LEAK LOCATOR (RIG TO REAL)

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ITEX'18 29TH INTERNATIONAL INVENTION, INNOVATION & TECHNOLOGY EXHIBITION, MALAYSIA

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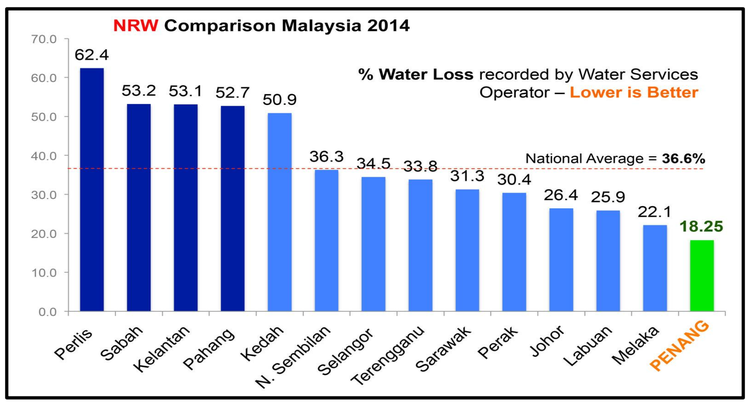
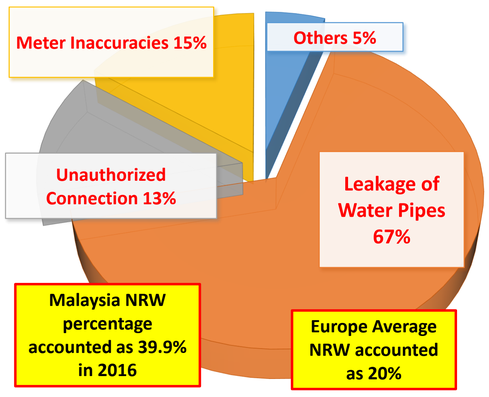
PRODUCT BACKGROUND





Leak Detection Method

- Commercialize Method
  - Ground Penetrating Radar
  - Pressure Calibration
  - Thermography Camera
  - Smart Ball
- Research Method
  - Acoustic Signal
  - Pressure Transient Analysis

ISSUE

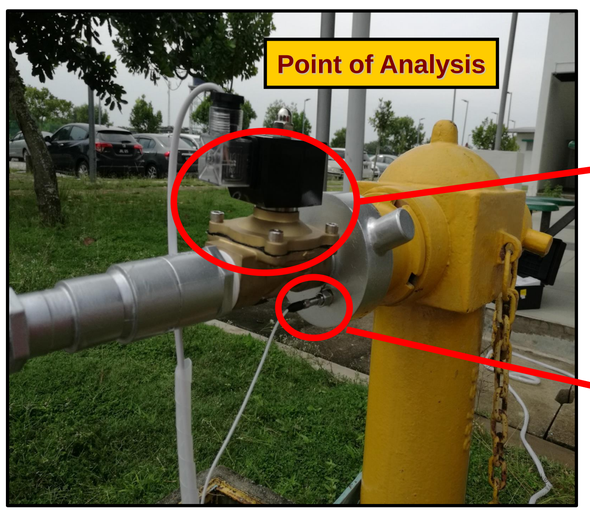
1. Cost effective.
2. limitation access.
3. Required interaction of skilled and expert user.
4. Accuracy.
5. Higher labour cost

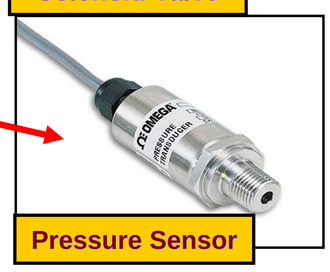
BENEFITS

1. Low cost
2. Robust
3. High accuracy and effectiveness
4. Easy to handle
5. Single access point
6. Less time consuming
7. Instant result
8. Can access large scale pipeline system

STATE OF ARTS

START → ACQUIRE DATA → DATA PROCESSING → RESULT

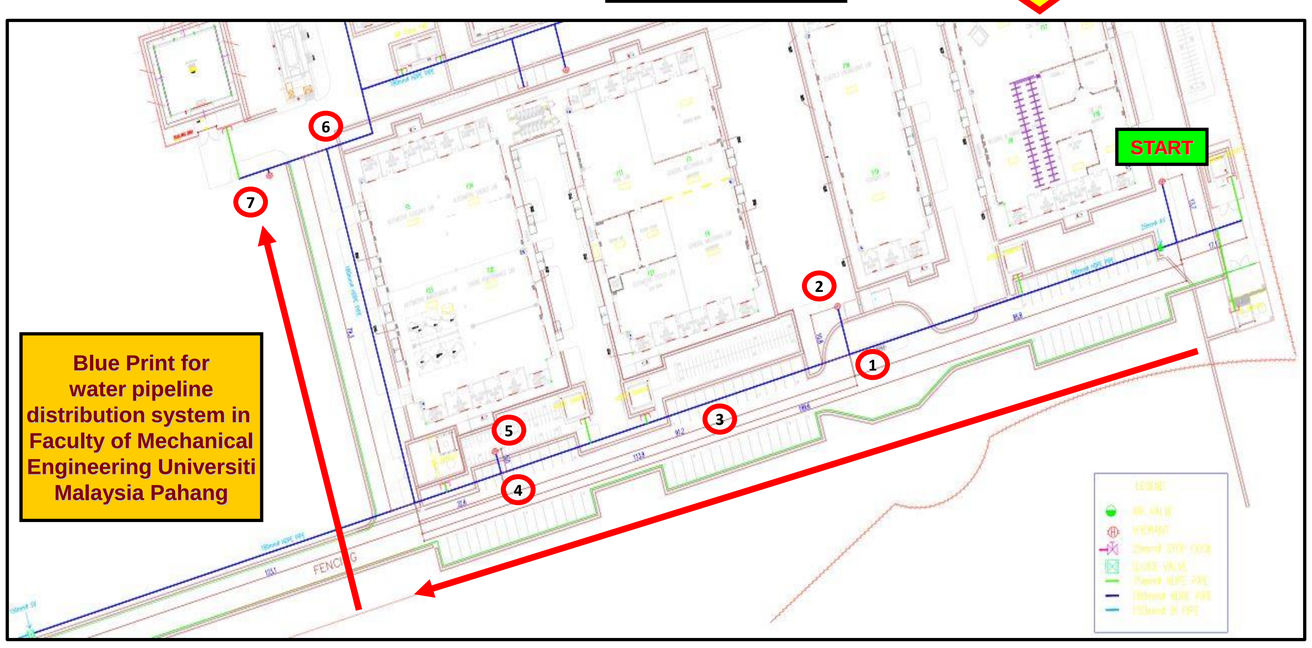




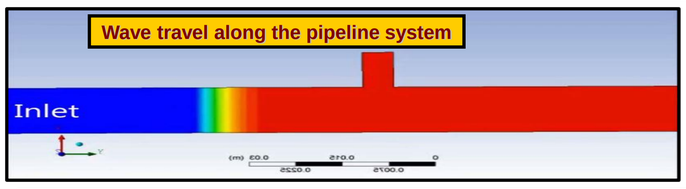
Cost Estimation

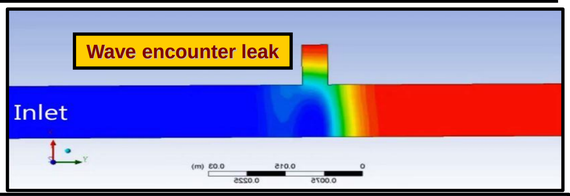
Ni-Daq = 12000 MYR
Pressure Sensor = 3000 MYR
14v Battery =50 MYR
Solenoid Valve = 250 MYR
Fire Hydrant Cap = 700 MYR
TOTAL COST = 16,000.00 MYR

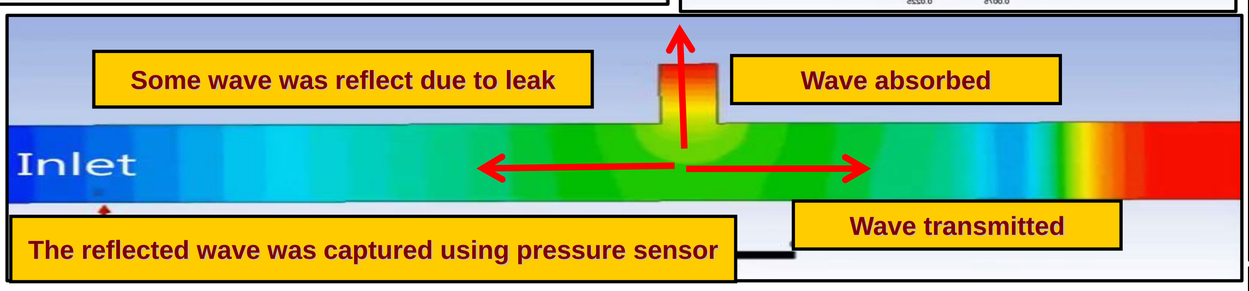
Smart Ball = 80k – 100k MYR
Enigma Leak Noise Loggers = 45k- 60k MYR
Source : Pengurusan Air Pahang Berhad (PAIP)

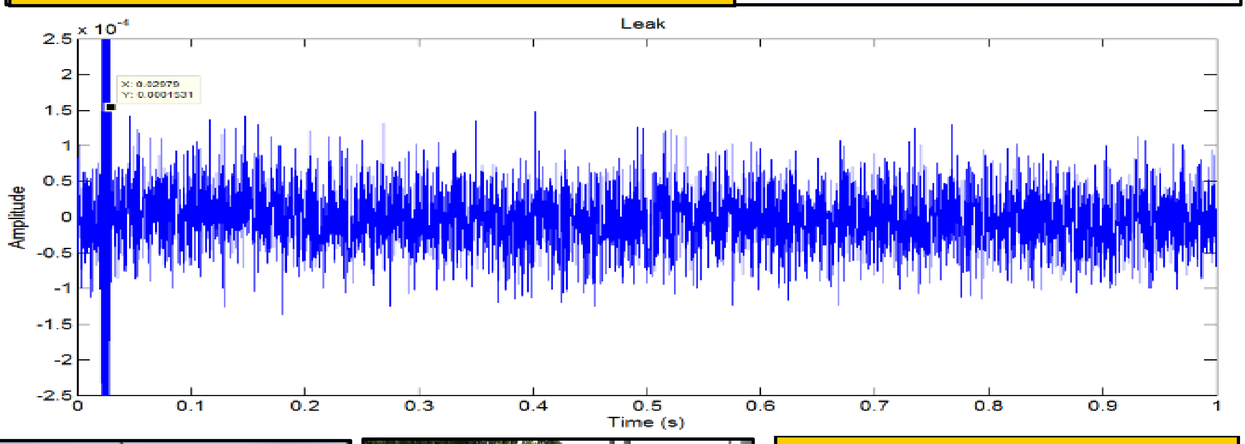


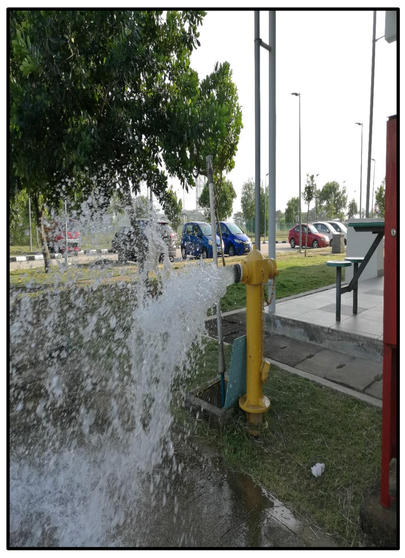
PRINCIPAL OF OPERATION





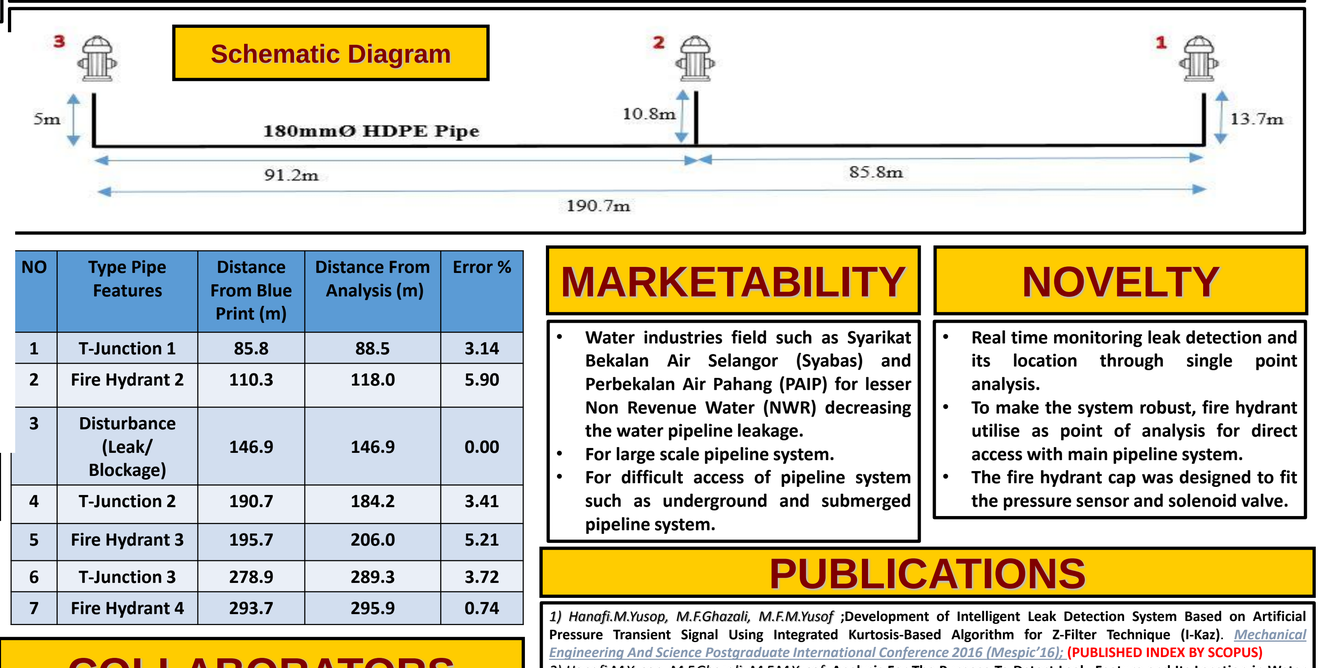


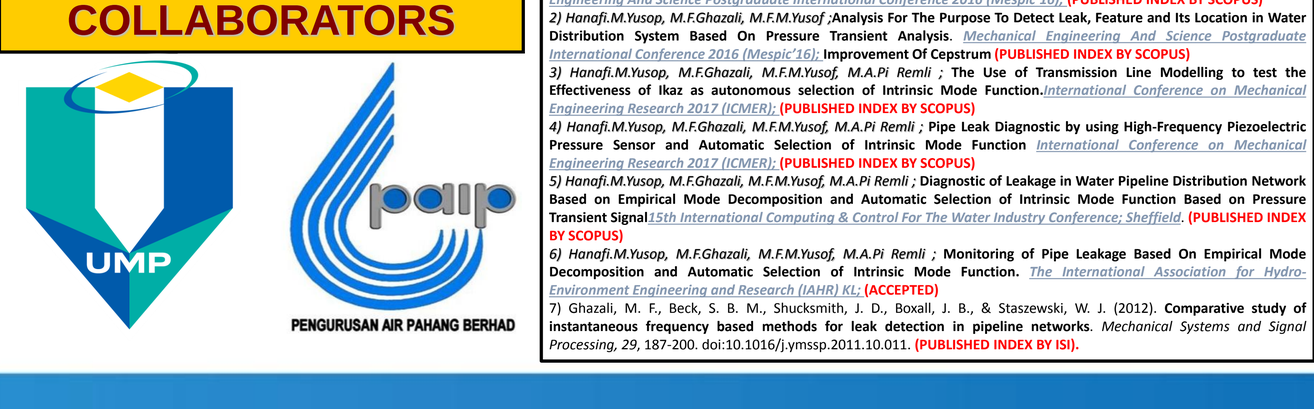




AWARDS

BEST OF THE BEST; Creation Innovation Technology and Research Exposition 2018 (Citrex'18) Staff Category
GOLD MEDAL ; Creation Innovation Technology and Research Exposition 2018 (Citrex'18) Staff Category
GOLD MEDAL ; Creation Innovation Technology and Research Exposition 2018 (Citrex'18) Student Category





NO	Type Pipe Features	Distance From Blue Print (m)	Distance From Analysis (m)	Error %
1	T-Junction 1	85.8	88.5	3.14
2	Fire Hydrant 2	110.3	118.0	5.90
3	Disturbance (Leak/ Blockage)	146.9	146.9	0.00
4	T-Junction 2	190.7	184.2	3.41
5	Fire Hydrant 3	195.7	206.0	5.21
6	T-Junction 3	278.9	289.3	3.72
7	Fire Hydrant 4	293.7	295.9	0.74

MARKETABILITY

- Water industries field such as Syarikat Bekalan Air Selangor (Syabas) and Perbekalan Air Pahang (PAIP) for lesser Non Revenue Water (NWR) decreasing the water pipeline leakage.
- For large scale pipeline system.
- For difficult access of pipeline system such as underground and submerged pipeline system.

NOVELTY

- Real time monitoring leak detection and its location through single point analysis.
- To make the system robust, fire hydrant utilise as point of analysis for direct access with main pipeline system.
- The fire hydrant cap was designed to fit the pressure sensor and solenoid valve.

COLLABORATORS

UMP

PENGURUSAN AIR PAHANG BERHAD

PUBLICATIONS

1) *Hanafi.M.Yusop, M.F.Ghazali, M.F.M.Yusof* ;Development of Intelligent Leak Detection System Based on Artificial Pressure Transient Signal Using Integrated Kurtosis-Based Algorithm for Z-Filter Technique (I-Kaz). *Mechanical Engineering And Science Postgraduate International Conference 2016 (Mespic'16);* (PUBLISHED INDEX BY SCOPUS)

2) *Hanafi.M.Yusop, M.F.Ghazali, M.F.M.Yusof* ;Analysis For The Purpose To Detect Leak, Feature and Its Location in Water Distribution System Based On Pressure Transient Analysis. *Mechanical Engineering And Science Postgraduate International Conference 2016 (Mespic'16);* Improvement Of Cepstrum (PUBLISHED INDEX BY SCOPUS)

3) *Hanafi.M.Yusop, M.F.Ghazali, M.F.M.Yusof, M.A.Pi Remli ;* The Use of Transmission Line Modelling to test the Effectiveness of Ikaz as autonomous selection of Intrinsic Mode Function.*International Conference on Mechanical Engineering Research 2017 (ICMER);* (PUBLISHED INDEX BY SCOPUS)

4) *Hanafi.M.Yusop, M.F.Ghazali, M.F.M.Yusof, M.A.Pi Remli ;* Pipe Leak Diagnostic by using High-Frequency Piezoelectric Pressure Sensor and Automatic Selection of Intrinsic Mode Function *International Conference on Mechanical Engineering Research 2017 (ICMER);* (PUBLISHED INDEX BY SCOPUS)

5) *Hanafi.M.Yusop, M.F.Ghazali, M.F.M.Yusof, M.A.Pi Remli ;* Diagnostic of Leakage in Water Pipeline Distribution Network Based on Empirical Mode Decomposition and Automatic Selection of Intrinsic Mode Function Based on Pressure Transient Signal*15th International Computing & Control For The Water Industry Conference; Sheffield.* (PUBLISHED INDEX BY SCOPUS)

6) *Hanafi.M.Yusop, M.F.Ghazali, M.F.M.Yusof, M.A.Pi Remli ;* Monitoring of Pipe Leakage Based On Empirical Mode Decomposition and Automatic Selection of Intrinsic Mode Function. *The International Association for Hydro-Environment Engineering and Research (IAHR) KL;* (ACCEPTED)

7) Ghazali, M. F., Beck, S. B. M., Shucksmith, J. D., Boxall, J. B., & Staszewski, W. J. (2012). **Comparative study of instantaneous frequency based methods for leak detection in pipeline networks**. *Mechanical Systems and Signal Processing, 29*, 187-200. doi:10.1016/j.ymssp.2011.10.011. (PUBLISHED INDEX BY ISI).