UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FACULTY OF ELECTRONICS AND COMPUTER

TECHNOLOGY AND ENGINEERING PROJECT

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COURSE	**:BERL211**
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PROGRAM	**:BERL**

Title of Assignment : Smart Garden

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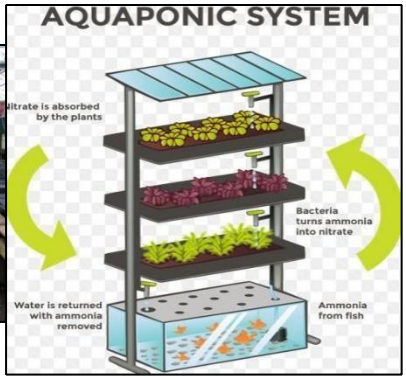
CONTENT

1. INTRODUCTION



Smart technology integration is now standard procedure in several industries, including urban planning, environmental monitoring and agriculture. Technological developments in the fields of agriculture and gardening have produced automated solutions for the best possible plant care. These developments meet the increasing demand for sustainable gardening solutions to meet the demands of urban greenery and global food security.

As a result, a lot of people and small farms have started gardening as a business or pleasure. There are obstacles to effectively managing a garden, including making sure that the soil is healthy, keeping an eye on environmental conditions and providing adequate irrigation. Poor plant development, resource waste, and increased maintenance expenses might result from inefficiencies in these areas.

As a result, a system called the Smart Garden Monitoring System was created to automate and enhance garden maintenance and monitoring. Real-time data on important factors, including soil pH, light intensity, water level, temperature, and CO_2 concentration, is provided by the system through sensors. The device also ensures healthy plant growth with minimal user involvement by automating environmental monitoring and irrigation. With this innovation, farmers and gardeners will be able to create a more efficient and sustainable gardening environment.

2. PROBLEMS AND SOLUTIONS RELATED TO SMART GARDENING

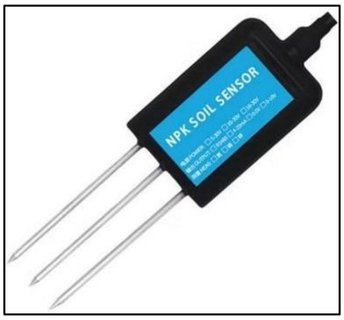
Inconsistent irrigation is a common problem for plants in smart gardens, as either too much watering or too little watering can cause stress and damage to the plants. Another major problem is improper soil pH, which has a negative impact on plant growth and impedes the absorption of nutrients. Furthermore, insufficient light exposure deprives plants of the sunlight required for photosynthesis, which is essential to their growth. Severe temperature swings are particularly dangerous since they can damage plant health and interfere with their growth cycle. Moreover, poor air quality which is typified by high CO_2 levels can have a detrimental effect on plant respiration, which in turn affects the general well-being and productivity of plants.

Solutions:

- **Automated irrigation**: Implement water level sensors and pumps to regulate water distribution based on soil moisture needs.
- **Soil pH sensors**: Use pH monitoring devices to ensure the soil is within optimal ranges for plant growth.
- **Light monitoring**: Employ lux sensors to measure light intensity and adjust artificial lighting when necessary.
- **Temperature regulation**: Use temperature sensors to monitor environmental conditions and implement heaters or fans to maintain optimal temperatures.
- **Air quality monitoring**: Install CO_2 sensors to measure and control carbon dioxide levels in the garden environment.

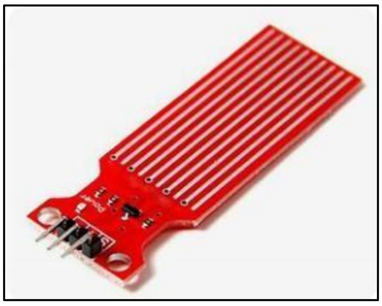
3. TYPE SENSOR USED IN THE PROJECT

The following sensor are included in the project:



pH Sensor: A soil pH sensor is a device that can measure soil pH values. It measures the concentration of hydrogen ions (H+) in the soil by inserting electrodes into the soil. The concentration of hydrogen ions is directly related to the pH value, which determines the soil's acidity or alkalinity.

Lux sensor: These devices are photosensors designed to detect and measure the intensity of light in a given area, allowing us to make decisions regarding lighting, optimize energy usage, enhance security, and improve overall comfort.



Water Level Sensor: A water level sensor is a device used to measure the level of water in a tank, container or other reservoir. These sensors are commonly used in various applications such as monitoring water level in sump pits, detecting leaks and measuring rainfall.

Temperature sensor: it can be used in various application such as thermometers, refrigerator, water heater and air-conditioners, as well as for measuring temperature in structures, buildings, soil and water.

Co2 sensor: Instrument that measure the amount of carbon dioxide gas in the surrounding air. These sensors are essential for monitoring air quality, ensuring safety in various environment and optimizing processes in industries like agriculture and HVAC.

3.1 WHY THESE SENSORS WERE CHOSEN

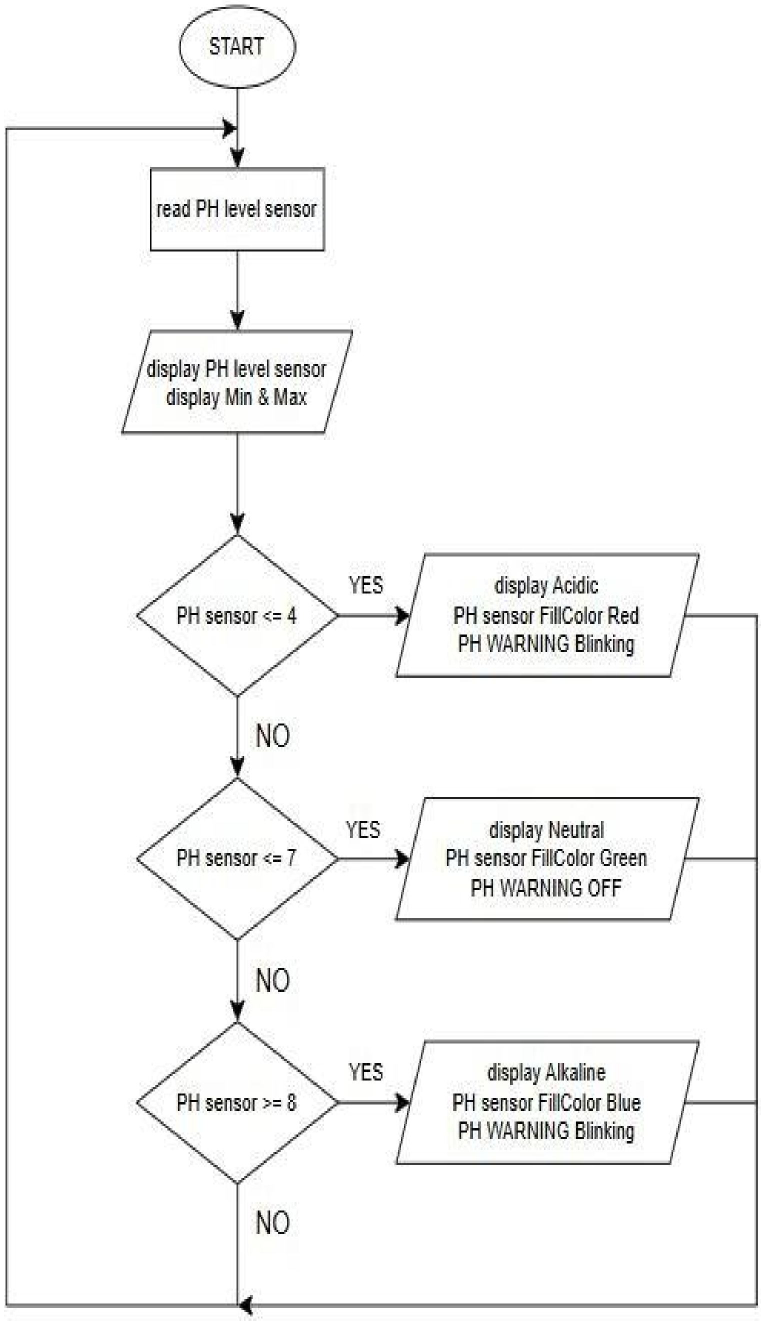
Every sensor was chosen for its applicability to essential horticultural requirements. Maintaining ideal soil conditions and making sure plants get the nutrients they require depend on the pH sensor. The lux sensor keeps an eye on the amount of light present to facilitate photosynthesis. Healthy plant development is encouraged by the temperature and CO2 sensors, which monitor environmental conditions. Finally, by preventing overwatering or dehydration, the water level sensor optimizes the irrigation operation.

3.2 ROLE OF SENSORS IN THE PROJECT

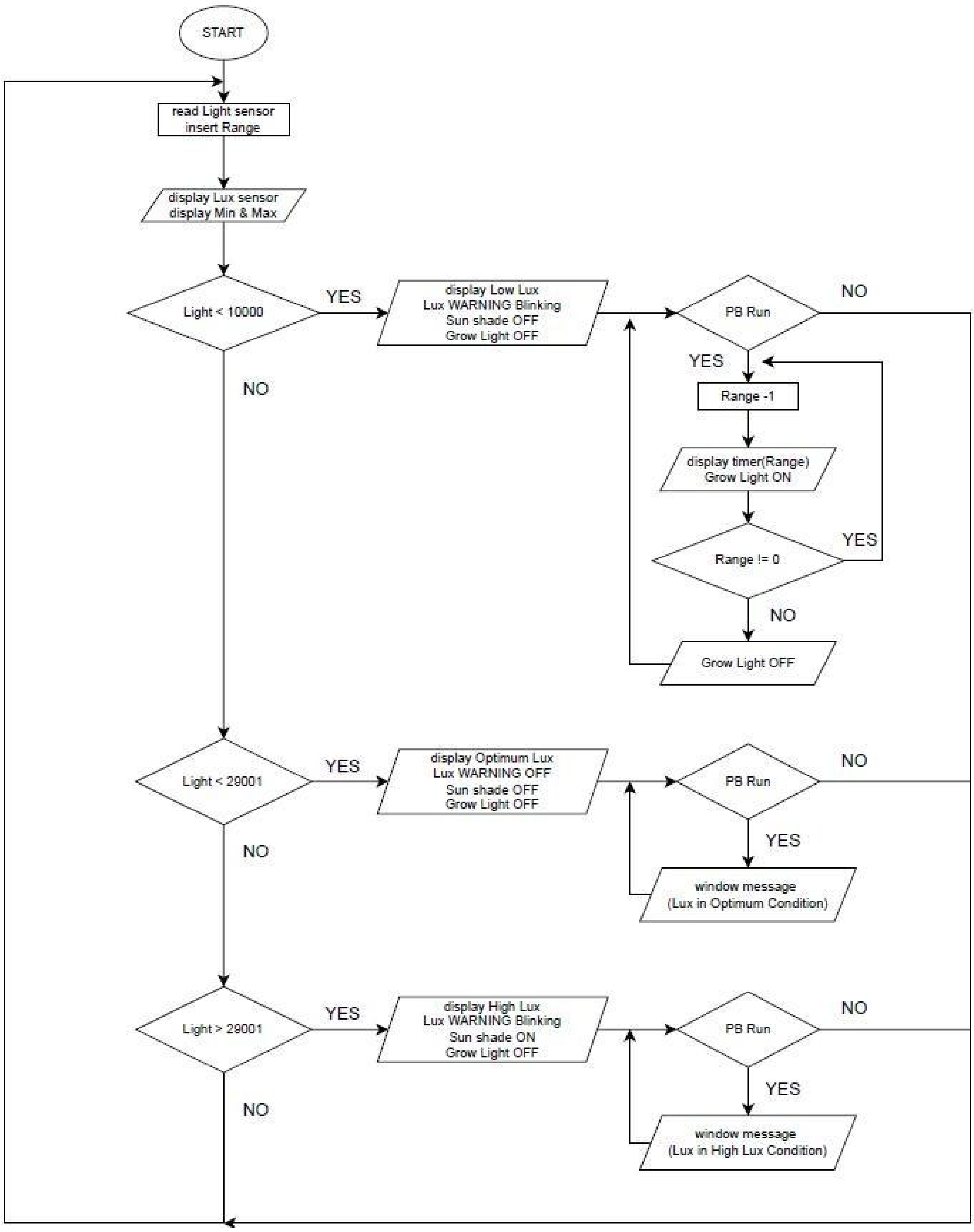
By gathering data on environmental elements in real time, the sensors serve as the system's fundamental component. By detecting acidity or alkalinity, the pH sensor makes sure the soil is suitable for plant growth. Optimal light exposure is maintained with the aid of the lux sensor. To protect plants, the temperature sensor keeps an eye on changes in the surrounding environment. The CO2 sensor makes sure the air is suitable for photosynthesis and healthy breathing. Together, these components create a sustainable and automated gardening system.

4. METHODOLOGY

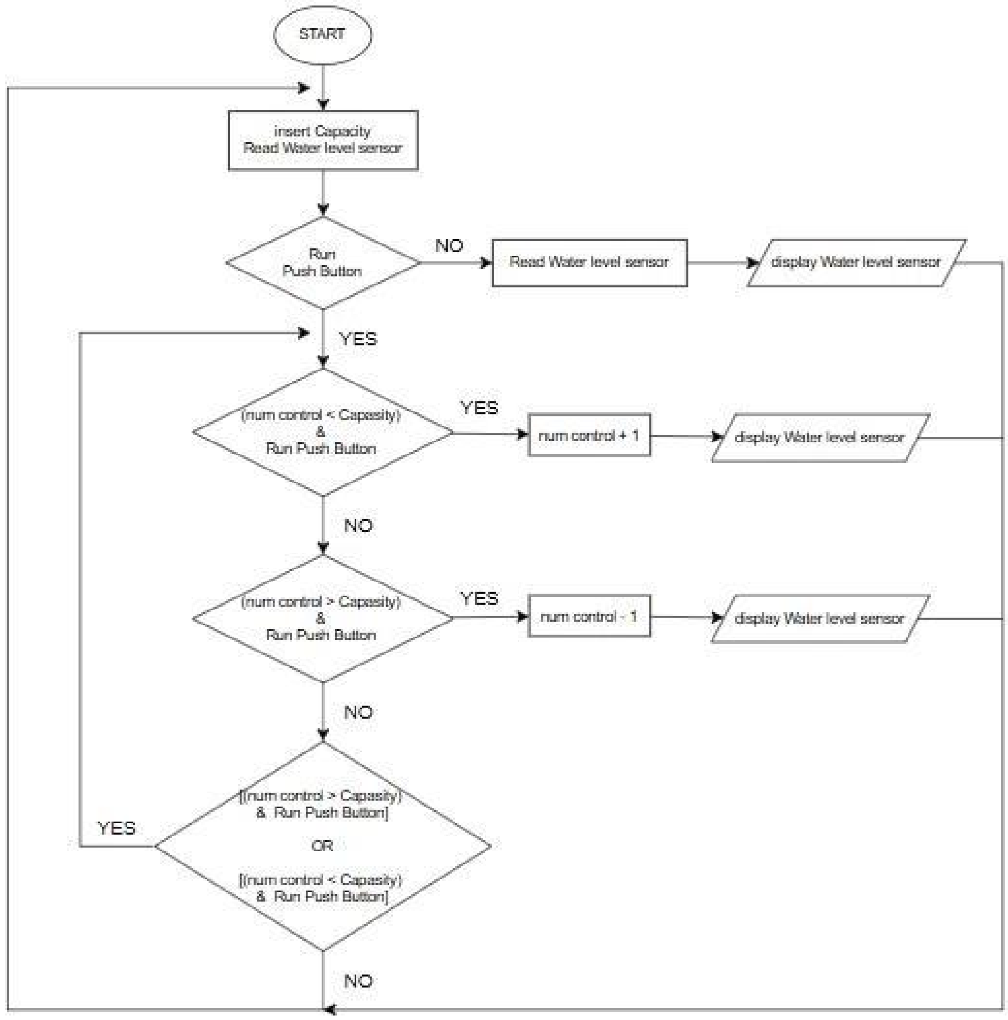
4.1 FLOWCHART



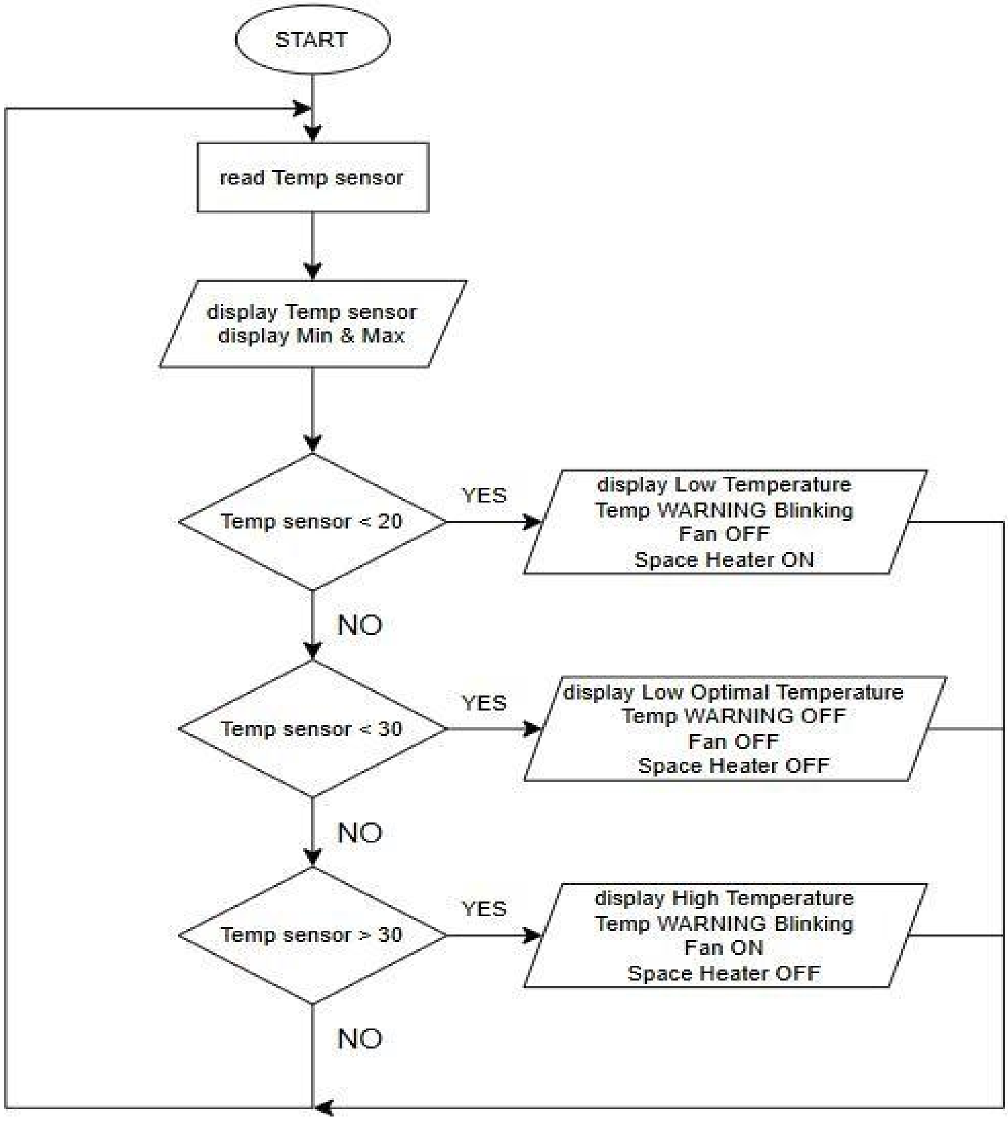
Flowchart for pH sensor



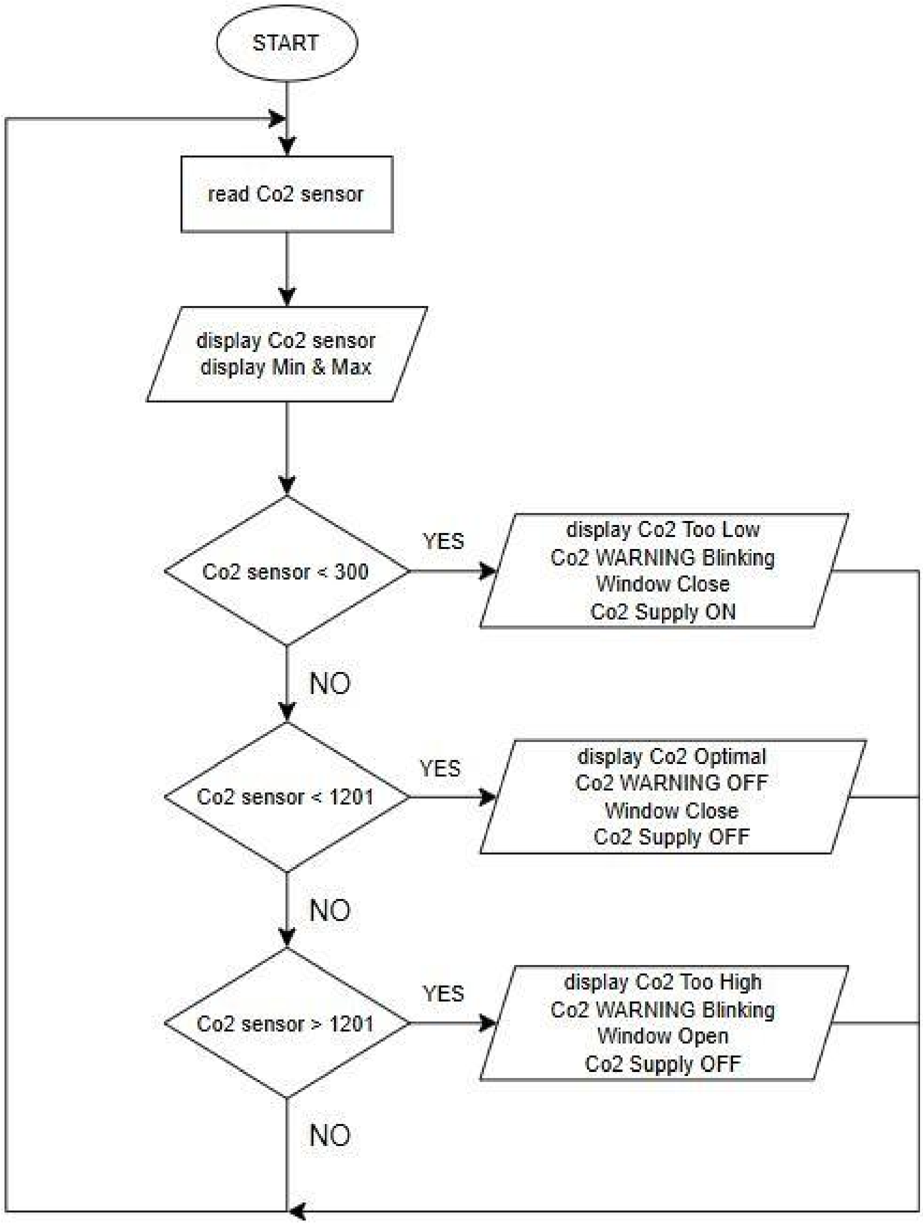
Flowchart for Lux sensor



Flowchart for water Level sensor



Flowchart for Temperature sensor

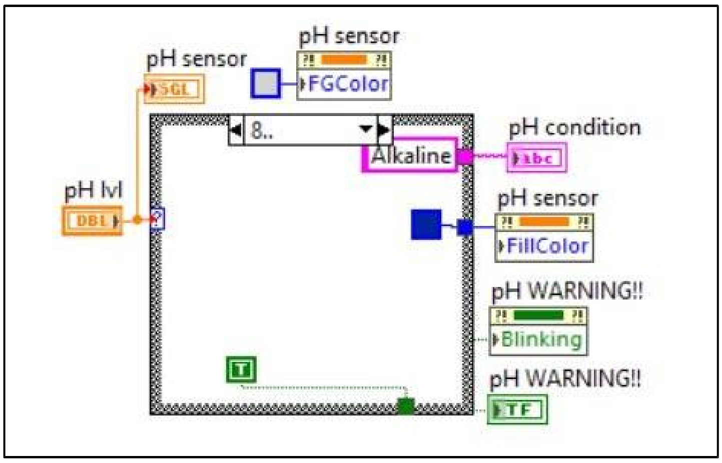


Flowchart for CO2 sensor

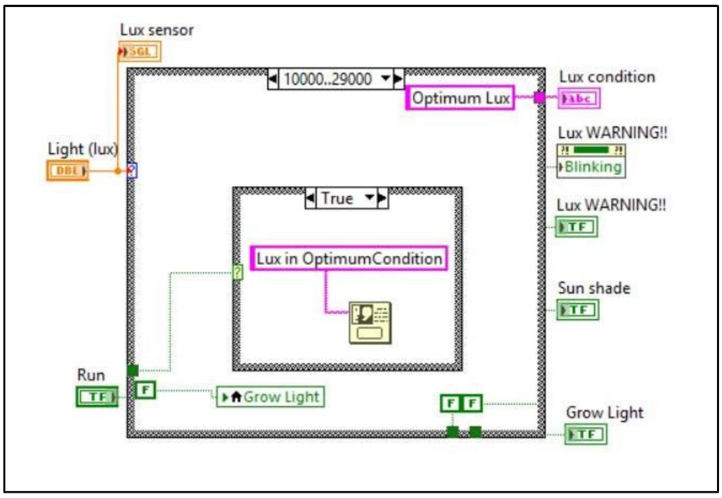
4.1 LABVIEW PROGRAM

- FRONT DIAGRAM

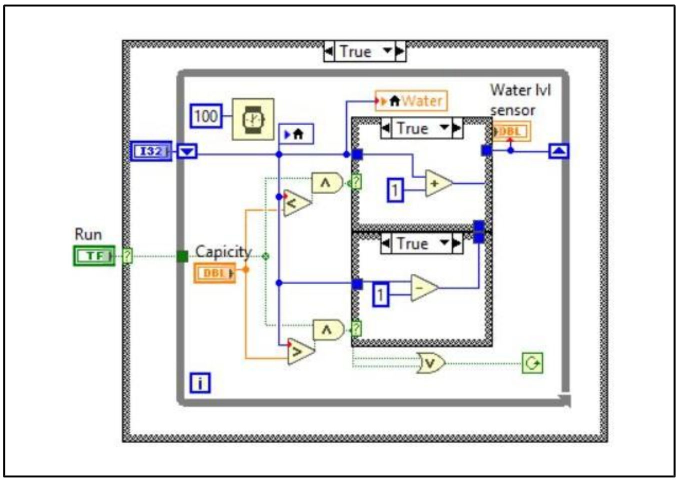
- **BLOCK DIAGRAM**



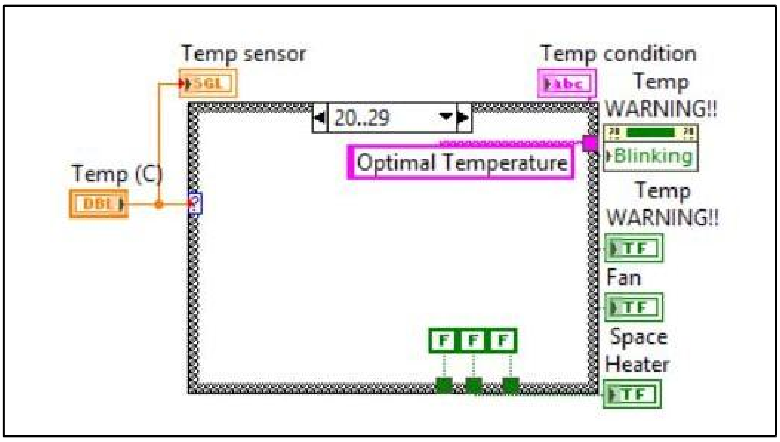
Block Diagram for pH Sensor



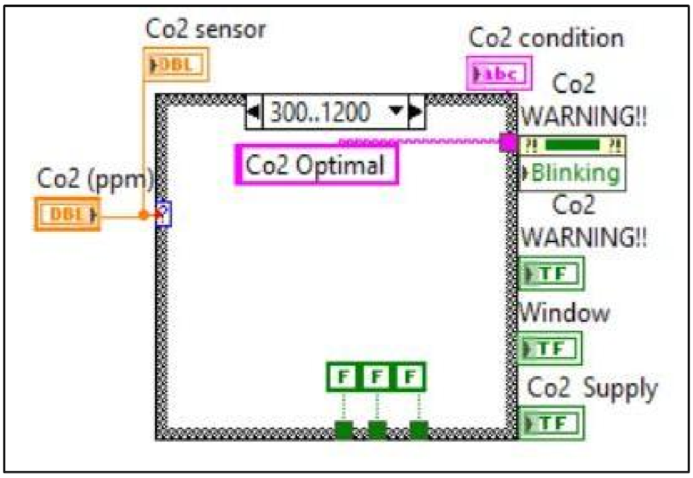
Block Diagram for Lux Sensor



Block Diagram for Water Level Sensor



Block Diagram for Temperature Sensor



Block Diagram for CO2 Sensor

5. DISCUSSION

The efficiency of plant care is greatly increased by combining automation and real-time monitoring. The technology guarantees the perfect climate and encourages healthy plant growth by minimizing operator involvement. Resource efficiency is further improved by the automatic irrigation system, which reduces water waste and guarantees that plants receive the right amounts of moisture. Future system enhancements might incorporate predictive analytics that forecast plant requirements based on past data and patterns, as well as wireless connectivity to allow remote monitoring and control. To guarantee the system's long-term dependability and steady functioning, however, issues including sensor calibration, power stability, and fluctuations in the environment must be resolved.

6. CONCLUSION

The Smart Garden Monitoring System offers a practical and efficient solution for maintaining healthy gardens. The technology improves plant growth while lowering labor costs by using sensors for automated control and real-time monitoring. This research raises up opportunities for advancements in sustainable agriculture by showcasing the potential of smart gardening.