Modernizing Cities via Smart Garden Alleys with Application in Makassar City

- Makassar City is the 5th largest urban center in Indonesia (1.7 M population)
- Makassar City's vision:

  "To create Makassar as a livable world class city for all"

- Makassar has converted 40+ alleys into garden alleys throughout the city

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Supporting Transition of Research into Cities Through the U.S. ASEAN (Association of Southeast Asian Nations Cities) Smart Cities Partnership

United States:

- Pennsylvania State University
- Virginia Tech
- University of Colorado Boulder
- Boulder, Colorado

Indonesia:

- Universitas Gadjah Mada
- Institut Teknologi Bandung
- Universitas Hasanuddin
- Makassar City

Program Objectives

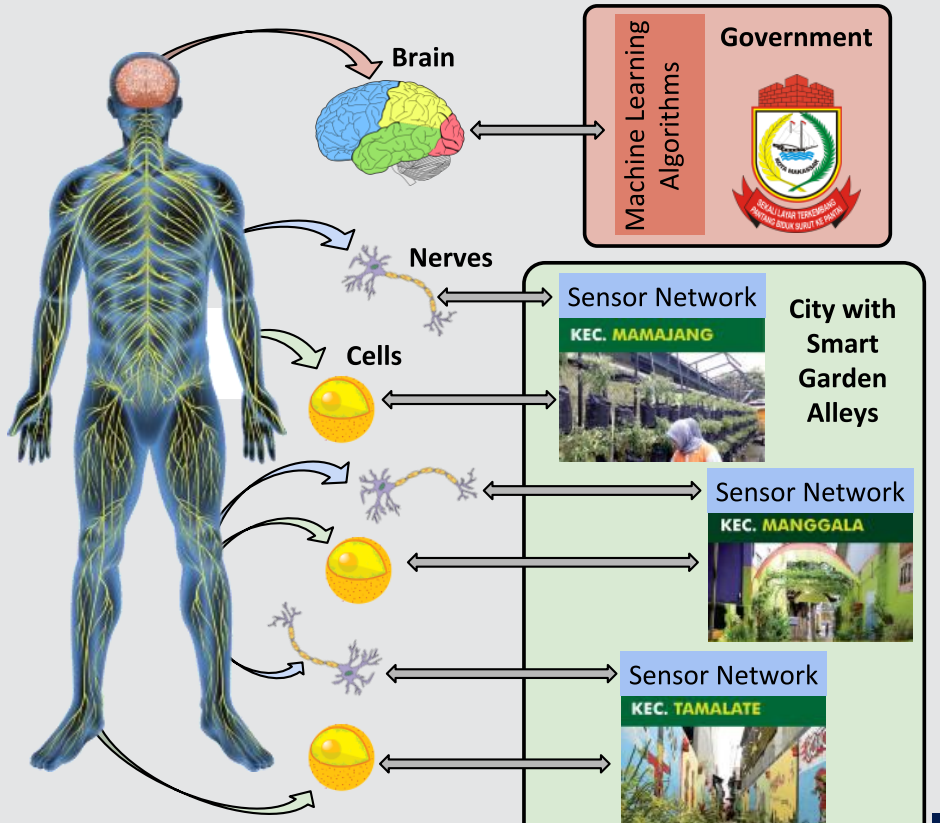
This project will work to integrate innovations in **smart and connected communities to improve garden alleys** within the City of Makassar.

Existing

- **Cells:** Garden alleys distributed throughout the city

Proposed

- **Nerves:** Distributed sensor network provides feedback
- **Brain:** City government leverages machine learning and optimization algorithms



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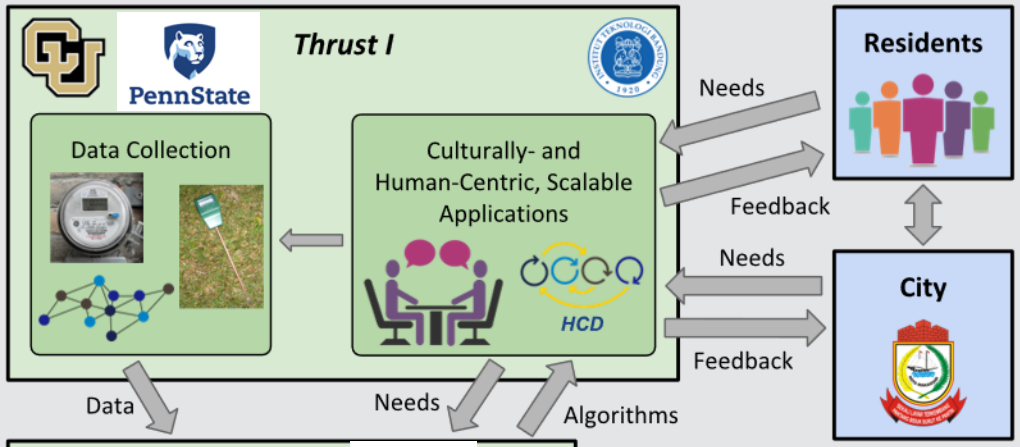
Indicators/M&E

Key outcomes:
- Appropriate & scalable applications & feedback mechanisms based on deep human & social needs assessment
- Low-cost distributed sensor networks with heterogeneous data collected through 6 garden alleys across Makassar

Collaboration with Makassar City and research teams in ALL thrusts

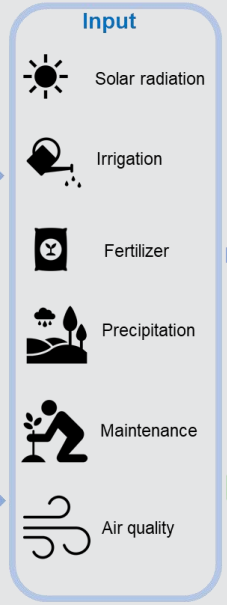


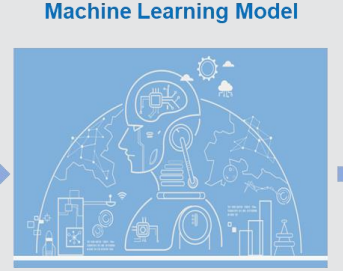
Key outcomes:
- Novel heterogeneous multi-task machine learning framework for quality of life and system assessment of garden alleys
- Data-driven garden alley system optimization, user feedback, & government intervention/incentive mechanisms

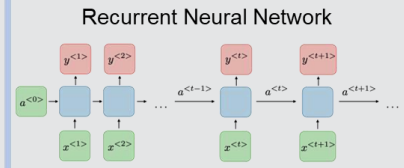
1. Data Collection for Air Quality Data and Social Data

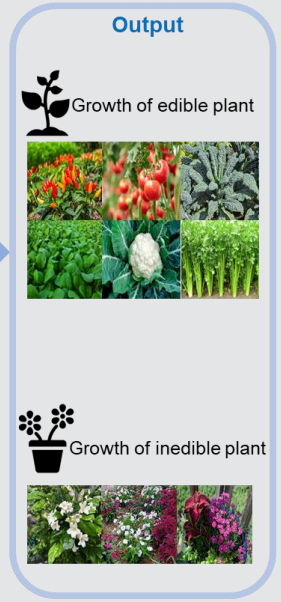
Custom designed air quality monitoring system for ASEAN Cities

2. Design a Recommendation System for Urban Farming









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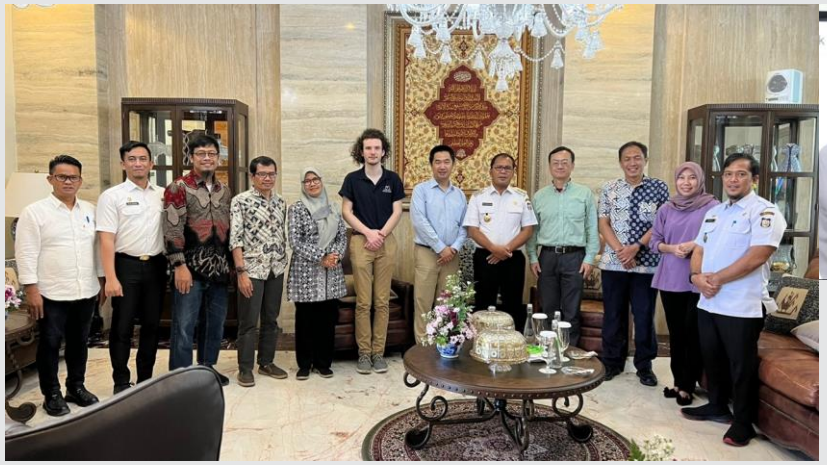
Recent Updates/Site Visits

Meeting with Mayor Pomanto on Dec 21



- Discussed Garden Alleys and plans for expansion
- Implementation of PV and carbon reducing practices throughout Makassar
- Expansion to 5,000+ alleys

Garden Alley KWT Appakabaji

Tourism Alley of Adliswil, KWT Ketumbar

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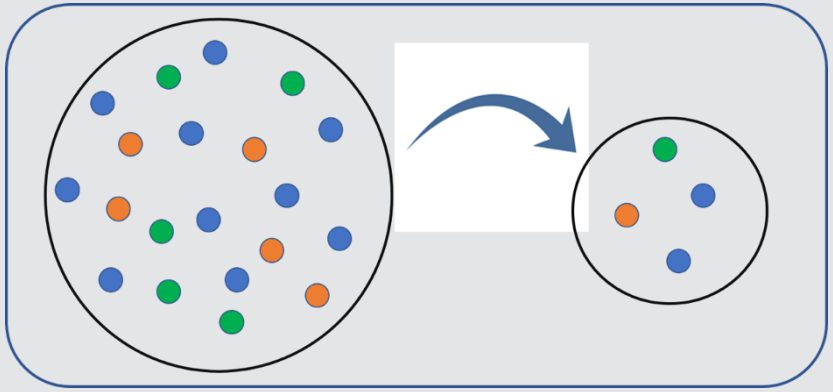
Program Next Steps

Scale-up: from 6 to 7000 Alleys Energy-Water-Food Nexus



Perform statistic analysis to determine the minimum number of alleys to be sampled according to

- Function
- Location
- Orientation
- Other impact factors

Produce 5 more sensors to collect the data at sample alleys

<u>Existing Aquaponic Systems</u>

+ Capture carbon by vegetables and recycle the fish waste
- Use electricity from power plants (mainly by coal)

<u>Proposed Improvements</u>

+ Reduce carbon emission by using onsite renewable energy (PV, wind turbine) to supply power to water pumps during the day
+ Pure carbon capture eco-system
+ Demonstrate at 3 alleys
+ Analyze the potential for net zero energy alley (NZEA)

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Photos

Tourism Alley of Haderslev

Tourism Alley of Leganes

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Photos

Tourism Alley of Maastricht, KWT Angrek

Tourism Alley of Sydney, KWT Citra Tello

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