HCMC UNIVERSITY OF TECHNOLOGY EDUCATION
FACULTY FOR HIGH QUALITY TRAINING
MECHATRONIC ENGINEERING

SPONSER:

G.A.Consultants Co.,Ltd.

VPIC1

FINAL YEAR PROJECT EXHIBITION - 06TH FEB 2023

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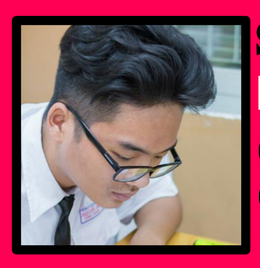

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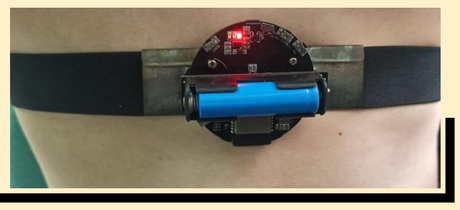
IOT DEVICE WITH AI SYSTEM FOR ECG CLASSIFICATION AND MONITORING

ABSTRACT

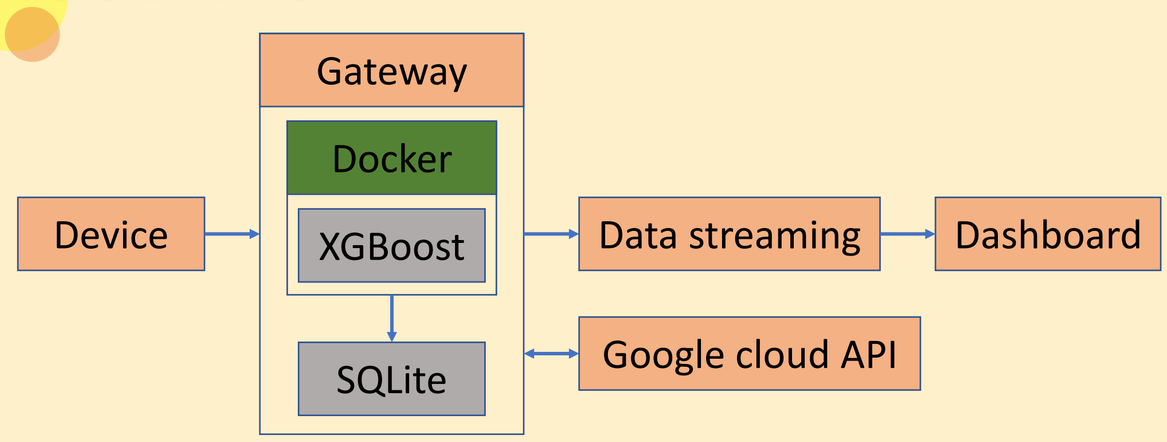
With the prevalence of life-threatening cardiac disorders on the rise, more cardiologists are in need of greater knowledge into their patients' heart health.

This solution is a form of portable system. It's a combination of IoT and AI system, which can constantly monitors and sends result of ECG classification to victim and doctor.

DEVICE:

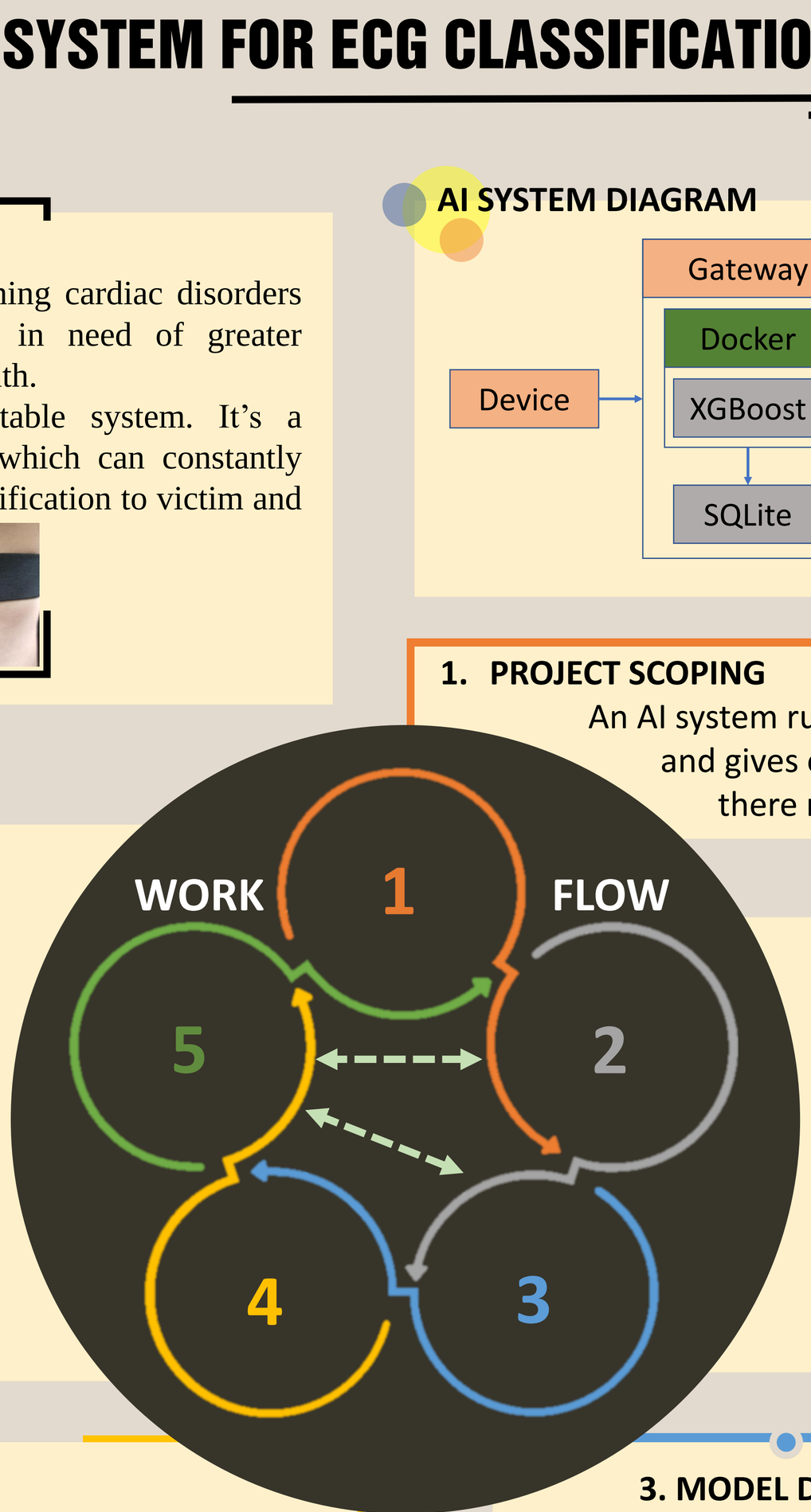


AI SYSTEM DIAGRAM



1. PROJECT SCOPING

An AI system run in real-time, classifies ECG and gives output immediately. Finally, there must be a dashboard for end user.



2. DATA ENGINEERING

- Dataset: MIT-BIH Arrythmia with 2 classes, abnormal cases and normal cases. Data from device.
- Filtering: baseline wander.
- Scaling.
- Class imbalanced handling: nested cross validation vs bootstrap.

3. MODEL DEVELOPMENT

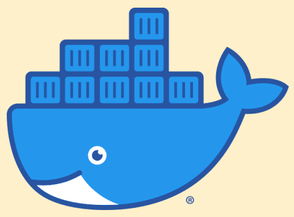
dmlc *XGBoost* + Weights & Biases

	Nested CV	ADASYN – RENN	ADASYN – IHT
TPR	0.910	0.911	0.905
FPR	0.002	0.003	0.003
TNR	0.998	0.997	0.997
FNR	0.090	0.089	0.095
F1-score	0.948	0.946	0.943

RENN: Repeated Edited Nearest Neighbours
IHT: Instance Hardness Threshold

4. MODEL DEPLOYMENT

Gateway: Jetson Nano Developer Kit 4GB RAM.
Create package with Docker.
Store date with SQLite and InfluxDB

5. MONITORING AND CONTINUAL LEARNING

Create dashboard with Grafana.
Use Google API for continual learning.