

NPTEL Workshop on Emerging POC Diagnostics

Design of a Paper Based Microfluidic-chip for Multiple Targets

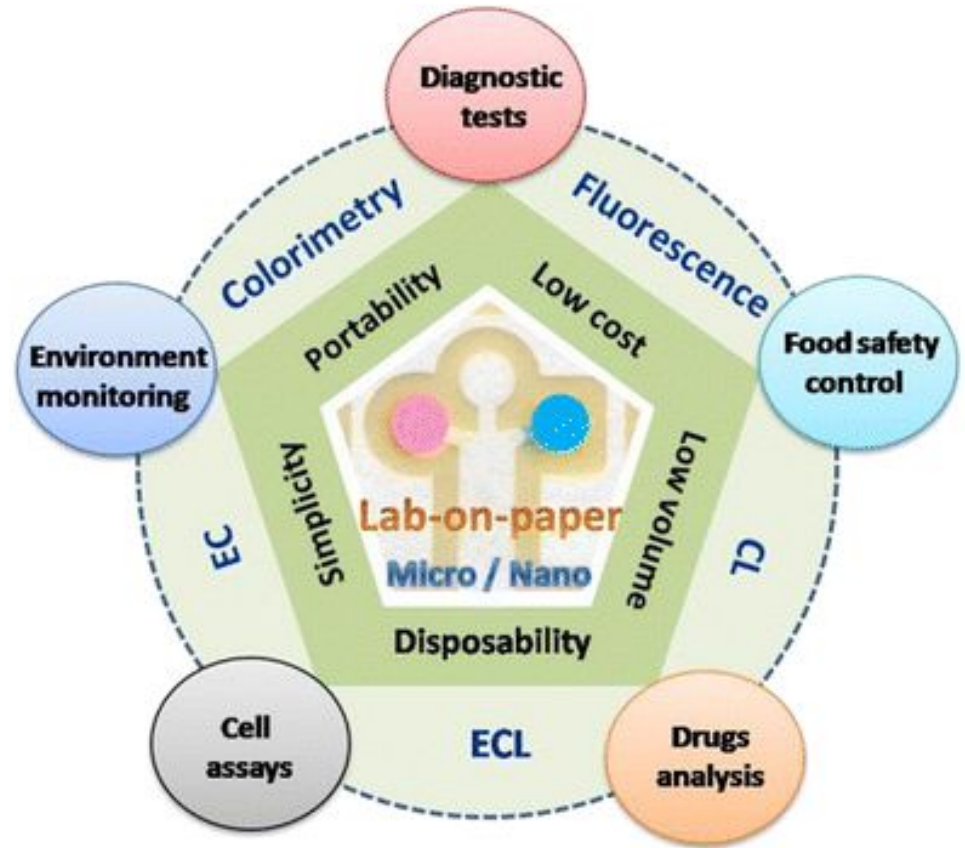
Team TIGER, 30 Nov. 2024

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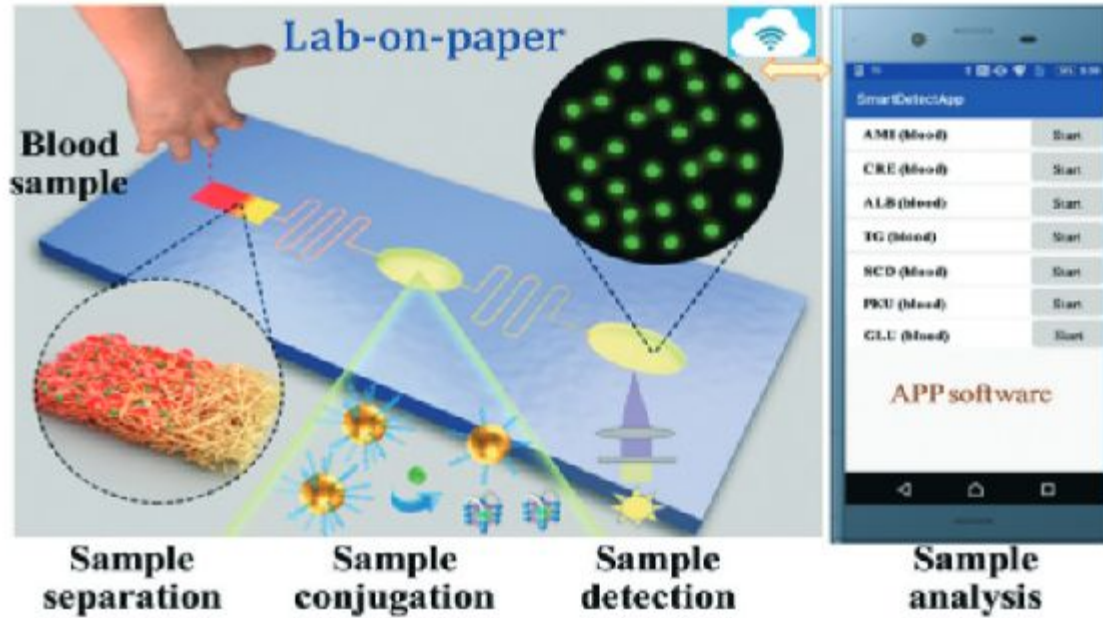
- Paper on chip - Introduction
- Paper based Whole blood assays
- Existing work
- Proposed design and Work Done
- Merits demerits
- Summary

PAPER ON CHIP APPLICATIONS



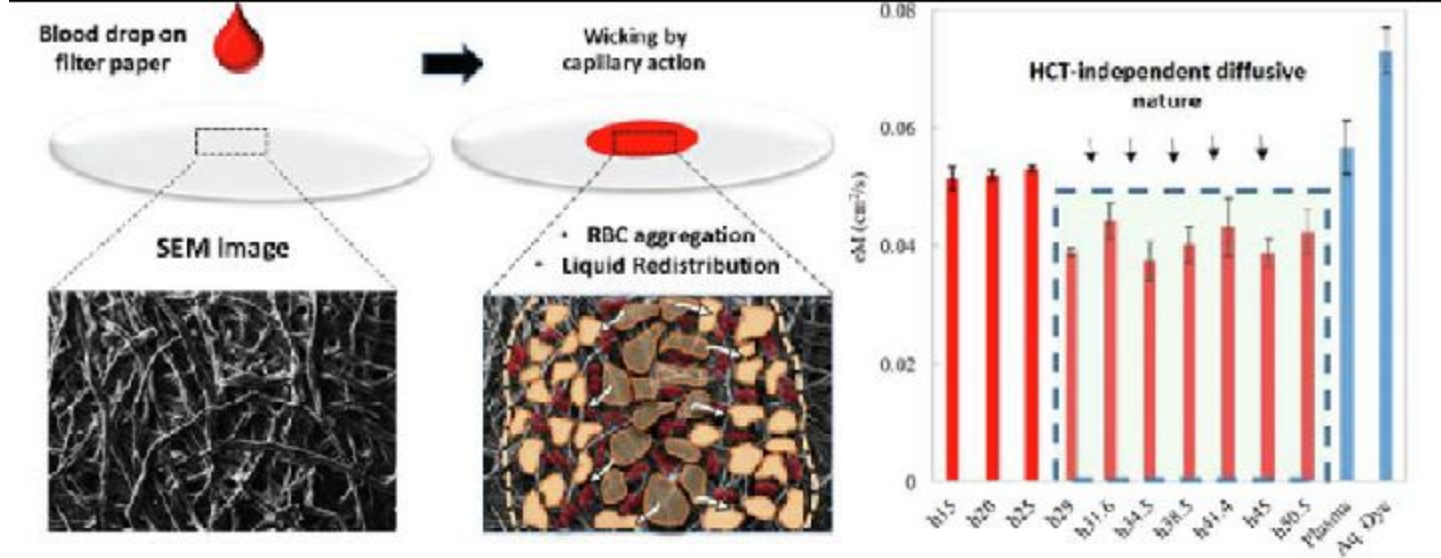
- Xu et al., Microchica Acta, 2016

PAPER ON CHIP - BLOOD ANALYSIS



- Lee et al. Lab Chip, 2021

Blood on paper assay



Laha et al., J. Coll. Int. Sci., 2023

Initial Discussion with In-house experts



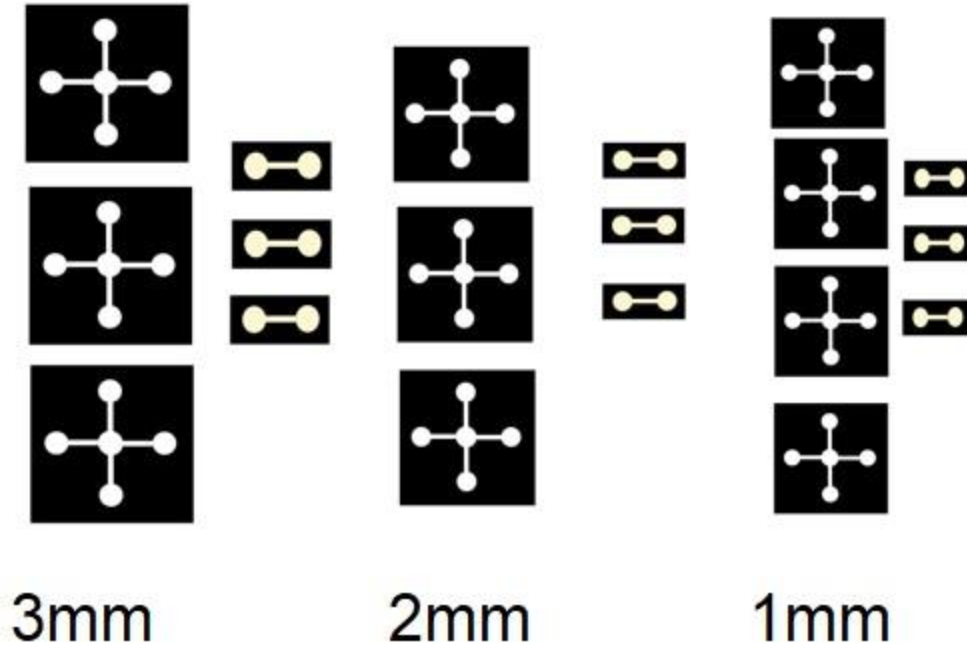
Proposed Design for Multiple Targets

1. Glucose
2. Hb
3. TDL
4. LDL

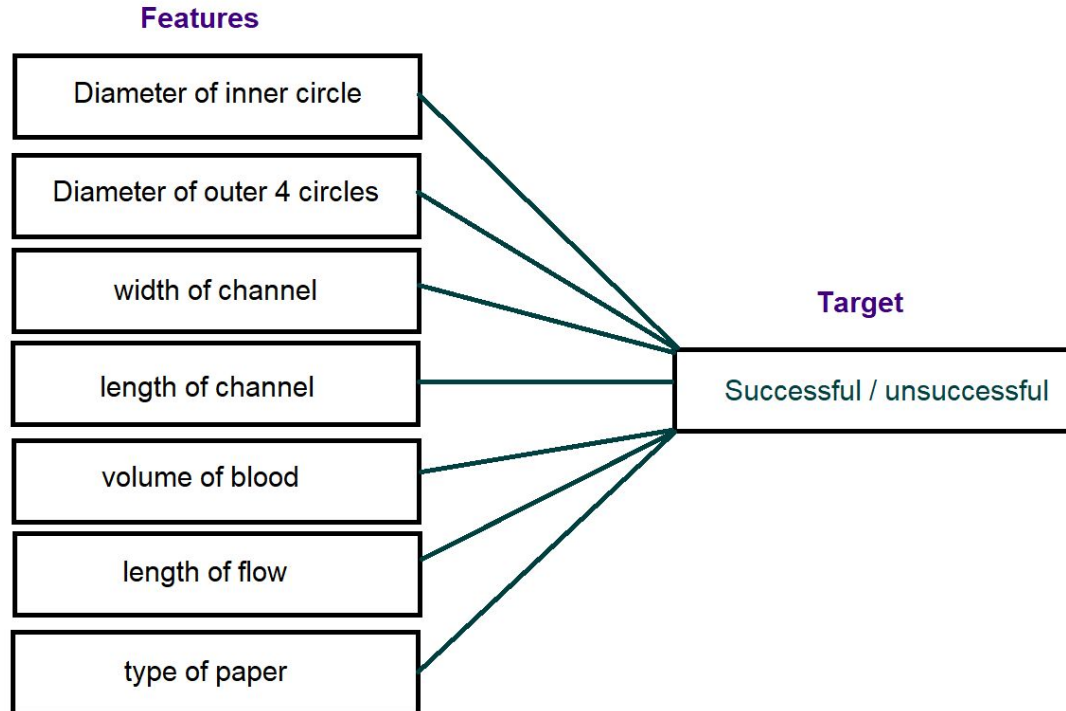
- Lee et al. Lab Chip, 2021

Proposed Design and Work Done

SKETCHES



Features for Machine Learning to identify the appropriate dimensions for the sketch



WORKFLOW IN MACHINE LEARNING

- ❑ Data Collection (10 x features) for training
- ❑ Split train and test data
- ❑ Feature scaling
- ❑ Learning curves
- ❑ Choose the best fit models
- ❑ Train the models
- ❑ Evaluate the models by accuracy, precision, recall, and MCC ($MCC = (TP * TN - FP * FN) / \sqrt{(TP + FP) * (TP + FN) * (TN + FP) * (TN + FN)}$)

Merits and demerits

Merits

- ★ Easy to use
- ★ Easy to dispose in eco-friendly manner
- ★ Cost effective

Demerits

- ★ Reagents self-life
- ★ Chemicals in papers
- ★ Producing accuracy and precision

REFERENCES

- Lee et al. Lab Chip, 2021
- Xu et al., Microchica Acta, 2016

THANK YOU

