DESIGN AND ANALYSIS OF PIPE INSPECTION & CLIMBING ROBOT

Authors

Abdul Rauf	**2K19-ME-01**
Hammad Rafiq	**2K19-ME-03**
Ahmad Hanif	**2K19-ME-15**
Nasir Mumtaz	**2K19-ME-29**

Supervisor

Engineer Sajjad Ur Rahman

MECHANICAL ENGINEERING DEPARTMENT

NFC Institute of Engineering & Technology, Multan

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Abstract

This thesis aims to explore the development and application of pipe climbing robots, focusing on their design, locomotion mechanisms, sensing capabilities, and potential applications in various industries. The pipes in plants, including power and chemical plants require steady maintenance, as the leakage, drop of pressure and corrosion by the fluid within the pipe and from the external environment occur. However, as the process to inspect the pipe is not automated, manual inspection is a very time-consuming job. Therefore, in order to reduce the inspection time and cost, we have proposed the pipe climbing robot for pipe inspection. The presented robot is applicable to plants in operation, because this robot is an out-pipe type, which allows it to move outside of the pipes. The designs of the mechanism as well as the control system for this robot have been presented and the feasibility of the proposed robot has been demonstrated by the climbing experiments the research conducted provides a comprehensive analysis of the state-of-the-art technologies, challenges, and future prospects of pipe climbing robots. The study also investigates their impact on improving safety, efficiency, and productivity in industrial and infrastructure settings. In old houses the ventilation systems are often in bad condition and clogged. This will increase air flow and improve the air quality inside the building. The robot will also be used to determine if and where reparation is needed. Pipe climbing robot has wide range of applications in industries. Power plants and chemical plants require steady maintenance since; corrosion and abrasion are caused due to fluid within the pipe. In thermal power plants, there is high temperature and pressure inside the boilers and hence, humans cannot be allowed to perform such operations.