

# MECHATRONICS BOOK SERIES

## CONTROL AND INTELLIGENT SYSTEMS

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Momoh Jimoh E. Salami  
Abiodun Musa Aibinu  
Yasir Mohd Mustafah



IIUM Press

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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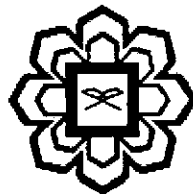
# CONTROL AND INTELLIGENT SYSTEMS

**EDITOR**

**Momoh Jimoh E. Salami**

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**Yasir Mohd Mustafah**



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## **Chapter 24**

### **Automatic Pipe Bursting Monitoring System**

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#### **24.1 Introduction**

The size, cost and complexity of today water supply systems prevent radical changes. The environmental concerns over the last few decades, together with increased awareness of customers, have placed pressure on water utilities to improve water services. This pressure is supported by the rapid development of advanced technologies in instrumentation, control and computer applications. Water is a precious resource and is essential for human existence. New legislation has raised higher demands for the efficiency of water supply in many countries. This situation forces water utilities to look for new ways to improve the condition and operation of the existing water supply systems. The main focus of the project will be on the simulation and development of pilot model based on pressure point analysis techniques for preventing pipe burst. The approach is based on the continuous monitoring of pressure for sudden failure-induced pressure.

The main objective of this project is to study the technique of combating pipe burst, leakage or any other phenomenon problem and to formulate a pilot study on how to use emerging new technology to solve this problem. To develop techniques that would utilize available measurement, data analysis, modeling and optimization methods to reduce the risk of failure, minimize losses associated with the failure and improve the reliability, availability, safety and efficiency of the urban water supply service.

#### **24.2 Literature Review**

The whole system can be divided into two major parts - the transmission system and the distribution system. A transmission system consists of components that are designed to convey large amounts of water over great distances, typically between major facilities within the system. Two types of pipes are found in the distribution system, distribution mains and service connections. Distribution mains are an intermediate step towards delivering water to the end customers and are smaller in diameter than transmission mains.

Pipe failure can be described as a multi-step process as explain below. The following steps could be identified:

1. Installation.
2. Initiation of corrosion.
3. Crack before leak.
4. Partial failure.
5. Complete failure.

#### **2.3 Failure Mechanism**