MFG 598: Lab12

From Sensor to Dashboard — Sense HAT Data Pipeline

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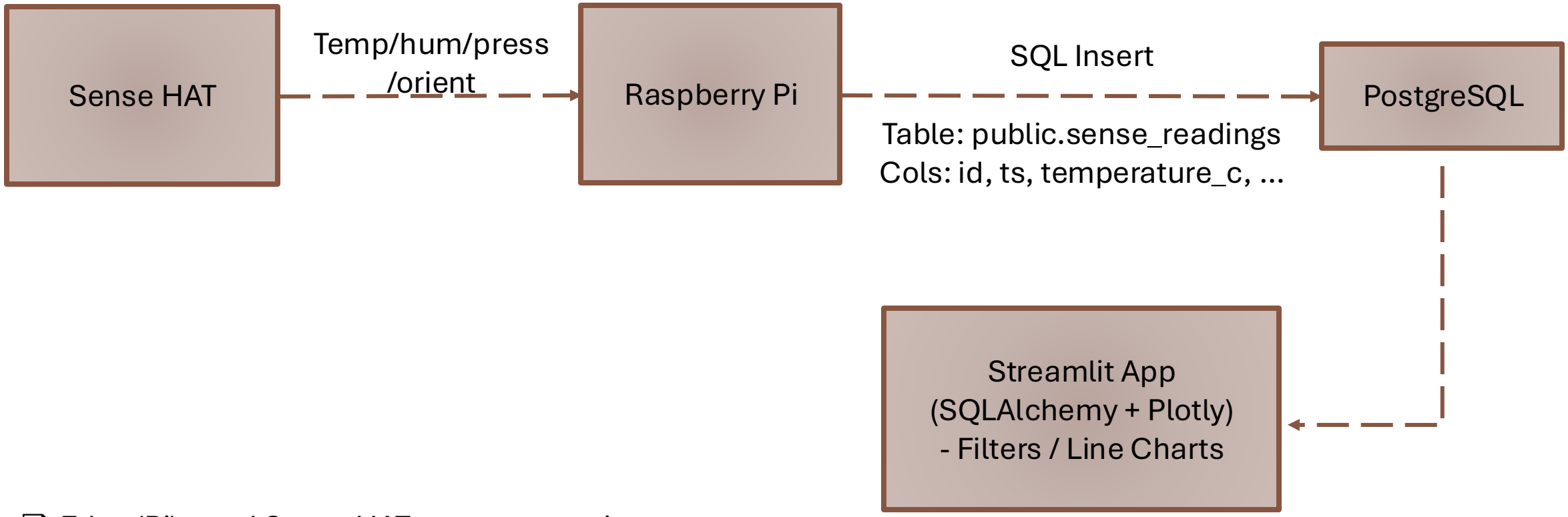
End-to-End IIoT Data Pipeline: Edge → Database → Visualization



- ❑ Edge (Pi): read Sense HAT; one row per timestamp.
- ❑ DB: append-only table keyed by ts.
- ❑ App: query by selected time window; re-render charts instantly.

Database table — PostgreSQL

	id [PK] bigint	received_at timestamp with time zone	local_time timestamp with time zone	topic text	qos smallint	retain boolean	payload text	sc te
1	1	2025-11-03 11:35:43.274411-...	2025-11-03 11:35:43.274411-...	MSN/group6/sens...	0	false	{"temperature": 34.69, "humidity": 24.21, "pressure": 976.06, "roll": 3.06, "pitch": 1.88, "yaw": 167.21, "ts": 17621949431...	0
2	2	2025-11-03 11:35:44.308423-...	2025-11-03 11:35:44.308423-...	MSN/group6/sens...	0	false	{"temperature": 34.6, "humidity": 23.15, "pressure": 976.04, "roll": 3.15, "pitch": 1.9, "yaw": 167.27, "ts": 1762194944166}	0
3	3	2025-11-03 11:35:45.340632-...	2025-11-03 11:35:45.340632-...	MSN/group6/sens...	0	false	{"temperature": 34.58, "humidity": 23.54, "pressure": 976.03, "roll": 3.19, "pitch": 1.91, "yaw": 167.1, "ts": 1762194945201}	0
4	4	2025-11-03 11:35:46.415565-...	2025-11-03 11:35:46.415565-...	MSN/group6/sens...	0	false	{"temperature": 34.56, "humidity": 23.3, "pressure": 976.03, "roll": 3.3, "pitch": 1.98, "yaw": 167.1, "ts": 1762194946235}	0
5	5	2025-11-03 11:35:47.413905-...	2025-11-03 11:35:47.413905-...	MSN/group6/sens...	0	false	{"temperature": 34.6, "humidity": 23.28, "pressure": 976.05, "roll": 3.27, "pitch": 1.91, "yaw": 167.1, "ts": 1762194947270}	0
6	6	2025-11-03 11:36:26.622908-...	2025-11-03 11:36:26.622908-...	MSN/group6/sens...	0	false	{"temperature": 34.5, "humidity": 23.15, "pressure": 976.03, "roll": 3.03, "pitch": 1.43, "yaw": 167.36, "ts": 1762194986486}	1
7	7	2025-11-03 11:36:27.689962-...	2025-11-03 11:36:27.689962-...	MSN/group6/sens...	0	false	{"temperature": 34.48, "humidity": 23.56, "pressure": 976.04, "roll": 3.03, "pitch": 1.35, "yaw": 167.31, "ts": 17621949875...	1
8	8	2025-11-03 11:36:28.705353-...	2025-11-03 11:36:28.705353-...	MSN/group6/sens...	0	false	{"temperature": 34.5, "humidity": 23.6, "pressure": 976.05, "roll": 3.2, "pitch": 1.31, "yaw": 167.39, "ts": 1762194988555}	1
9	9	2025-11-03 11:36:29.723373-...	2025-11-03 11:36:29.723373-...	MSN/group6/sens...	0	false	{"temperature": 34.52, "humidity": 23.76, "pressure": 976.08, "roll": 3.14, "pitch": 1.36, "yaw": 167.36, "ts": 17621949895...	1
10	10	2025-11-03 11:36:30.764349-...	2025-11-03 11:36:30.764349-...	MSN/group6/sens...	0	false	{"temperature": 34.58, "humidity": 23.65, "pressure": 976.07, "roll": 3.05, "pitch": 1.39, "yaw": 167.35, "ts": 17621949906...	1
11	11	2025-11-03 11:36:31.784241-...	2025-11-03 11:36:31.784241-...	MSN/group6/sens...	0	false	{"temperature": 34.5, "humidity": 23.63, "pressure": 976.08, "roll": 3.01, "pitch": 1.35, "yaw": 167.26, "ts": 1762194991659}	1
12	12	2025-11-03 11:36:32.829292-...	2025-11-03 11:36:32.829292-...	MSN/group6/sens...	0	false	{"temperature": 34.6, "humidity": 23.7, "pressure": 976.07, "roll": 3.45, "pitch": 1.26, "yaw": 167.33, "ts": 1762194992693}	1
13	13	2025-11-03 11:36:33.86889-07	2025-11-03 11:36:33.86889-07	MSN/group6/sens...	0	false	{"temperature": 34.54, "humidity": 23.5, "pressure": 976.07, "roll": 3.42, "pitch": 1.32, "yaw": 167.3, "ts": 1762194993728}	1
14	14	2025-11-03 11:36:34.905903-...	2025-11-03 11:36:34.905903-...	MSN/group6/sens...	0	false	{"temperature": 34.62, "humidity": 23.61, "pressure": 976.08, "roll": 3.41, "pitch": 1.21, "yaw": 167.33, "ts": 17621949947...	1
15	15	2025-11-03 11:36:35.933479-...	2025-11-03 11:36:35.933479-...	MSN/group6/sens...	0	false	{"temperature": 34.46, "humidity": 23.14, "pressure": 976.07, "roll": 3.41, "pitch": 1.35, "yaw": 167.26, "ts": 17621949957...	1
16	16	2025-11-03 11:36:36.975328-...	2025-11-03 11:36:36.975328-...	MSN/group6/sens...	0	false	{"temperature": 34.58, "humidity": 23.77, "pressure": 976.06, "roll": 3.21, "pitch": 1.37, "yaw": 167.29, "ts": 17621949968...	1
17	17	2025-11-03 11:36:38.037354-...	2025-11-03 11:36:38.037354-...	MSN/group6/sens...	0	false	{"temperature": 34.6, "humidity": 23.49, "pressure": 976.06, "roll": 3.33, "pitch": 1.25, "yaw": 167.3, "ts": 1762194997866}	1
18	18	2025-11-03 11:36:39.047841-...	2025-11-03 11:36:39.047841-...	MSN/group6/sens...	0	false	{"temperature": 34.58, "humidity": 23.74, "pressure": 976.08, "roll": 3.36, "pitch": 1.24, "yaw": 167.2, "ts": 1762194998900}	1
19	19	2025-11-03 11:36:40.076291-...	2025-11-03 11:36:40.076291-...	MSN/group6/sens...	0	false	{"temperature": 34.5, "humidity": 23.55, "pressure": 976.08, "roll": 3.32, "pitch": 1.32, "yaw": 167.21, "ts": 1762194999935}	1
20	20	2025-11-03 11:36:41.109717-...	2025-11-03 11:36:41.109717-...	MSN/group6/sens...	0	false	{"temperature": 34.62, "humidity": 23.4, "pressure": 976.08, "roll": 3.32, "pitch": 1.32, "yaw": 167.24, "ts": 1762195000969}	1
21	21	2025-11-03 11:36:42.14699-07	2025-11-03 11:36:42.14699-07	MSN/group6/sens...	0	false	{"temperature": 34.6, "humidity": 23.63, "pressure": 976.07, "roll": 3.21, "pitch": 1.32, "yaw": 167.17, "ts": 1762195002004}	1
22	22	2025-11-03 11:36:43.178041-...	2025-11-03 11:36:43.178041-...	MSN/group6/sens...	0	false	{"temperature": 34.6, "humidity": 23.53, "pressure": 976.07, "roll": 3.16, "pitch": 1.29, "yaw": 167.22, "ts": 1762195003038}	1
23	23	2025-11-03 11:36:44.213954-...	2025-11-03 11:36:44.213954-...	MSN/group6/sens...	0	false	{"temperature": 34.69, "humidity": 23.33, "pressure": 976.11, "roll": 3.25, "pitch": 1.27, "yaw": 167.3, "ts": 1762195004073}	1

Retrieve and Visualize — Streamlit

Stop Deploy

Filters

Time window (minutes)

- Full recording
- Last 1 min
- Last 2 min
- Last 3 min
- Last 5 min

Smoothing (downsample)

5s mean

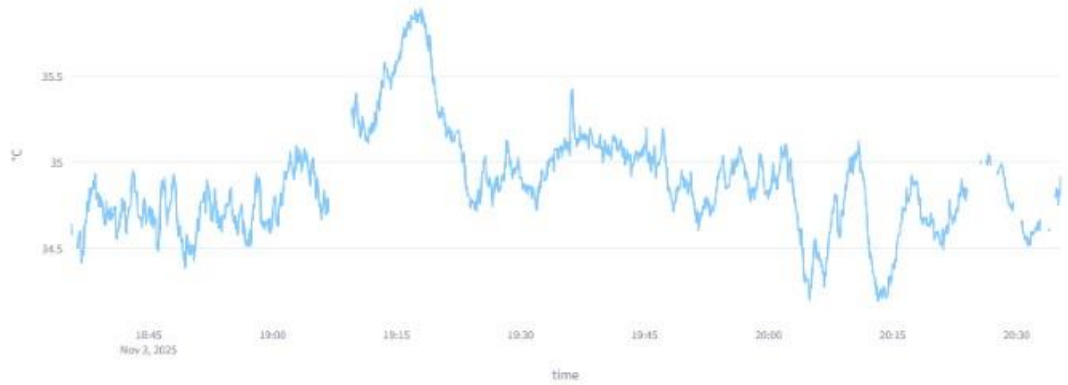
Retrieve

Sense HAT Dashboard (DB-backed)

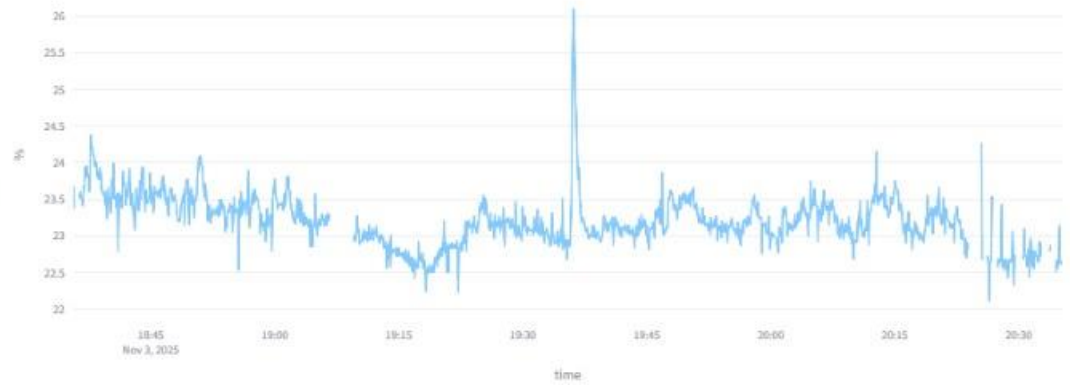
Temperature (°C)	Humidity (%)	Pressure (hPa)	Time span
34.95	22.58	974.23	119.6 min

Latest data

Temperature (°C)

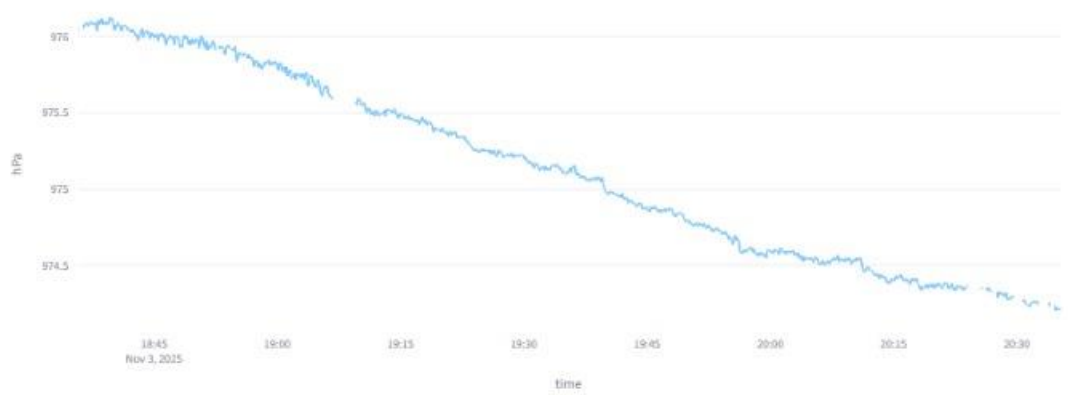
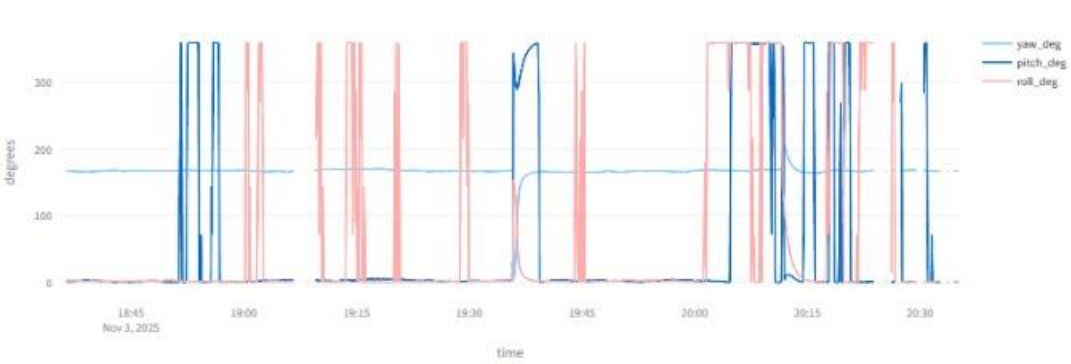


Humidity (%)



Charts

Pressure (hPa)



Orientation (Yaw / Pitch / Roll, °)