of the challenge layouts but as already stated, minor changes will be made for 2022.

#### Maze



#### **Egg and Spoon**





#### **Skittles**



#### Golf





# Line Following





#### **Revision History**

Rev	Section	Change	Date
A	All	Document recreated from Cannock Chase Changes to the text relevant for 2022.	3 Mar 2022
В	Details Challenges	Added challenge hyperlinks menu Changes to Maze, White-line and Crazy Golf Arenas redrawn for clarity and photos used to show obstacles	18 Apr 2022
	All	Further minor changes to the text.	
С	Egg & Spoon	Details of the Egg Drop added	8 May 2022
D	Line Follower	Directional arrows added to diagram	19 May 2022
Е	Egg & Spoon	Rocker details reworded	3 June 2022
F	Egg & Spoon	Removed penalties for collisions etc	30 Aug 2022
G	Egg & Spoon Crazy Golf	Clarification the time add and deducted Three attempts is allowed with a max 5 mins	20 Oct 2022

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