



# A Multi-Output Differential controlled In-Pipe Climbing Robot

## ABSTRACTS

Pipe networks are omnipresent, in a concealed manner, rendering their manual inspection difficult. Our proposed solution, Modular Three-Module Pipe Climber is dynamically more stable. It houses a novel 1-Input 3-Output Open Differential (3-OOD) which allows the robot to move inside the pipe networks in any orientation without requiring electronic controls for the track speeds.

## OBJECTIVE

The robot aims to perform regular pipe inspection and maintenance in complex pipe networks with very little effort to control the robot, while carrying equipment load.

Traverses in Vertical pipes, Horizontal pipes, 90° bends and 180° bends in any orientation without any slip or drag. It has bidirectional capabilities and adjusts its motion according to pipe network, without the need of computational feedbacks and processing.

## METHOD

To mechanically control the track speed of the robot, we developed an 1-Input 3-Output Open Differential (3-OOD). The differential takes feedback from the loads experienced on the track to modulate the track speeds of the robot accordingly. The 3-OOD also helps in achieving a novel result of eliminating slip and drag.

We modelled and simulated the differential with the robot. The prototype was later developed and experimented to validate the proof of concept.

