

WHEEL DRIVE ARTICULATED ROBOT MOVING ON THE INCLINE HALF PIPE

LAU KAR HEI



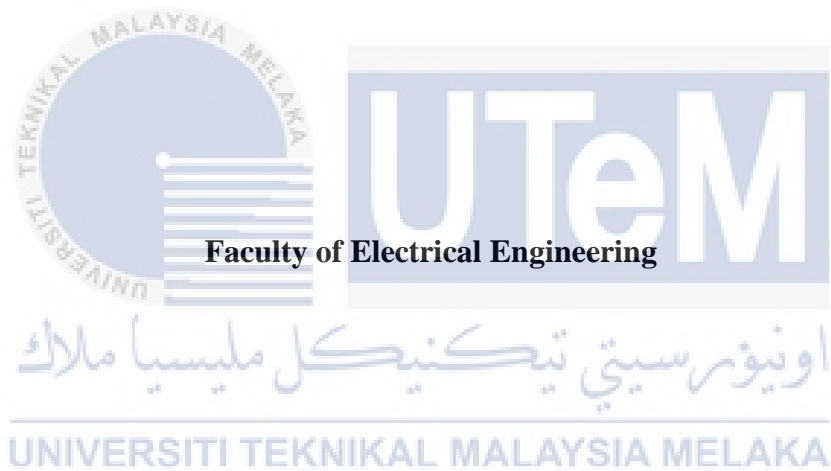
**BACHELOR OF MECHATRONICS ENGINEERING WITH
HONOURS
UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

2021

**WHEEL DRIVE ARTICULATED ROBOT MOVING ON THE INCLINE HALF
PIPE**

LAU KAR HEI

**A report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Mechatronics Engineering with Honours**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

DECLARATION

I declare that this thesis entitled “WHEEL DRIVE ARTICULATED ROBOT MOVING ON THE INCLINE HALF PIPE is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature

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12 July 2021



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APPROVAL

I hereby declare that I have checked this report entitled “WHEEL DRIVE ARTICULATED ROBOT MOVING ON THE INCLINE HALF PIPE” and in my opinion, this thesis it complies the partial fulfillment for awarding the award of the degree of Bachelor of Mechatronics Engineering with Honours

Signature :

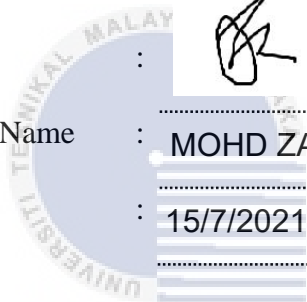


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DEDICATIONS

To my beloved mother and father



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ABSTRACT

Pipelines are essential instruments since they are used for various purposes, such as transportation of oil, water, or gaseous substances in many industries. The pipelines are aging and corrosive, which can lead to accidents if these concerns are overlooked. Pipeline inspection robots are designed to inspect and eliminate hazards inside the pipelines where human inspection is difficult. This project proposes a new pipeline inspection robot design that can examine the inclined pipelines. The proposed approach is to build a semi-autonomous articulated pipeline inspection robot with adaptive legs. The pipeline's inner surface is fitted with two independent wheel drive units symmetrically mounted with a robot chassis. Besides, the adaptive legs are self-adjustable according to the inclination of the pipeline. The articulated pipeline inspection robot is designed for maneuvering in a straight half-pipe with a diameter of 152 mm with various incline positions. For better wheel traction of the robot, the mathematical model of the articulated pipeline inspection robot is configured. The pipeline inspection robot can transmit information such as the pipeline's inclination angle and communicate via the Bluetooth module. Data such as the angle of inclination and acceleration of the in-pipe inspection robot are collected and analyzed to determine the articulated pipeline inspection robot's performance at various pipeline inclination. Finally, some of the conclusions are essential for optimal design and motion control of the robot's legs to get better traction to prevent slippage.

objectives not stated clearly

summary of results?

ABSTRAK

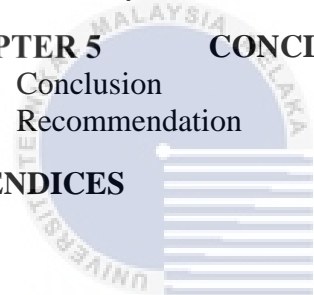
Saluran paip adalah instrumen yang penting untuk tujuan memindahkan minyak, air, atau gas yang digunakan oleh sektor perindustrian. Keadaan saluran paip yang kurang baik seperti penghakisan boleh menyebabkan kemalangan sekiranya masalah ini diabaikan. Robot pemeriksaan saluran paip dirancang untuk memeriksa dan memindahkan bahan yang berbahaya di dalam saluran paip. Manusia sukar untuk membuat pemeriksaan bahagian dalam saluran paip disebabkan saiz yang kecil dan kompleks. Projek ini mencadangkan penciptaan robot pemeriksaan saluran paip baru yang dapat membuat pemeriksaan pada saluran paip yang condong. Pendekatan yang dicadangkan adalah membina robot pemeriksaan saluran paip artikulasi separa autonomi dengan kaki yang adaptif. Sistem penyesuaian diameter saluran paip dilengkapi dengan dua unit pemacu roda bebas yang dipasang secara simetri dengan badan robot. Selain itu, kaki adaptif boleh menyelaras secara autonomi mengikut kecenderungan saluran paip. Robot pemeriksaan saluran paip artikulasi direka dapat bergerak dalam paip separuh lurus dengan diameter 152mm dengan pelbagai kecondongan. Pemodelan matematik digunakan untuk mencipta robot pemeriksaan saluran paip artikulasi yang mempunyai system kecengkaman roda yang lebih baik dan efektif. Robot pemeriksaan saluran paip dapat menghantar maklumat seperti sudut kecenderungan saluran paip dan berkomunikasi dengannya melalui peranti *Bluetooth*. Data yang dihantar oleh robot pemeriksaan saluran paip akan dikumpul dan dianalisis untuk mengetahui prestasi robot pada pelbagai kecenderungan saluran paip. Akhirnya, beberapa konsep atau isu untuk reka bentuk dan kawalan pergerakan kaki robot untuk mendapatkan kecengkaman roda yang lebih memuaskan untuk mengelakkan tergelincir.

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