

SPECIAL TOPICS IN COMPUTER SCIENCE (CS4401)

ASSIGNMENT 2

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1. **HIGH LEVEL SYSTEM ARCHITECTURE**





The high-level system architecture of the Mini Automatic Weather Station project is comprehensively outlined through its distinct layers: Sensing, Control, Communication, Persistence, and Application. Each of these layers plays a critical role in the overall functionality of the system, ensuring efficient data collection, processing, transmission, storage, and user interaction.

**Sensing Layer**

*Components:* Temperature sensor, humidity sensor, pressure sensor, GPS module

*Responsibilities:* Measure environmental parameters such as temperature, humidity, pressure, and geographical coordinates

*Interactions:* Data acquisition from the sensors

**Control Layer**

*Components:* Arduino microcontroller

*Responsibilities:* Process and control the data acquisition from the sensors, manage power and communication modules

*Interactions:* Receiving sensor data, controlling sensor operations

**Communication Layer**

*Components:* GSM/GPRS module, Wi-Fi module

*Responsibilities:* Transmit data to a remote server, receive commands for remote configuration

*Interactions:* Sending sensor data to the remote server, receiving commands from the remote server

**Persistence Layer**

*Components:* Remote database server (e.g., MySQL)

*Responsibilities:* Store the transmitted sensor data, provide data retrieval services

*Interactions:* Receiving and storing sensor data, providing data retrieval services

**Application Layer**

*Components:* User interface (web or mobile), data visualization tools

*Responsibilities:* Present the sensor data to the users, enable data visualization and analysis

*Interactions:* Retrieving data from the remote database server, presenting data to the users

**2.System Implementation Details**

**Overview:**

The Mini Automatic Weather Station project is an amalgamation of various hardware components and software tools, working cohesively to measure, process, and display environmental data.

**Hardware Components:**

*Temperature, Humidity, and Pressure Sensors:* Collect atmospheric data.

*GPS Module:* Provides geographical coordinates.

*Arduino Microcontroller:* Acts as the central processing unit.

*GSM/GPRS Module:* Facilitates cellular communication.

*Wi-Fi Module:* Enables wireless internet connectivity.

*User Interface Display:* For real-time data presentation.

**Software and Programming:**

*Arduino IDE:* Used for coding the Arduino microcontroller in C.

*Sensor Libraries:* Specific libraries for interfacing sensors with Arduino.

*Communication Protocols:* Utilization of GSM and Wi-Fi modules for data transmission.

*Database Management:* Remote database handling for data persistence.

*Application Development:* Building user interfaces for data display and interaction.

**Techniques:**

*Sensor Data Acquisition:* Programming the Arduino to read data from various sensors.

*Data Processing:* Filtering and processing raw data for accuracy.

*Wireless Communication:* Implementing protocols for transmitting data to remote servers.

*Database Operations:* Storing and retrieving data efficiently.

*User Interface Design:* Creating intuitive and informative displays for end-users.



