STTHK3113: SENSOR-BASED SYSTEMS

Semester A242

School of Computing, CAS, UUM

FRONT COVER
Lab Assignment 2

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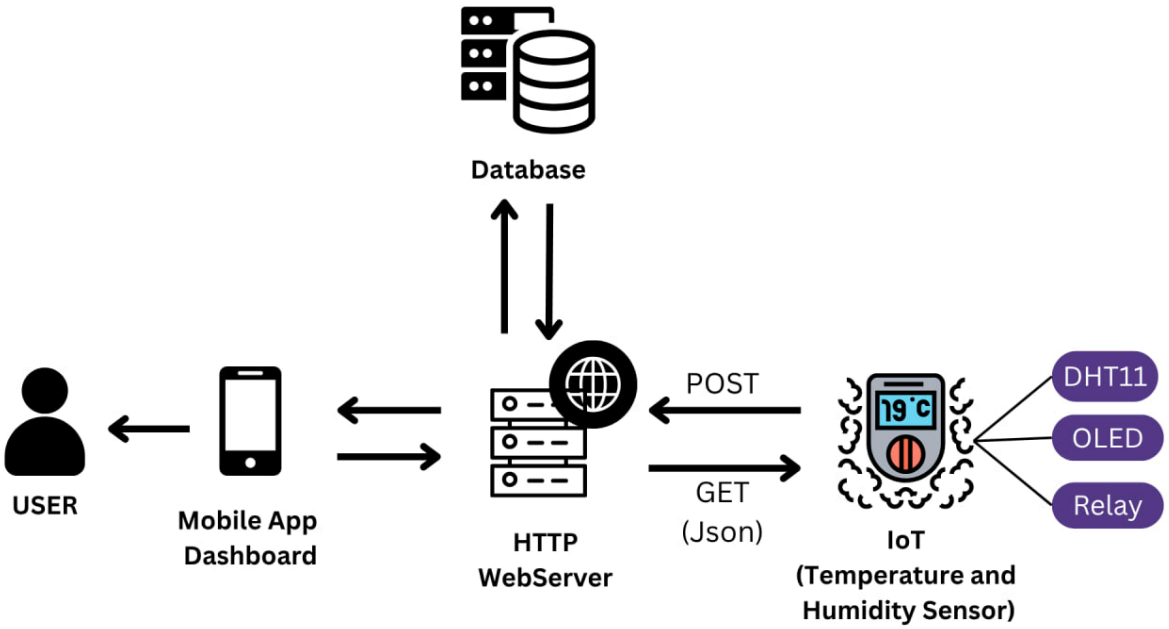
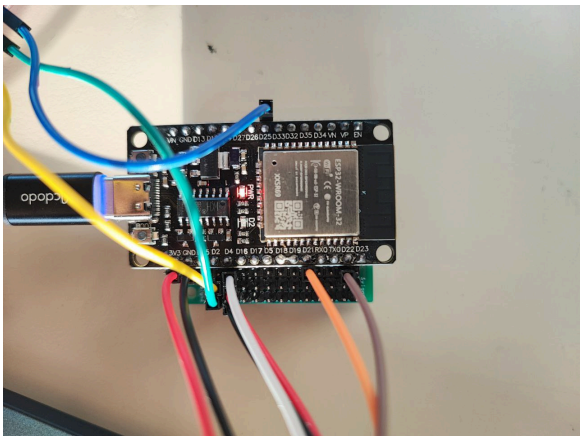
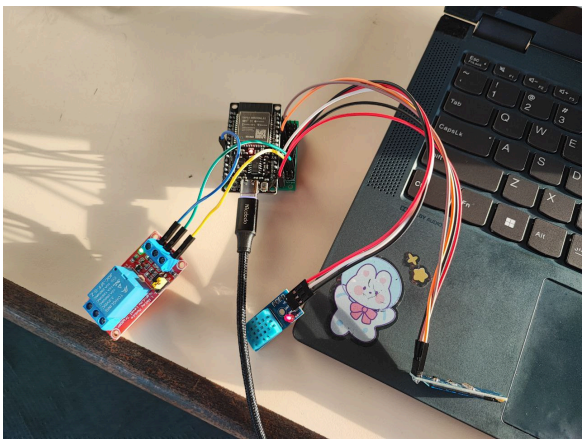
GitHub Link	https://github.com/irdinaaase/dht11_monitoring_system
YouTube Link	https://youtu.be/iIOcbnN08EQ?si=hfrz_KdSRWov1YgA
Submission Date	30/05/2025
Acknowledgment	I hereby signed and acknowledge that the following works are from my effort in submitting this document. If found otherwise, severe action such as marks deduction or removal from the assignment can be taken against me.
Digital Signature	
Your Picture	

1.0 System architecture diagram



2.0 Setup steps



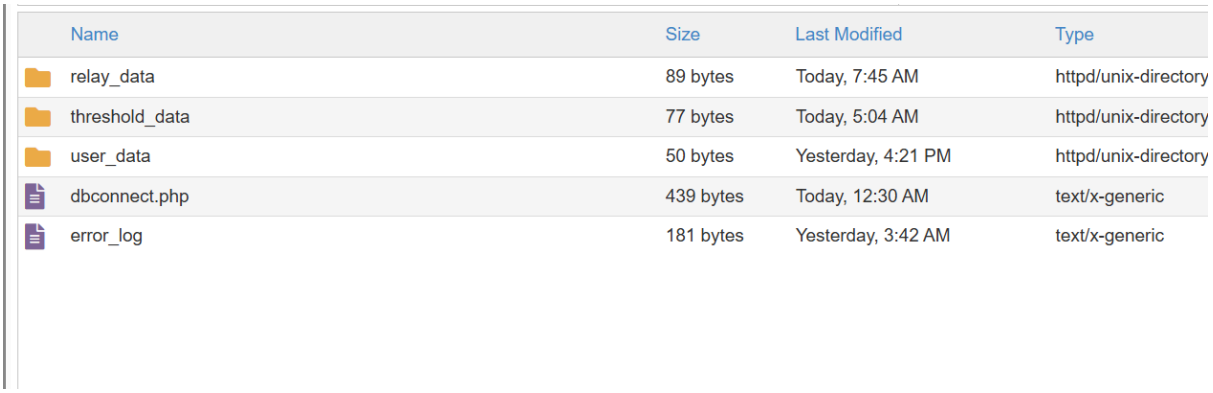


DHT11	OLED display	Relay

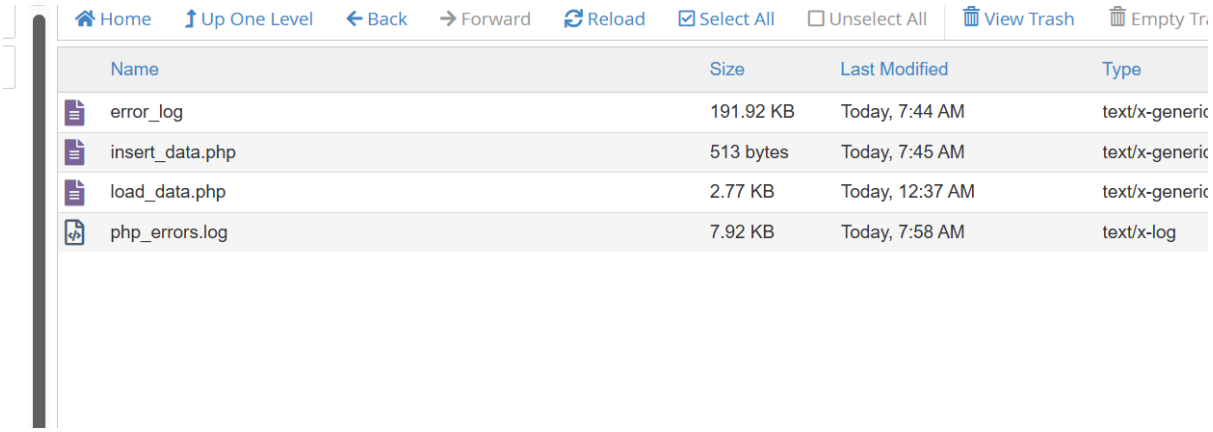
• VCC → 3.3V • GND → GND • Data → GPIO4	• VCC → 3.3V • GND → GND • SDA → GPIO21 • SCK → GPIO22	• VCC → 3.3V • GND → GND • IN → GPIO25

3.0 Screenshots

a. Backend



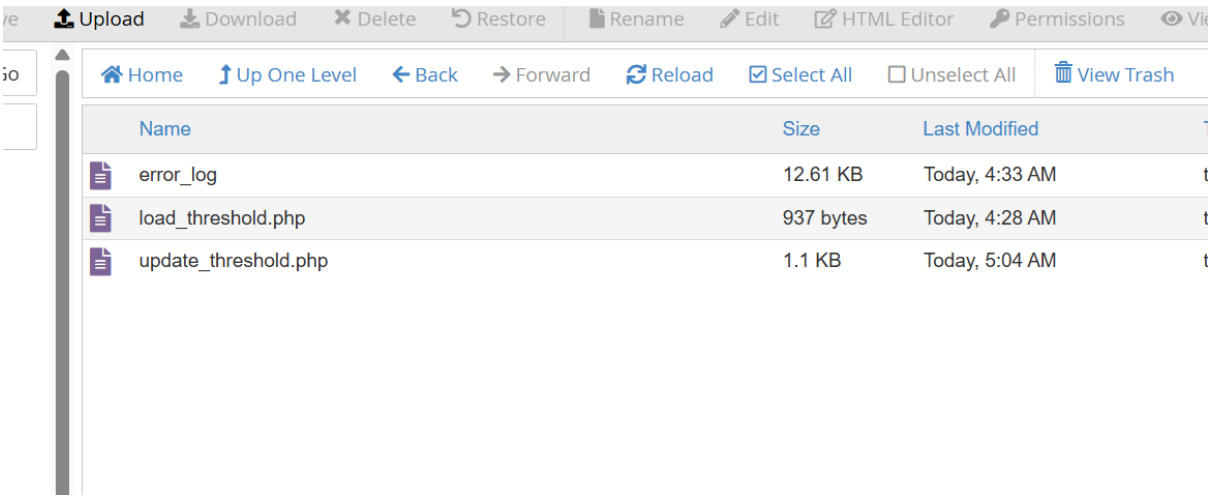
Name	Size	Last Modified	Type
relay_data	89 bytes	Today, 7:45 AM	httpd/unix-directory
threshold_data	77 bytes	Today, 5:04 AM	httpd/unix-directory
user_data	50 bytes	Yesterday, 4:21 PM	httpd/unix-directory
dbconnect.php	439 bytes	Today, 12:30 AM	text/x-generic
error_log	181 bytes	Yesterday, 3:42 AM	text/x-generic

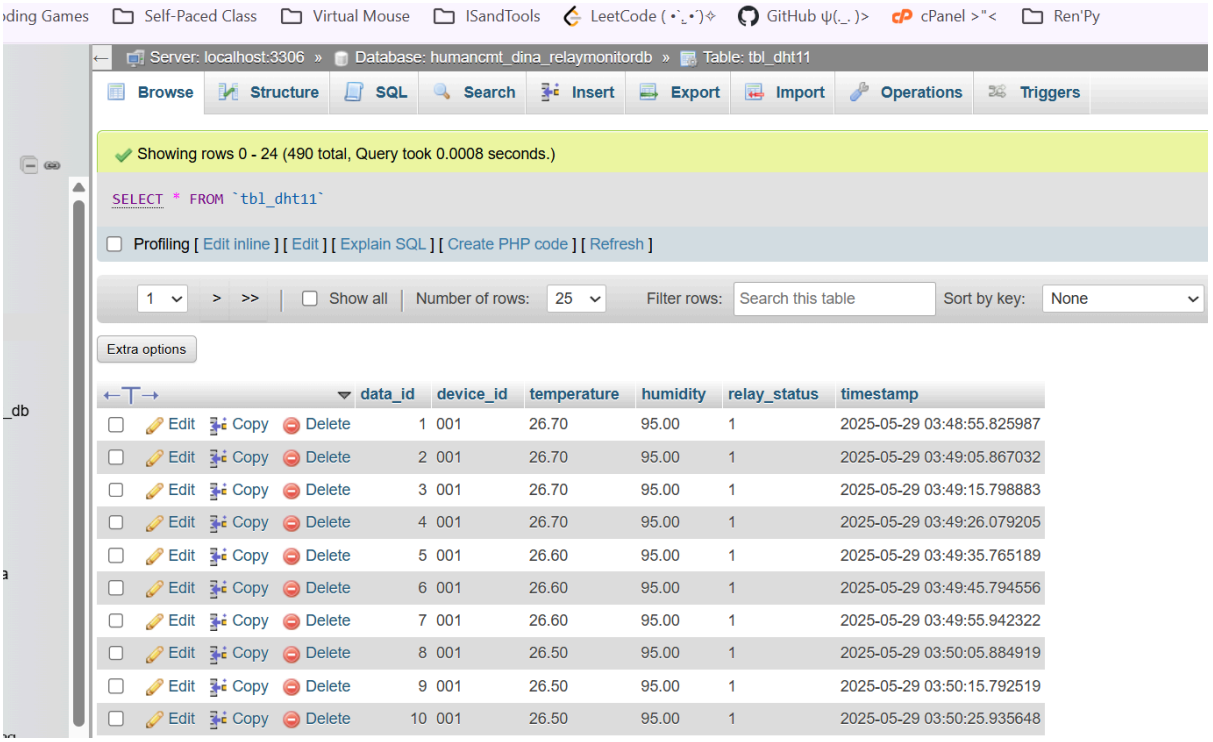


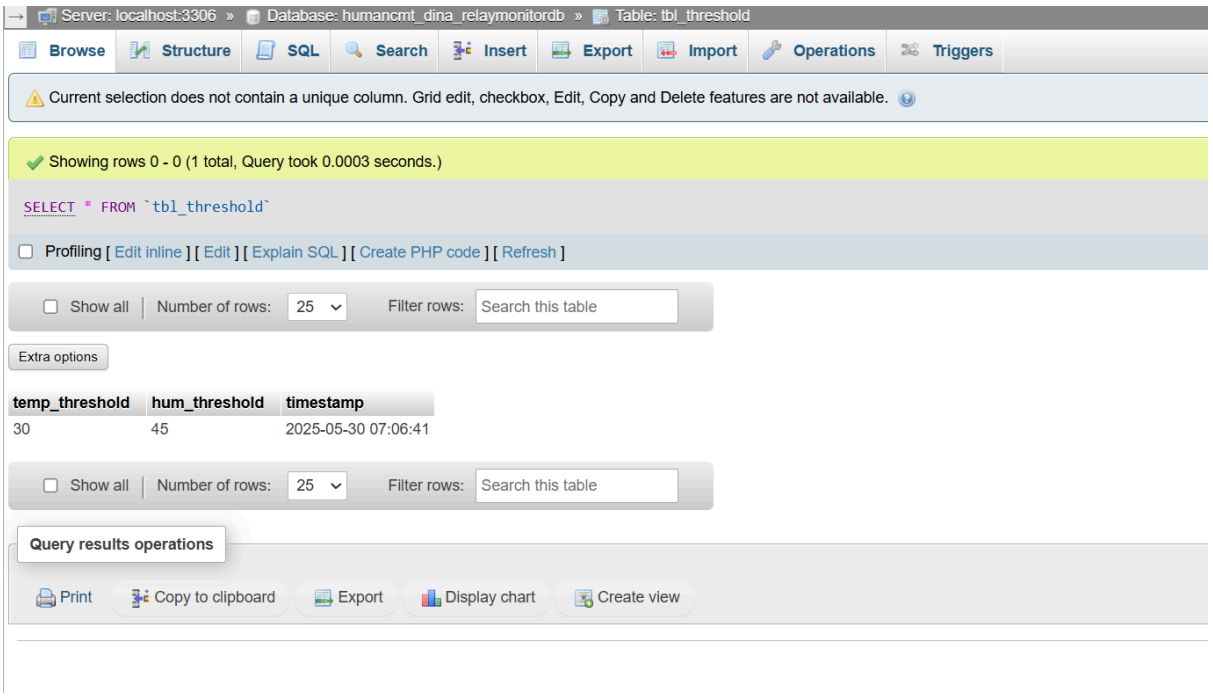
Home | Up One Level | Back | Forward | Reload | Select All | Unselect All | View Trash | Empty Tr

Name	Size	Last Modified	Type
error_log	191.92 KB	Today, 7:44 AM	text/x-generic
insert_data.php	513 bytes	Today, 7:45 AM	text/x-generic
load_data.php	2.77 KB	Today, 12:37 AM	text/x-generic
php_errors.log	7.92 KB	Today, 7:58 AM	text/x-log

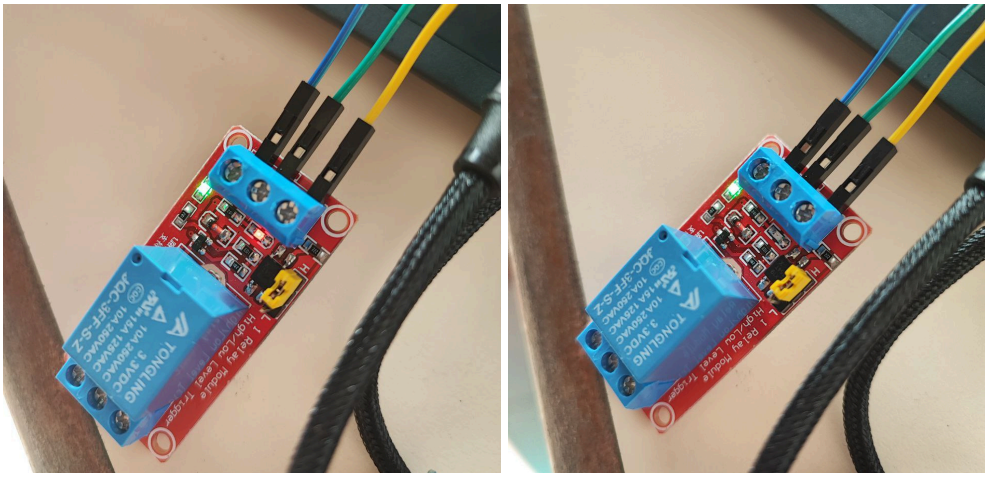
SENSOR-BASED SYSTEMS (STTHK3113) – MIDTERM EXAM



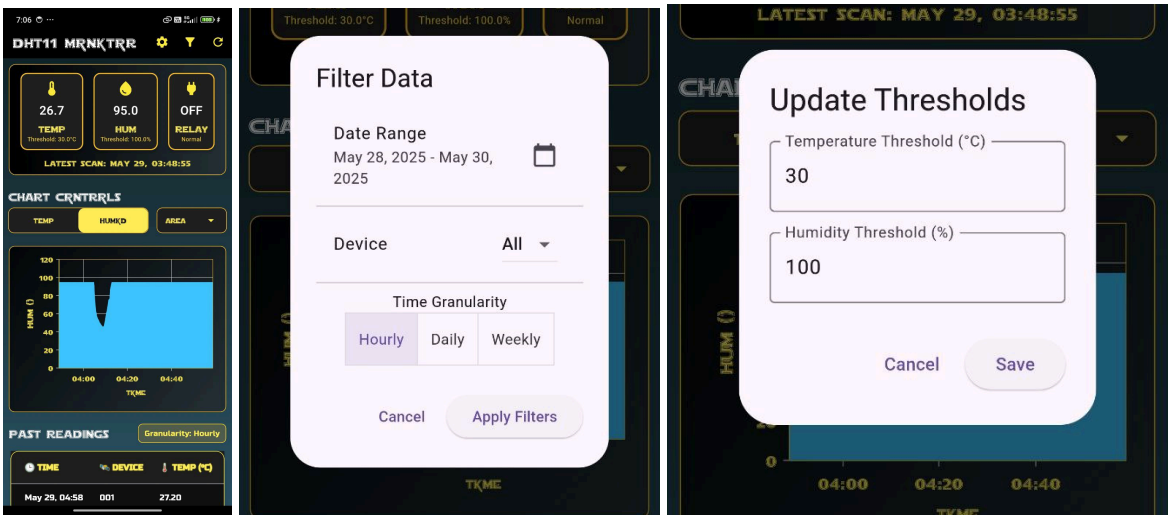


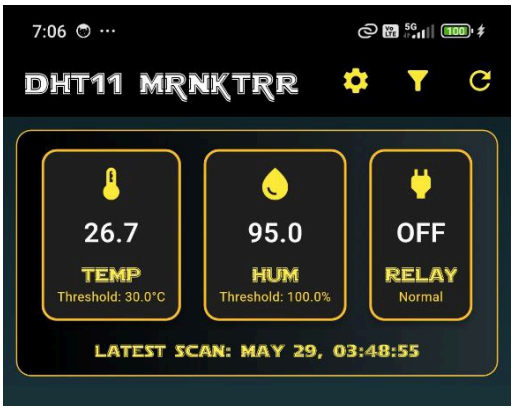

Server: localhost:3306 » Database: humancmt_dina_relaymonitordb » Table: tbl_threshold
Browse
Structure
SQL
Search
Insert
Export
Import
Operations
Triggers
Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.
Showing rows 0 - 0 (1 total, Query took 0.0003 seconds.)
SELECT * FROM `tbl_threshold`
Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]
Show all
Number of rows: 25
Filter rows: Search this table
Extra options
temp_threshold
hum_threshold
timestamp
30
45
2025-05-30 07:06:41
Show all
Number of rows: 25
Filter rows: Search this table
Query results operations
Print
Copy to clipboard
Export
Display chart
Create view

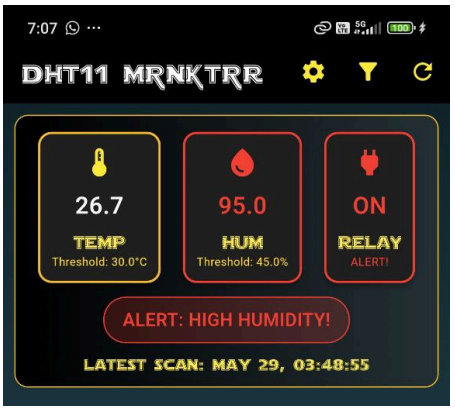
b. Relay

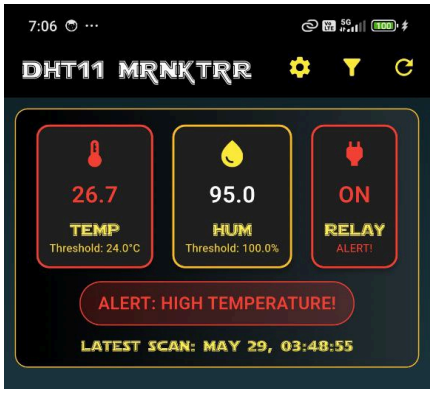

TONGLING
JQC-3FF-S-Z

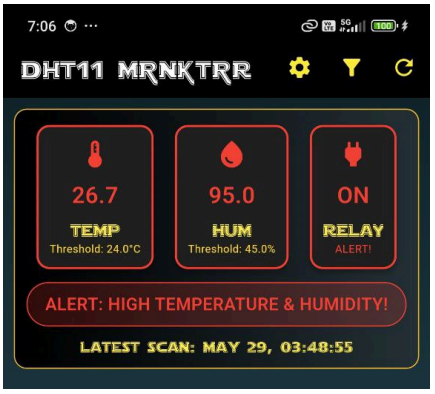
c. App

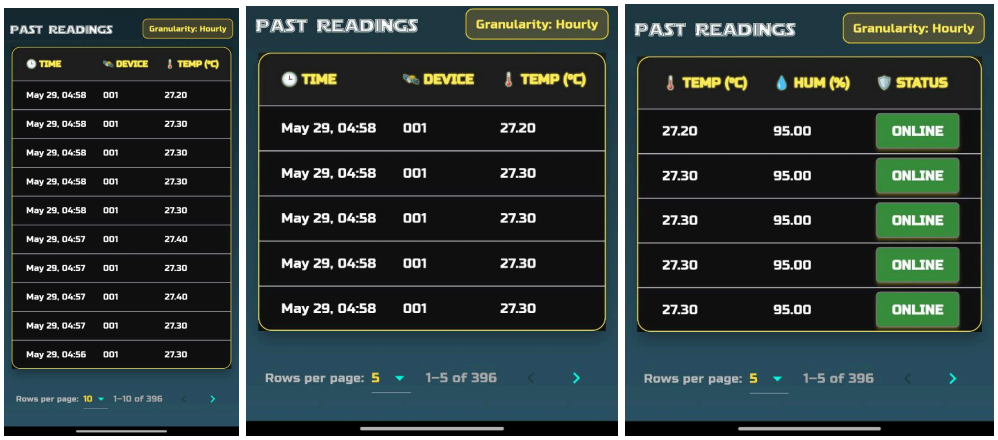

DHT11 MRNKTRR
26.7
TEMP
95.0
HUM
OFF
RELAY
LATEST SCAN: MAY 29, 03:48:55
CHART CRNTRRLS
PAST READINGS
Filter Data
Date Range
May 28, 2025 - May 30, 2025
Device
All
Time Granularity
Hourly
Daily
Weekly
Cancel
Apply Filters
Update Thresholds
Temperature Threshold (°C)
30
Humidity Threshold (%)
100
Cancel
Save


7:06
DHT11 MRNKTRR
26.7
TEMP
Threshold: 30.0°C
95.0
HUM
Threshold: 100.0%
OFF
RELAY
Normal
LATEST SCAN: MAY 29, 03:48:55


7:07
DHT11 MRNKTRR
26.7
TEMP
Threshold: 30.0°C
95.0
HUM
Threshold: 45.0%
ON
RELAY
ALERT!
ALERT: HIGH HUMIDITY!
LATEST SCAN: MAY 29, 03:48:55


7:06
DHT11 MRNKTRR
26.7
TEMP
Threshold: 24.0°C
95.0
HUM
Threshold: 100.0%
ON
RELAY
ALERT!
ALERT: HIGH TEMPERATURE!
LATEST SCAN: MAY 29, 03:48:55


7:06
DHT11 MRNKTRR
26.7
TEMP
Threshold: 24.0°C
95.0
HUM
Threshold: 45.0%
ON
RELAY
ALERT!
ALERT: HIGH TEMPERATURE & HUMIDITY!
LATEST SCAN: MAY 29, 03:48:55



4.0 Challenges and improvements

a. Challenges

Several technical complications arose as the project was being developed and were overcome. One challenge we faced was that it took too long for data to get from the Arduino to the app. This was corrected by having the

Arduino send data more efficiently and by upgrading Flutter's data handling. A further difficulty was the app showing outdated information when it couldn't connect with the server. This was fixed by including timers that check automatically for updates and by fixing errors to maintain smooth offline use. Data issues between charts and their raw data were resolved through regular parsing and thorough cabvnull checks. When working with many users, the app became much more responsive and quick thanks to pagination and lazy loading. Also, loading indicators and messages were incorporated into the UI to ensure users followed the progress of their data operations.

b. Improvements

In the future, the system can be made better to serve more needs and be more reliable. An important improvement would be notifying users right away when sensor readings fall outside the safe bounds. A feature to add different user types such as admin, technician and viewer, might improve the control of the system. If WebSockets substitute HTTP polling, real-time updates can be made more quickly. For safety, sending all information using HTTPS should be required. Improving the sensors by using the DHT22 would increase accuracy, while provides some protection against failures in the relays. A CSV or Excel export would enable users to look at their history of activity. Making these changes will strengthen the system and make it simpler to handle by users and more adaptable to wide adoption.