Title: DOST-ASTI Initiatives on Information Infrastructure and Intelligent Systems

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DOST-ASTI Initiatives on Information Infrastructure and Intelligent Systems

Background :

Various research and development efforts of the DOST-ASTI are focused in addressing societal needs. Priority areas include - **disaster risk reduction and management, agriculture, addressing information poverty, and connectivity for unserved and underserved areas**.

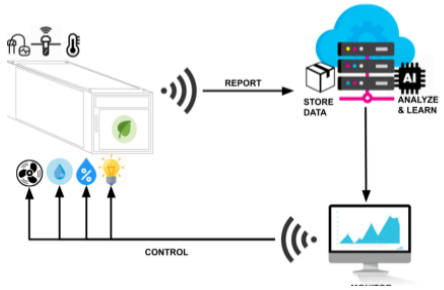
DOST-ASTI is collaborating with different government, academic, and research institutions in the implementation of the different research and development projects.

Weather Stations

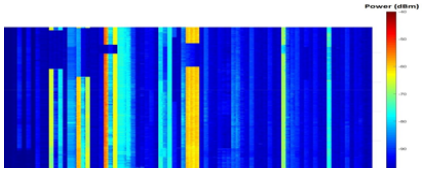
ULAT Project

AI Robot

DOST-ASTI



Gul.AI

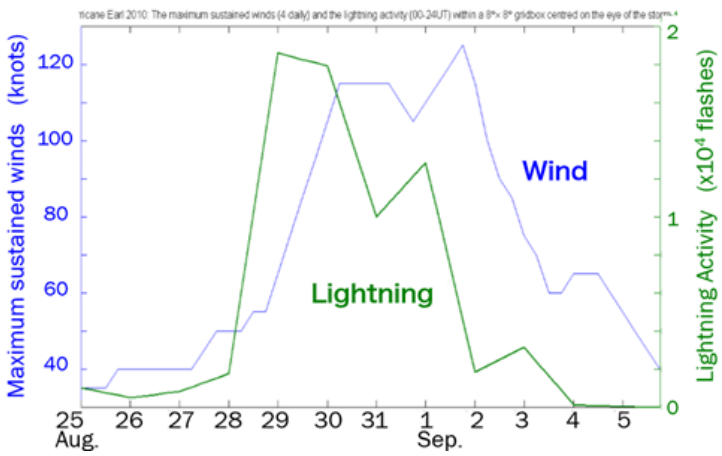


Spectrum Sensing

Communication Relay Buoy

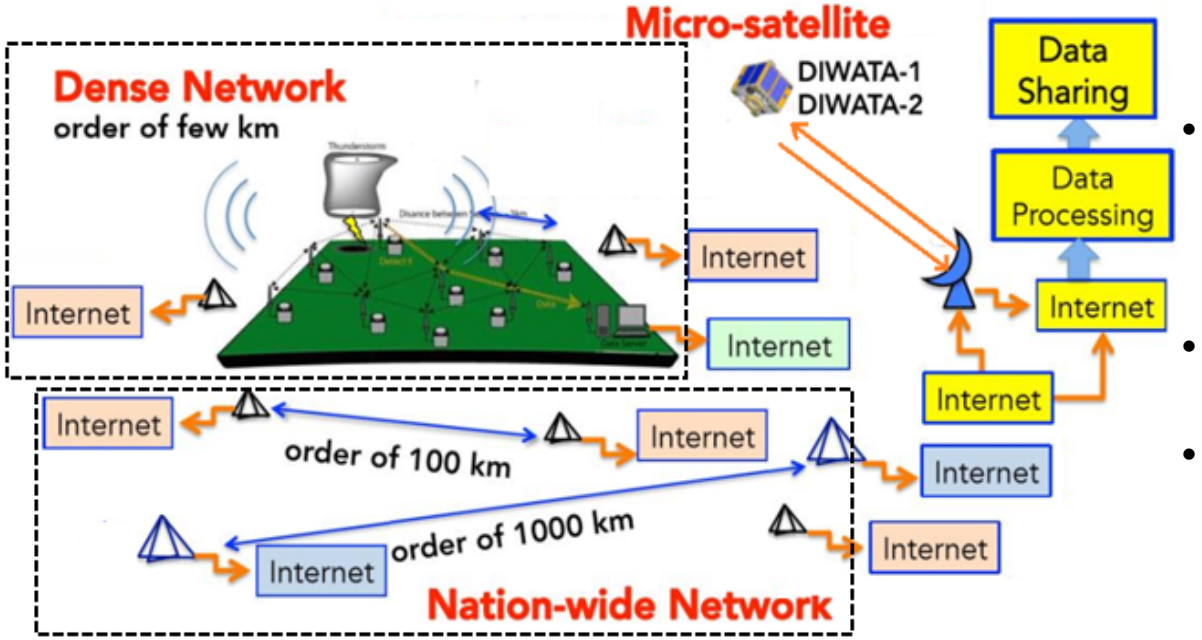
DEVELOPMENT OF EXTREME WEATHER MONITORING AND INFORMATION SHARING SYSTEM IN THE PHILIPPINES

PROJECT ULAT (UNDERSTANDING LIGHTNING AND THUNDERSTORM)



According to Price et al. (2007), there is a high correlation between typhoon and lightning

Prediction of **typhoon intensity** by lightning with a lead time of **1-2 day(s)**



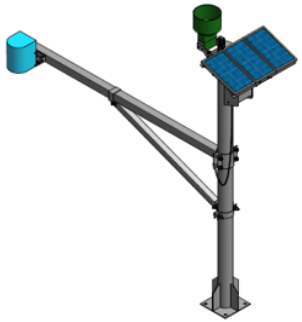
- Aid concerned stakeholders in generating localized weather forecasts and accurate thunderstorm advisories
- Public access to real-time monitoring of weather parameters
- Help LGUs and DRRMOs in monitoring/responding to weather disasters and emergencies

DOST-ASTI DEVELOPED WEATHER STATIONS

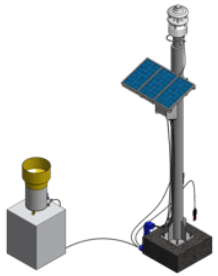
83 Automated Weather Station (AWS)

443 Water Level Monitoring Station

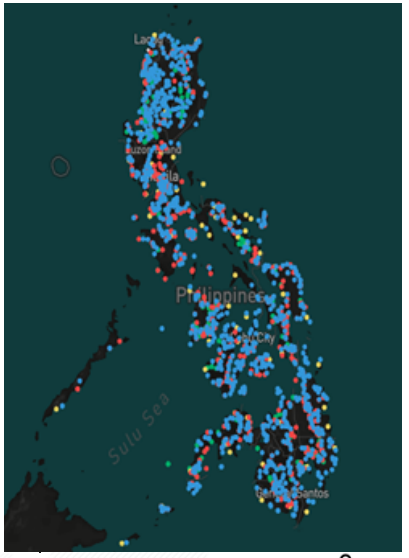
949 Automated Ra... Gauges (ARGs) Station



172 Tandem Station



153 AgroMet Station



Over **2000 Stations** deployed throughout the Philippines providing a **wealth of meteorological and agricultural data** primarily for the **mitigation of weather-related disaster casualties.**

Measures rain amount, duration and intensity

Measures air pressure

Measures air temperature

Measures air humidity

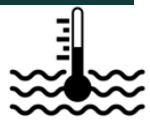
Measures wind speed & direction

Measures rate of water inundation

Sunshine Duration and Solar Radiation

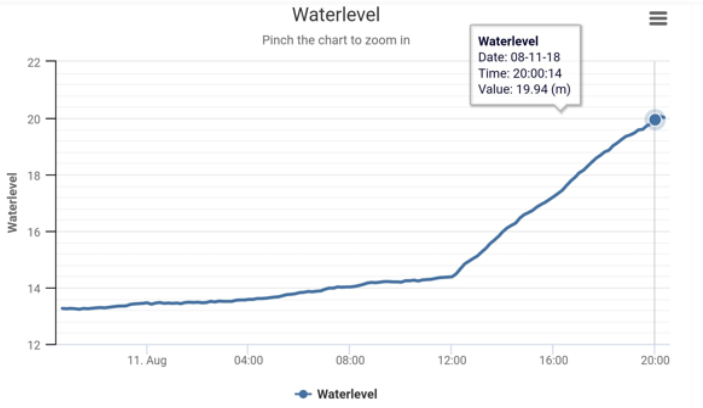
Soil Temperature, Humidity and Conductivity

Wave height and period



Sea Surface Temperature

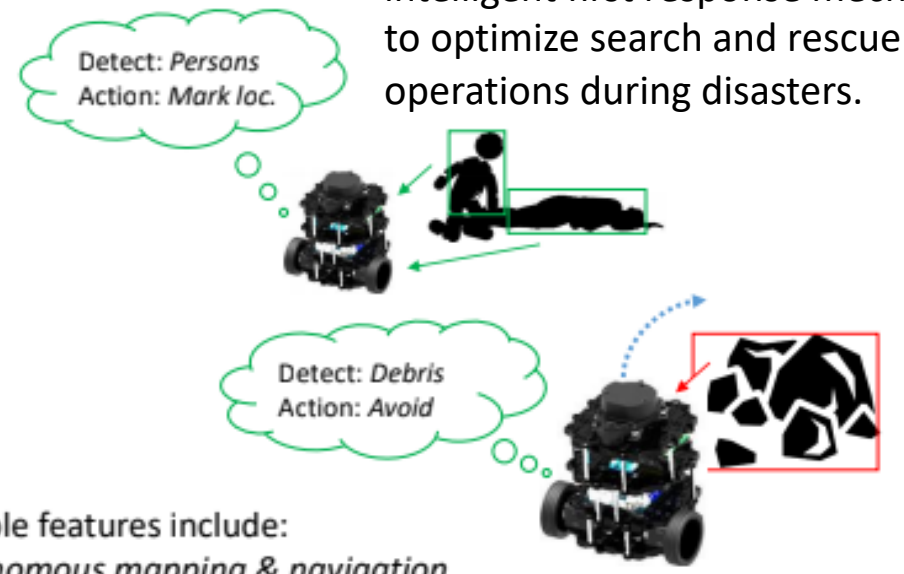
Local Government Units and **Researchers** are able to monitor weather phenomenon for both **proactive** and **reactive measures** to extreme weather conditions



ASTI INTELLIGENT ROBOT

Application Idea

There is a need for a safe and intelligent first response mechanism to optimize search and rescue operations during disasters.



Swarm of autonomous explorers for Rescue & Recovery

Desirable features include:
Autonomous mapping & navigation,
Detection of people or body parts,
Robot communication (direct or indirect),
Disposability (as compared to humans)

Objective:
- To develop intelligent mobile robots that will aid human personnel in decision making during disasters

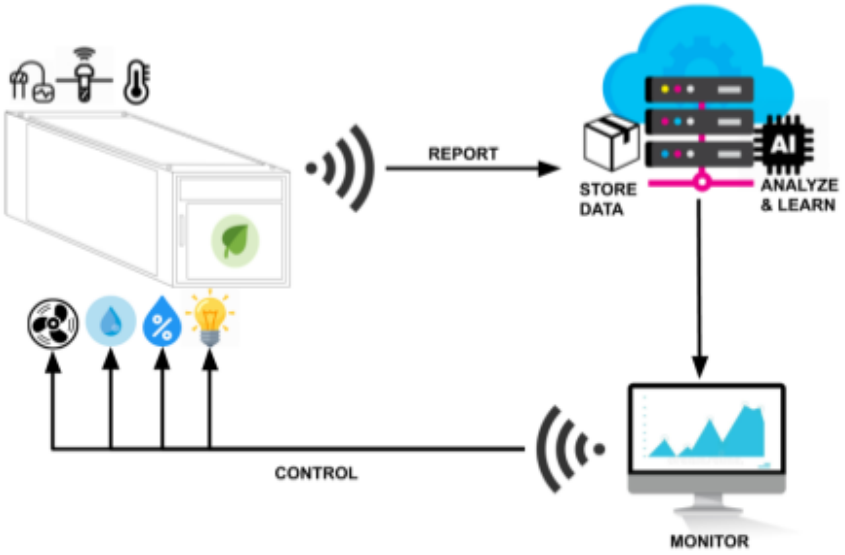
Methodology:
- Design and build of mobile robot with real-time object and human detection using deep learning and edge computing

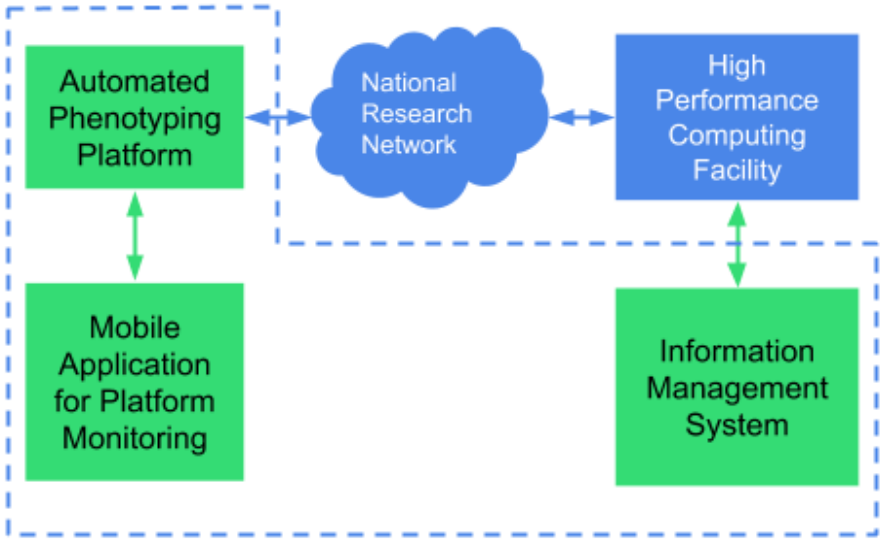
Output:
- Functional robot unit to be transferred to disaster response teams of local government units

Gul.ai: AI & IOT-ASSISTED PHENOTYPING PLATFORM

Gul.ai: AI & IoT-assisted Phenotyping Platform

- A small form-factor platform for growing plants for the purpose of phenotyping
- Plant-growing component can either be a soil-based growing module or a hydroponics-based growing module
- Internal sensors measure environmental parameters: temperature, water pH level, luminosity, rel. humidity, etc.
- Platform can be managed using mobile application



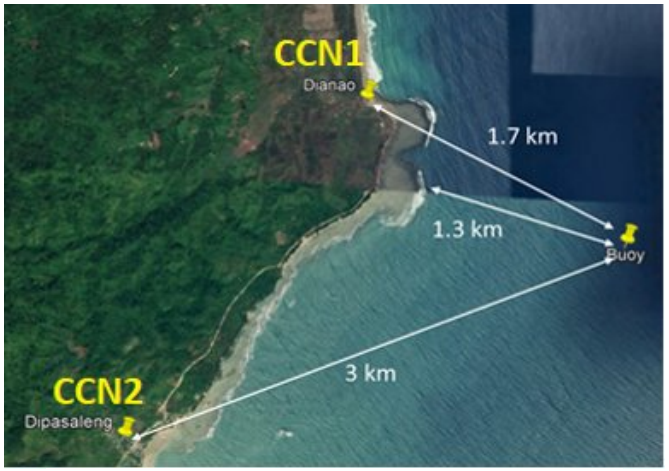


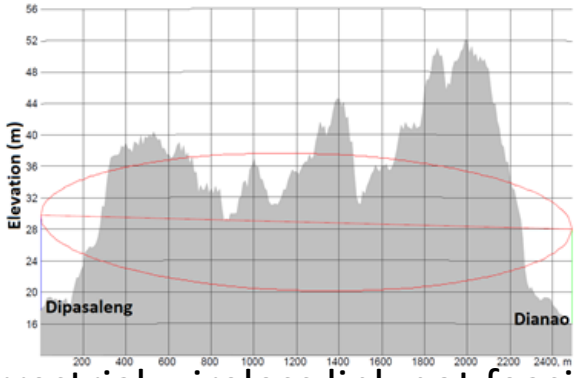
Features

- Experiments can be managed through mobile app
- Status of experiments are logged periodically and sent to a computing facility (COARE) through a national research network (PREGINET)
- Results of experiment can be analyzed using a web application (multivariate analysis)
- Plant growth models can be developed using results of experiments

ALTERNATIVE BACKHAUL SOLUTION FOR COMMUNITY CELLULAR NETWORK USING COMMUNICATION RELAY BUOY

Community Cellular Network (CCN) deployed in Dilasag, Aurora



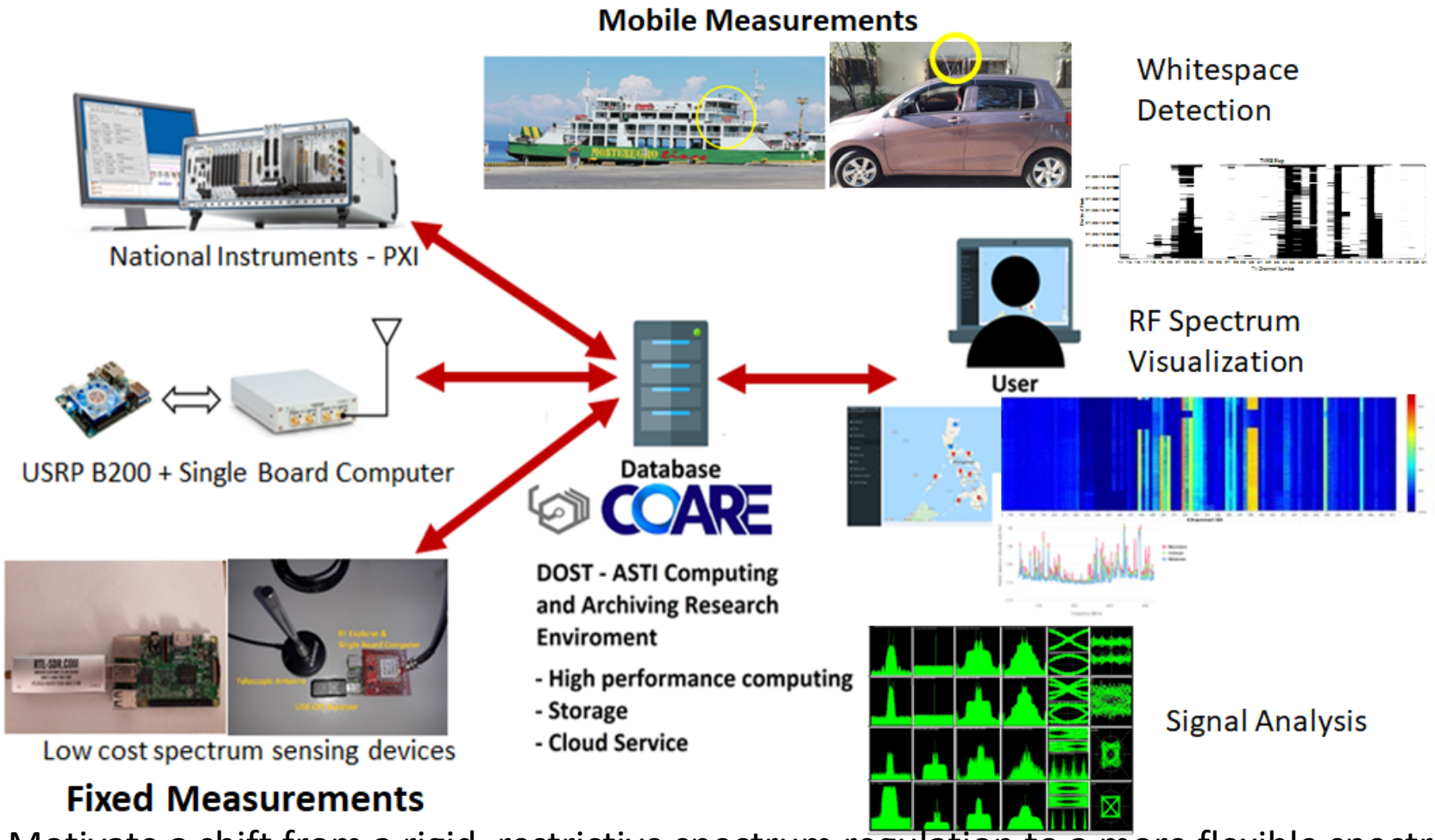


Terrestrial wireless link not feasible – no line-of-sight between two CCNs

DOST-ASTI developed Communication Relay Buoy

- Low power, low cost GSM base stations – community-owned model
  - Provides connectivity for unserved and underserved far-flung areas
- Study alternative technologies to address high backhaul costs (CAPEX and OPEX) – **use of ocean buoys as backhaul relay**

DATA-DRIVEN SPECTRUM MANAGEMENT THROUGH DISTRIBUTED SPECTRUM SENSING AND SIGNAL ANALYSIS



- Motivate a shift from a rigid, restrictive spectrum regulation to a more flexible spectrum management model for the Philippines
  - Evidence based policies and recommendations
- Contribute to the crafting of a dynamic spectrum access strategy and policy for shared access of licensed spectrum for various applications – rural and maritime connectivity