- Emergency monitoring system often fail to active the early warning system because during the initial states of emergency situation; the infrastructure of the areas including electricity, network (internet) connection …; might already be destroyed which make the system cannot exchange data with the main server; where data were processing and analyze, prediction was made before send back to the embedded nodes to active the warning system. Such disruption in data transfer has caused many early warning systems failed to active at the most needed moment, causing significant lost of life, damage many other properties, facilities, infrastructures … which could have been save if early warning system has been able to accomplish their mission. There a need for cutting the disruption, making edge embedded nodes become more independent/resilient.

- By implementing ML/DL on local edge embedded nodes, all of that disruption could be eliminated as all of workload; data processing and making prediction; could be performed by the local nodes.

- Current state-of-the-art of implementing ML/DL on resource constraint embedded systems are…limit:

+ Neural models lacking for non-ARM micros. ESP8266/ESP32

+ Non-neural models missing inference engines designed for microcontrollers

+ "Small DNN" work mostly on computer vision for mobile phones (model size 1000x of uC)

+ Few/no pretrained models available. Transfer learning little explored?

+ Very little documentation of entire development process. From planning, data aquisition, model design

+ Best practices underdocumented (or underdeveloped?)

- Works need to be done:

+ faster speed, better accuracy of the models which run on embedded systems.

+ Learning transfer from pre-trained models to models on embedded systems.

+ Power saving, Smaller models. Cheaper MCU, or bigger problems.

+ Better user experience, new use cases

+ Solve a concrete use case. Easier to deploy similar use cases

+ Comparison between approaches. Microcontroller, ML model

+ Libraries or tools. Lower time to market, enable more developers