

MECHATRONICS BOOK SERIES

ROBOTICS AND AUTOMATION

Rini Akmeliawati
Wahju Sediono
Nahrul Khair Alang Md. Rashid



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MECHATRONICS BOOK SERIES: ROBOTICS AND AUTOMATION

Editors

Rini Akmeliawati
Wahju Sediono
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Mobile Robot for Fined Tube Inspection

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10.1 Introduction

The “Mobile Robot for Finned Tube Inspection” can perform task which it is difficult for human being to do so, such as surveying and navigating into small area where the size of human body difficult and impossible to enter. This currently has been assigned to do multitask in many real applications such as to inspect tube surface, to move in high risk area, to navigate the place of the error, and to mark the specific place for adjustment.

To employ this robot also upon concern that many tasks, human work force is necessary to be protected and avoided from dangers. In many situations that worker are always involved in uncertainty and difficulty environments. They have to perform their duties in many dangerous work plants. From this point of view, Robot has been created and developed to support human performing in difficulty tasks. **There** are many inspections or monitoring robot that are employed with different mechanism such as; snake-like arm, micro-inspection robot and crawling robot.

This project is to introduce a simple mechanism for the Finned Tube Inspection Robot (FTIR), which is targeted to inspect along the finned tube surface. This FTIR is driven by single geared dc motor and design to have moving arm to inspect the finned tube. FTIR has a translation motions in three main directions:

10.2 Problem Statement

Finned tubes are able to even out the heat transfer between the inside of the tube and the outside. When the heat transfer coefficient on the outside of the tube is significantly lower than the heat transfer coefficient on the inside of the tube, there is a major advantage to incorporate fins on the outside tube surface to take full advantage of the high heat transfer rate on the inside of the tube.

But because of the unpleasant condition of high pressure and high temperature, it will affect the tube. Small cracks and leaks can get larger if it is not detected and treated. Detecting these cracks is really hard since it originates from inside of the tube. The naked eye can only detect when there is visible water comes out from crack of the pipes. In power plant for example, when this problem happened they have to shut down the plant for two or three days to do the inspection. This can result in loss of profit to companies and for people, it produced discomfort and unease. The objective of this project is

1. To design and develop a novel robot for outer surface inspection of boiler tubes.
2. Develop robot which can move automatically in the power plant area.
3. Robot can inspect the tube by taking picture of the area.
4. The project describes the hardware system, wireless communication strategy, communication procedure and system software of the robot.

10.3 Problem Statement

There are many applications of mobile robot in inspection field. Moreover, they are also using many types on non-destructive test and embedded it to mobile robot. So, there many things have to be considering building a robot for inspection, especially for tube inspection. For example, we have