



جامعة السلطان قابوس
Sultan Qaboos University



UVS-OMAN 2024
CONFERENCE
SULTAN QABOOS UNIVERSITY MUSCAT
12-14
FEB
2024

Students' UVSC 24 IIR Competition

Open to teams from universities and colleges

Description

The In-pipe Inspection Robot (**IIR**) competition consists of designing and implementing a robot that must successfully navigate through a pipe of a given diameter and geometry. There are three levels of difficulty in this competition depending on the pipe orientation and the task, which are explained below.

Spec of the robot:

The robot must have the capability to carry a payload of at least 1 kg, which includes the mass of the robot and batteries. Additionally, it should fit within the specified pipe dimensions (refer to pipe specifications). The maximum length of the robot should not exceed 50 cm. Powering the robot can be achieved through cords as well. Furthermore, the robot can be controlled manually or autonomously (higher marks will be awarded for autonomous control and on-board batteries).

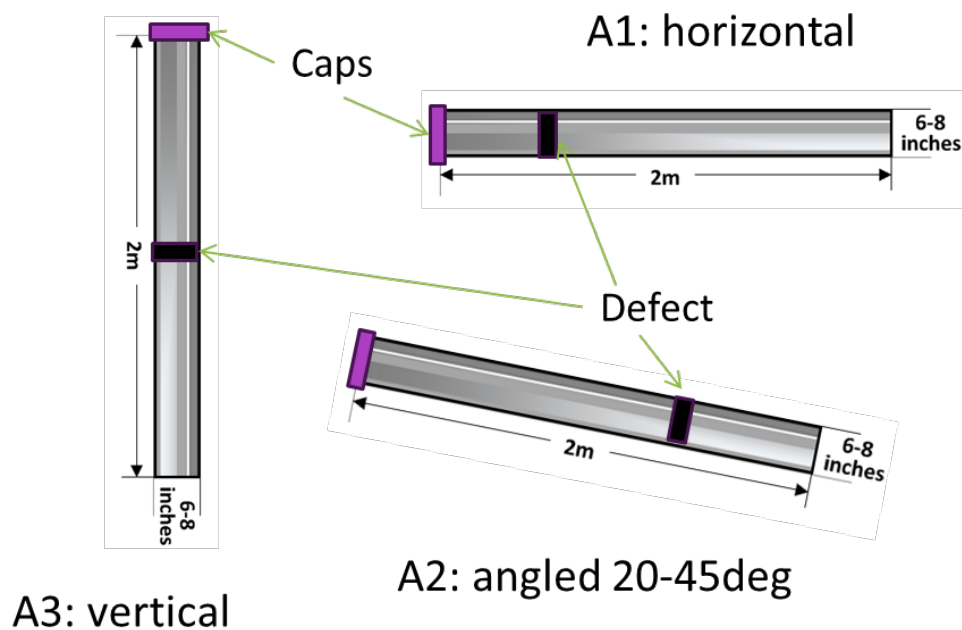
Competition Levels:

The competition is divided into three levels, each with its own set of challenges and requirements. The details of each level are described below:



Level A: [15 points]

1. The pipe is made of transparent (Acrylic material), sloped at various angles (A1: 0deg, A2: 20-45deg, A3: 90deg).
2. The pipe's inner diameter (ID) will be revealed on the competition day (6-8 inches).
3. The robot must detect a black ring defect on the pipe wall.
4. The defect's location will be disclosed on the competition day.
5. The robot should autonomously traverse the pipe from one end to the other, with one candidate intervention allowed after initial placement.
6. one pipe end is capped as shown in the figure.
7. The entire trip must be completed in less than 7 minutes.
8. The robot may be wired or wireless, with extra points for wireless capability.





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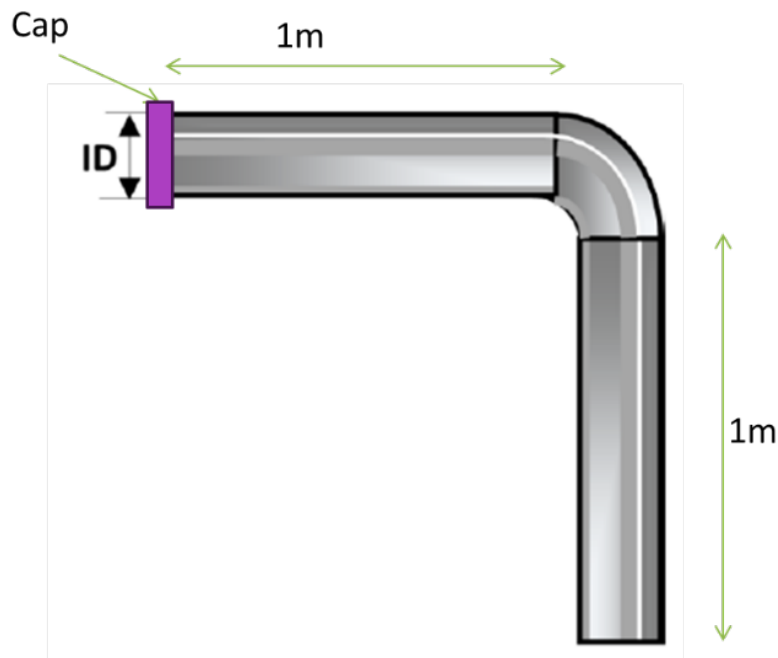


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Level B: [10 points]

1. The pipe is transparent Acrylic material.
2. The pipe's inner diameter (ID) will be revealed on the competition day (6-8 inches).
3. The robot must move vertically, then horizontally through the pipe.
4. One candidate intervention is allowed after initial placement.
5. Upper pipe end is capped.
6. The entire trip must be completed in less than 7 minutes.
7. The robot may be wired or wireless, with bonus points for wireless capability.





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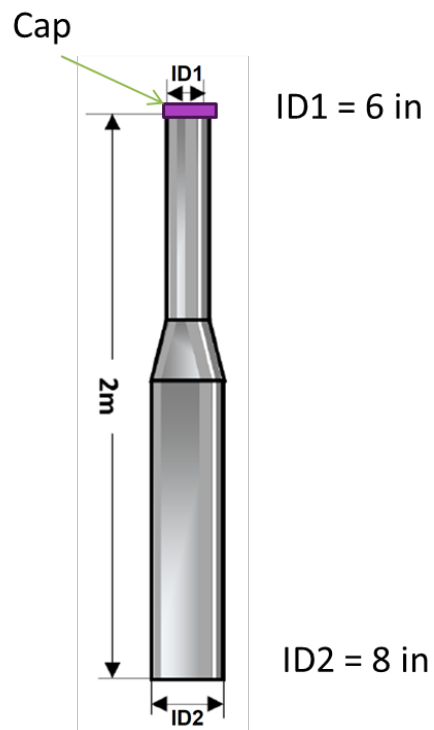


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Level C: [10 points]

1. The pipe is transparent (Acrylic material), has two different inner diameters (ID1=6in and ID2=8in), and is oriented vertically.
2. The robot must move autonomously up
3. The robot may be wired or wireless, with bonus points for wireless capability.
4. One candidate intervention is allowed after initial placement.
5. Top end of the pipe is capped.
6. The entire trip must be completed in less than 7 minutes.





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IIR Competition: Rules

Rounds

1. Each team will have two rounds to complete the competition. The maximum duration allowed for each round is 10 minutes.
2. If a team's robot is stuck in the pipe for more than 60 seconds during a round, the team will proceed to their second round.

Scoring

1. Travelling time along the pipe (must be less than 10 min)
2. The robot rotation angle while travelling (Yawing) (ideally must be zero).
3. Powering type (on-board batteries, or via cords)
4. Control of the robot (manually or autonomously)
5. Complexity of the design

Awards:

- First winner: 1000 OMR
- Second winner: 600 OMR
- Third winner: 400 OMR