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The Kandy Conference

ICSBE 2025

TITLE: SMART SENSOR NETWORK SYSTEM FOR SHM

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Introduction

Why we need crack monitoring ?

Aging concrete structures

if it Ignored ???

Seoul, South Korea - 1995 June 29

CRACK MONITORING IS MUCH IMPORTANT !!!

Unreliable ⟸ **Problems in Manual Inspection**

Complex

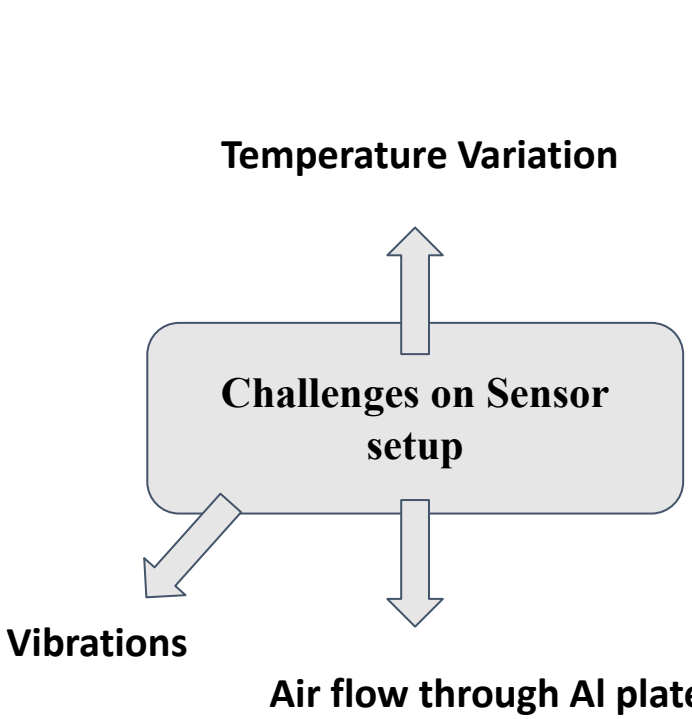
Cost ??

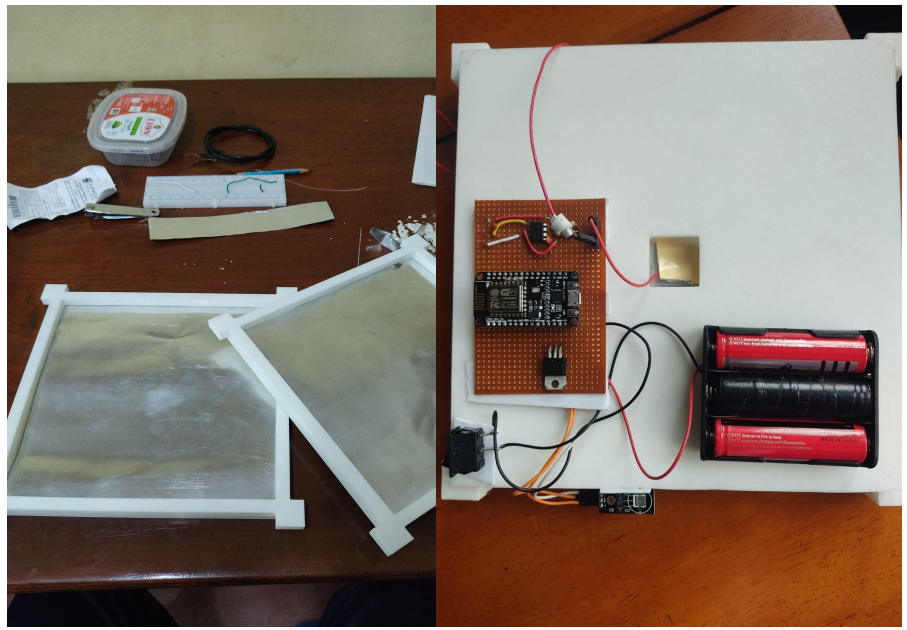
Continuous ??

Need a Automated, reliable and a low cost setup

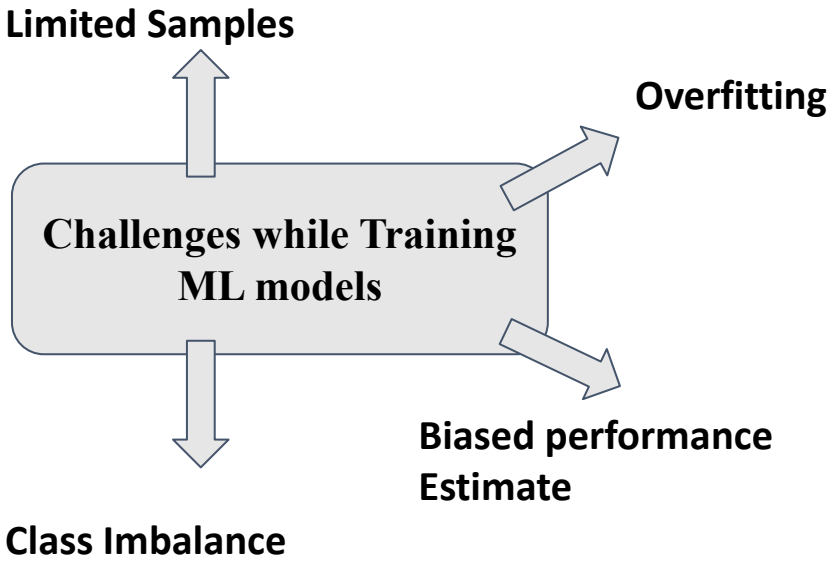
Methodology

Capture crack photographs → Image Processing and Crack localization → Deploy Sensor setup → Collect multi-sensor data → Train ML models

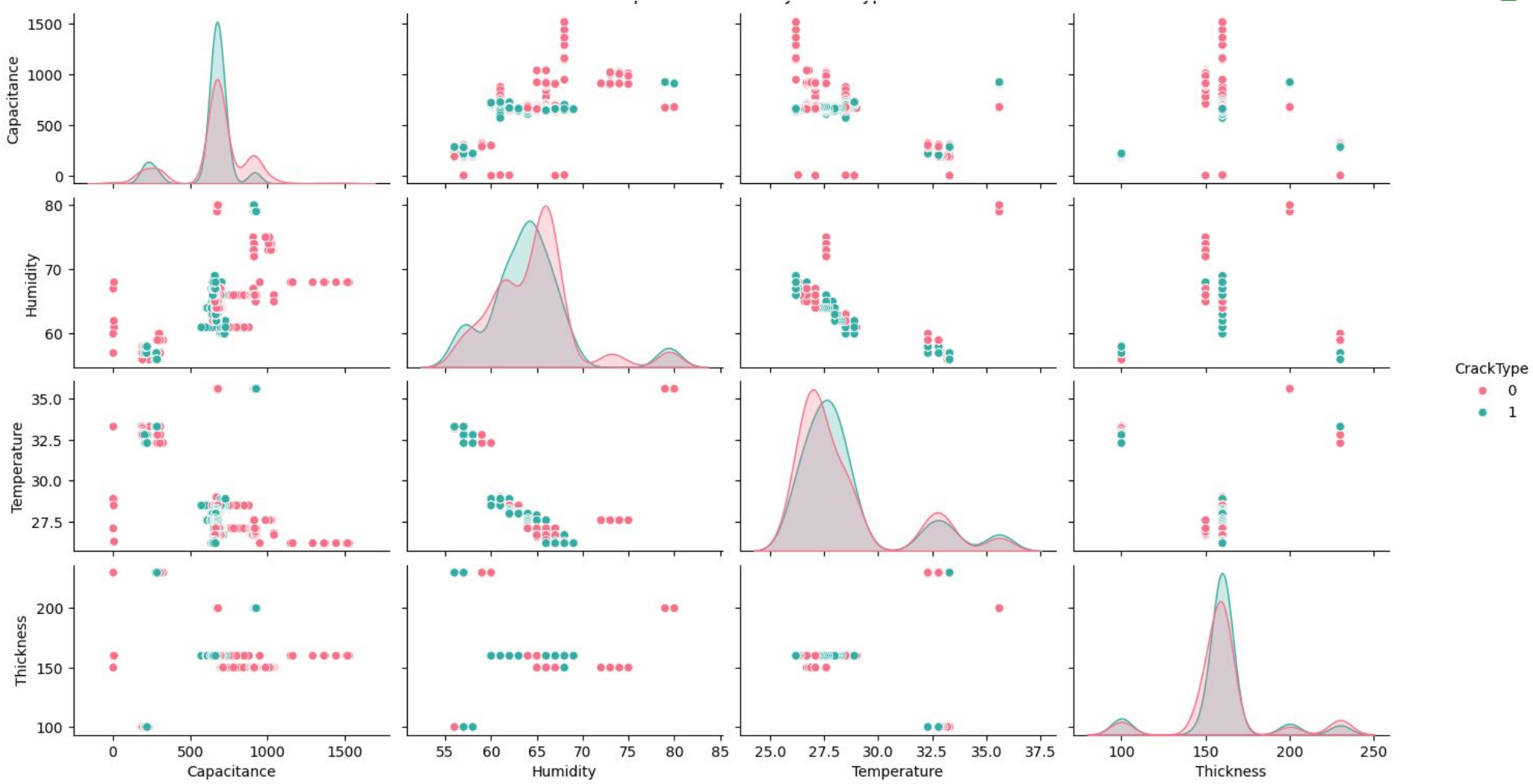




Own-customized Capacitive sensor & DHT11



Results and Discussions

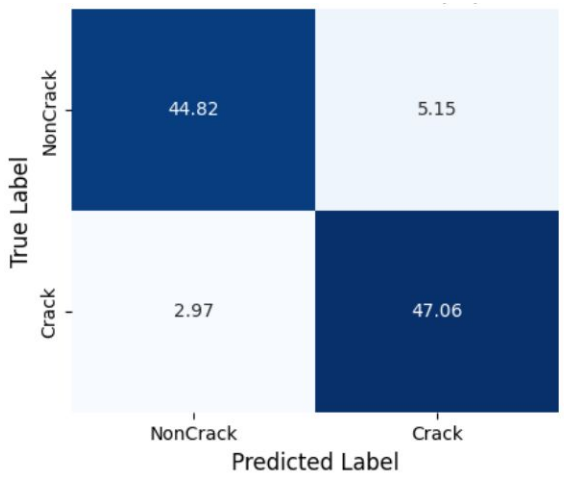


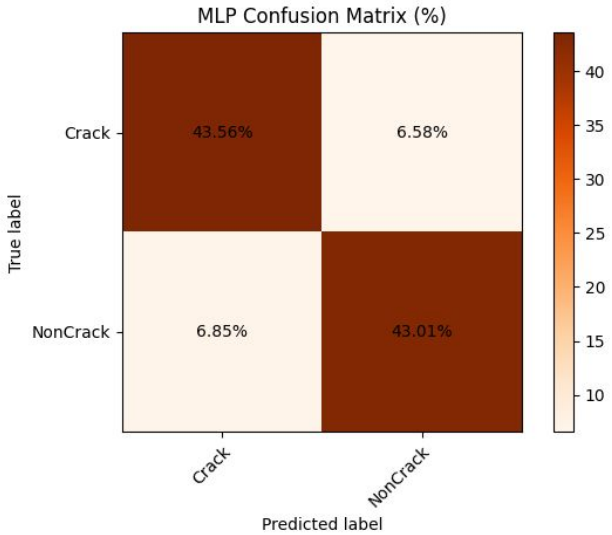
Pairplot

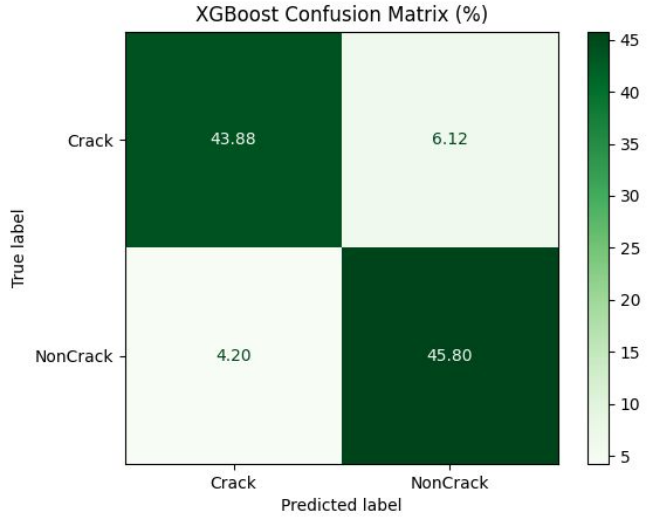
DATA DIVERSITY !!!

Results and Discussions

Confusion Matrices







Convergence time ???

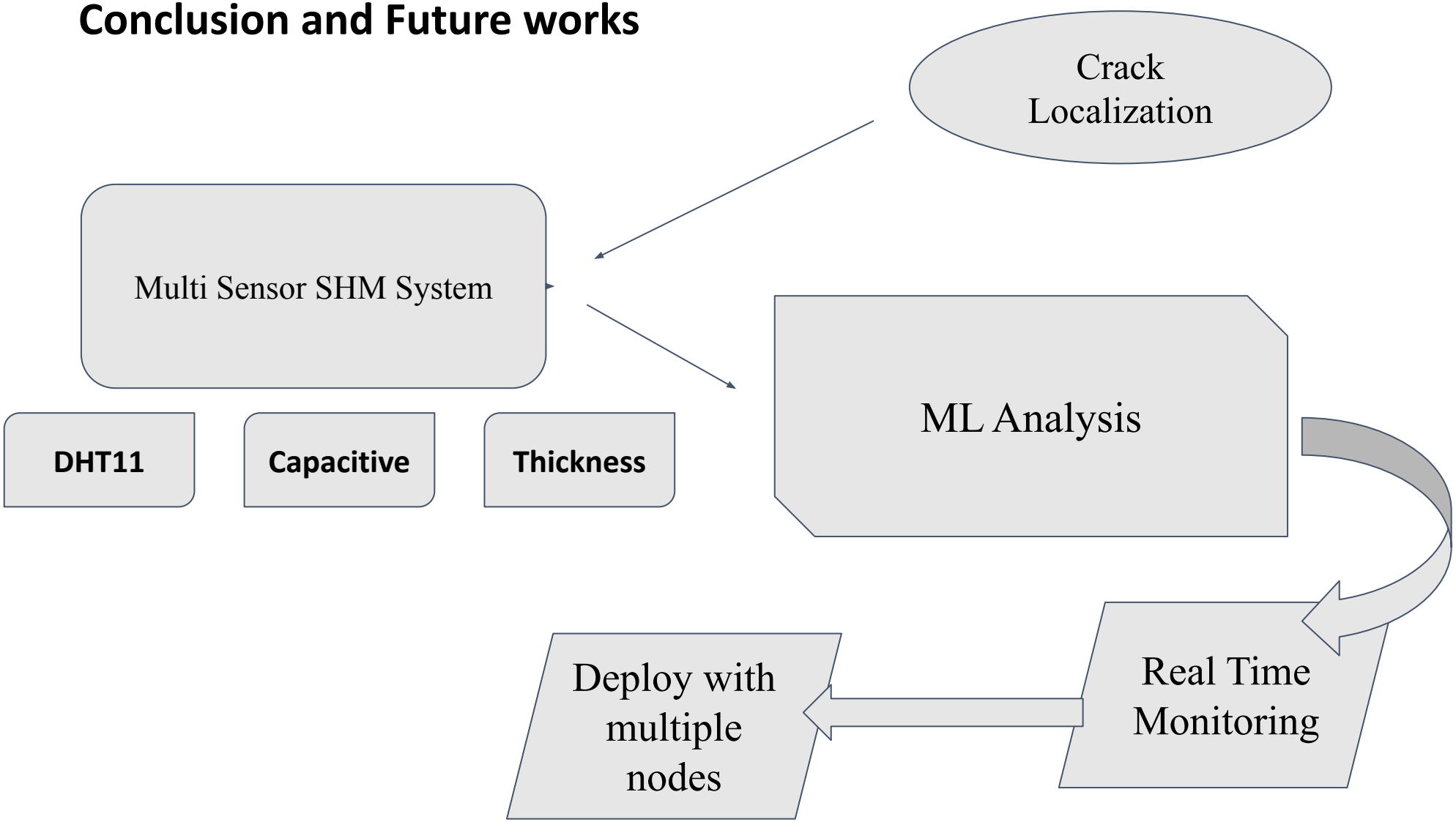
ML Model	SVM	MLP	XGBoost
Convergence Period	21 s	130 s	2 s

Accuracy ???

Performance indicators	SVM	MLP	XGBoost
Precision	0.901359	0.864114	0.912645
Recall	0.940635	0.868767	0.895510
F1-score	0.920578	0.866434	0.903996
Overall accuracy(%)	91.88	86.57	89.68

XGBoost

Conclusion and Future works



Acknowledgements & References

Acknowledgements

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References

[1] E. T. Júnior, A. Cury, and J. L. Júnior, "Assessment of Low-Cost Wireless Sensors for Structural Health Monitoring Applications,"Research, Society and Development, vol. 10, no. 4, 2021. doi: 10.33448/rsd-v10i4.14197
[2] Jin Yan et al., "Concrete Crack Detection and Monitoring Using a Capacitive Dense Sensor Array," Sensors, vol. 22, no. 4, 2022.
[3] J. Chinna Babu et al., "IoT-Based Intelligent System for Internal Crack Detection in Building Blocks," Journal of Sensors, vol. 2022, Article ID 2332271.
[4] Ahmed Badawy et al., "Structural Health Monitoring Using Wireless Sensor Networks: A Comprehensive Survey," Computer Communications, vol. 121, 2018, pp. 1–16. doi: 10.1016/j.comcom.2018.03.012
[5] J. F. Canny, "A computational approach to edge detection," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. PAMI-8, no. 6, pp. 679–698, Nov. 1986.
[6] A. Author et al., "Crack detection in concrete surfaces using convolutional neural networks," Journal of Structural Engineering, vol. 145, no. 3, pp. 04019012, Mar. 2019.
[7] T. Author et al., "Real-time crack detection in infrastructure using TensorFlow," Automation in Construction, vol. 102, pp. 1–10, Dec. 2019.

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Thank You!

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