Abstract

To simplify the necessary steps required to get into urban farming using AI LLM models such as ChatGPT for AIOT, and in doing so, creating a larger community of urban farmers for sustainability.

30.201 Wireless Communications and Internet-of-Things

Espress(if) Farming

Sean Ang 1005019

**Introduction**

In the current century, where global warming is taking the world by storm (quite literally), it is now, more than ever, where sustainability should be taken more seriously by the average person. In Singapore alone, the greenhouse gas emissions in 2021 totaled to 50,089.9 gigagram of CO2[[1]](#footnote-2). With a lack of land and natural forests, Singapore does not have a suitable outlet for the reduction of these greenhouse gas emissions. Thus, we see a move to vertical farming in space-constricted areas like Singapore, which uses many different smart systems and even Internet-of-Things (IOT) technologies to care for these vertical farms. There is one key area in which Singapore has yet to utilize, however, and I believe that solution lies with the average Joe. Households are yet an untapped source of urban farming, and I believe one of the key reasons is the accessibility to information. How does one get started? What are the easiest plants to take care of? How do I germinate a plant? These are all, I believe, reasonable questions that are enough to turn people off from gardening altogether. Thus, I aim to provide a solution to this problem, by incorporating the current use of smart, automated farming, coupled with the use of Artificial Intelligence (AI) Large Language Models (LLM) such as chat GPT to alleviate this barrier to entry.

**Methodology**

To create said solution, let us first break this down into multiple parts:

* AI assistant (Think ChatGPT, Copilot)
* Sensor reading
* Data processing
* Notification / Action

**AI assistant:**

To implement the AI assistant, open source

AI to help to determine thresholds of humidity and temperature\*

**Sensor reading:**

A few sensors would ideally be used for the monitoring of the soil and plant, but for the scope of this project, we will focus on the monitoring of the moisture level of the soil and its corresponding temperature.

**Data processing:**

From the sensor readings, we will determine whether both the moisture level and temperatures are indeed within the acceptable ranges using simple logic.

**Notification / Action:**

From the processed sensor data, there would be two outcomes:

1. Ok
2. Not ok

If everything is as normal, it would be displayed as such on the Rainmaker app should the owner check the app.

Else, the user would be notified on the Rainmaker app, and corrected using an automated process of watering via a pump and valve.

**Hardware / Software**

**Schematic, code**

1. [(https://www.nea.gov.sg/our-services/climate-change-energy-efficiency/climate-change/greenhouse-gas-inventory)](https://www.nea.gov.sg/our-services/climate-change-energy-efficiency/climate-change/greenhouse-gas-inventory) [↑](#footnote-ref-2)