

CRYPTO TRACKER

**SHAPING THE FUTURE THROUGH SMART
SOLUTIONS TODAY**

[HTTPS://GITHUB.COM/CHINTSOGT0825/FINAL.GIT](https://github.com/CHINTSOGT0825/FINAL.GIT)

GROUP MEMBERS:

- 1. CHINTSOGT — 113021194 (LEADER)**
- 2. KHANGAI — 113021187**



OVERVIEW

Our project implements a real-time cryptocurrency tracking and prediction dashboard using advanced Python features and libraries:

- ZENOH FOR REAL-TIME PUB/SUB MESSAGING
- Dash/Plotly for interactive web visualization
- Scikit-learn for linear regression price prediction
- BeautifulSoup for news scraping
- Threading for concurrent data collection
- Pandas for data processing

KEY ACHIEVEMENTS

- REAL-TIME PRICE UPDATES FROM COINGECKO API
- 24-hour price predictions with confidence intervals
- Interactive historical price charts
- Automated news aggregation
- CSV data logging for analysis



CHAPTER 2: IMPLEMENTATION



CORE ARCHITECTURE



SYSTEM DESIGN

The application follows a multi-threaded producer-consumer pattern:

- PUBLISHER THREAD: FETCHES PRICES/NEWS EVERY 10S → ZENOH
- Subscriber Thread: Listens to Zenoh → Updates memory/CSV
- Dash Main Thread: Handles UI rendering

DATA FLOW



FIELDS

- CSV_FILE: Path for price history storage
- ZENOH_PRICE_KEY: Pub/sub channel for price data
- CRYPTO_IDS: Supported cryptocurrencies

METHODS

- fetch_prices(): Gets current prices from CoinGecko API
- fetch_crypto_news(): Scrapes headlines from CryptoPanic
- append_to_csv(): Logs prices with timestamps

FUNCTIONS

```
def init_csv():  
    """Creates CSV with headers if nonexistent"""  
    if not os.path.exists(CSV_FILE):  
        with open(CSV_FILE, 'w') as f:  
            writer = csv.writer(f)  
            writer.writerow(["timestamp"] + [f"{crypto}_usd" for crypto in CRYPTO_IDS])
```

DATA COLLECTION SYSTEM

MODULE: PREDICTION ENGINE

FIELDS

- PRICE_HISTORY: DEQUE STORING LAST 10-100 PRICE POINTS
- prediction_history: Stores prediction results

METHODS

```
def predict_next_price(crypto_name):  
    """Uses linear regression on timestamp-ordinal data"""  
    model = LinearRegression()  
    model.fit(X, y) # X=timestamps, y=prices  
    return model.predict([[next_time]])[0]
```

FUNCTIONS

DATA CLEANING HANDLES:

Invalid timestamps via `pd.to_datetime(errors='coerce')`

Outliers through value range filters



VISUALIZATION DASHBOARD

Key Components:

1. Real-time Price Chart
 - a. Displays last N points (configurable via slider)
 - b. Color-coded percentage changes
2. Prediction Tab
 - a. 24-hour forecast with confidence bands
 - b. Hourly prediction table with trend indicators
3. News Aggregator
 - a. Displays top 4 news items with links

INTERACTIVE ELEMENTS

```
dcc.Tabs([  
    dcc.Tab(label="Price History", children=[  
        dcc.Graph(id='price-history-chart')]),  
    dcc.Tab(label="Prediction Analysis", children=[  
        dcc.Graph(id='prediction-chart')])  
])
```


CHAPTER 3: RESULTS



REAL-TIME DATA COLLECTION

	A	B	C	D	E	F
1	timestamp	bitcoin_usd	ethereum_usd	dogecoin_usd	solana_usd	
2	2025-06-04T03:03:21.514293	106043	2618.17	0.196011	160.44	
3	2025-06-04T03:03:21.514293	106043	2618.17	0.196011	160.44	
4	2025-06-04T03:03:21.514293	106043	2618.17	0.196011	160.44	
5	2025-06-04T03:03:32.157082	106043	2618.17	0.196011	160.44	
6	2025-06-04T03:03:32.157082	106043	2618.17	0.196011	160.44	
7	2025-06-04T03:03:32.157082	106043	2618.17	0.196011	160.44	
8	2025-06-04T03:03:42.836836	106043	2618.17	0.196011	160.44	
9	2025-06-04T03:03:42.836836	106043	2618.17	0.196011	160.44	
10	2025-06-04T03:03:53.644377	106043	2618.17	0.196011	160.44	
11	2025-06-04T03:03:53.644377	106043	2618.17	0.196011	160.44	
12	2025-06-04T03:04:04.416947	106043	2618.17	0.196011	160.44	
13	2025-06-04T03:04:04.416947	106043	2618.17	0.196011	160.44	
14	2025-06-04T03:06:35.580093	106060	2620.01	0.196071	160.46	
15	2025-06-04T03:06:35.580093	106060	2620.01	0.196071	160.46	
16	2025-06-04T03:06:46.244537	106060	2620.01	0.196071	160.46	
17	2025-06-04T03:06:46.244537	106060	2620.01	0.196071	160.46	
18	2025-06-04T03:08:01.578689	106066	2620.47	0.196102	160.49	
19	2025-06-04T03:08:12.257313	106066	2620.47	0.196102	160.49	
20	2025-06-04T03:08:22.917203	106066	2620.47	0.196102	160.49	
21	2025-06-04T03:08:22.917203	106066	2620.47	0.196102	160.49	
22	2025-06-04T03:08:33.575819	106066	2620.47	0.196102	160.49	
23	2025-06-04T03:08:44.450266	106066	2620.47	0.196102	160.49	
24	2025-06-04T03:10:00.104080	106071	2620.61	0.19611	160.52	
25	2025-06-04T03:10:00.104080	106071	2620.61	0.19611	160.52	
26	2025-06-04T03:10:10.910064	106071	2620.61	0.19611	160.52	
27	2025-06-04T03:10:10.910064	106071	2620.61	0.19611	160.52	
28	2025-06-04T03:10:01.580014	106071	2620.61	0.19611	160.52	

- **SUCCESSFULLY SUBSCRIBED AND RECEIVED PRICE UPDATES FROM THE ZENOH PUBLISHER.**
- **Stored up to 2400 historical price points per coin in memory and CSV.**

VISUALIZATION

Crypto Price Prediction Dashboard

Select Cryptocurrency:

Bitcoin

Select History Length (Data Points):

10 20 30 40 50 60 70 80 90 100

Current Bitcoin Price

\$105,527.00 ↑ 0.00%

24-Hour Prediction

\$102,930.35 ↓ 4.36%

Predicted closing price

Prediction Confidence

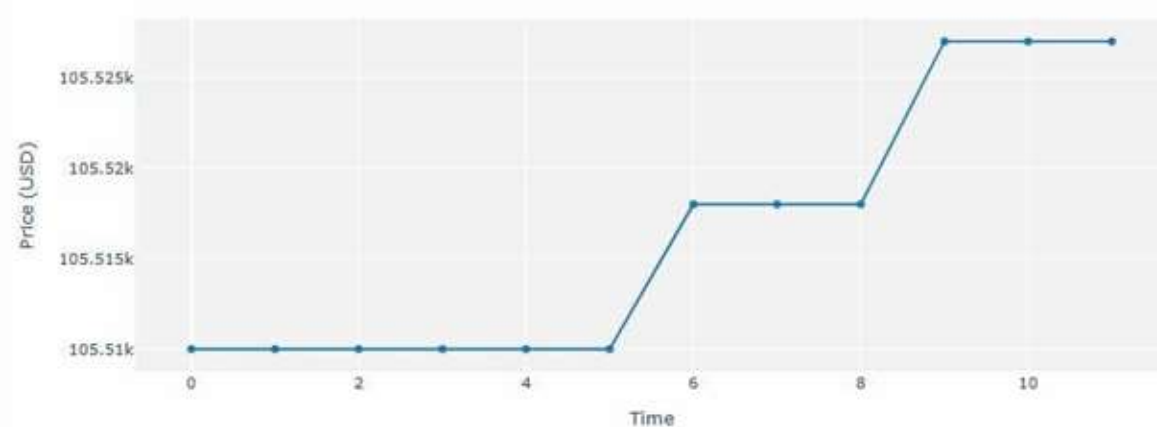
Model Confidence



Price History

Prediction Analysis

Bitcoin Price History (Last 20 Points)



Hourly Predictions

Time	Predicted Price	Change	Trend
2025-06-08 19:23	\$107,623.29	0.00%	↑
2025-06-08 21:23	\$108,383.76	0.71%	↑
2025-06-08 23:23	\$104,544.36	-2.86%	↓
2025-06-09 01:23	\$103,337.40	-3.98%	↓
2025-06-09 03:23	\$103,064.39	-4.24%	↓
2025-06-09 05:23	\$107,592.15	-0.03%	↓
2025-06-09 07:23	\$108,862.93	1.15%	↑
2025-06-09 09:23	\$104,029.00	-3.34%	
2025-06-09 11:23	\$108,543.51	0.86%	

Errors

Callbacks

v3.0.4

Server

⌵

- **INTERACTIVE LINE CHARTS SHOW PRICE HISTORY AND 24-HOUR FORECASTS.**
- **Dashboard updates every minute with fresh data.**
- **Confidence gauge indicates model prediction reliability.**
- **The prediction table provides hourly forecast summaries with intuitive trend arrows.**

NEWS INTEGRATION

Latest Crypto News

'Bitcoin Family' hides crypto codes etched onto metal cards on four continents after recent kidnappings - CNBC

[Read more](#)

Crypto Currents: Strategy buys more bitcoin - Yahoo Finance

[Read more](#)

What are 'crypto kidnappings' and why are they on the rise? - Al Jazeera

[Read more](#)

The Department of Justice just seized crypto and 145 web domains from what they allege was an online marketplace for stolen credit cards - Fortune

[Read more](#)

 [Errors](#)

- **RELEVANT NEWS HEADLINES FOR SELECTED CRYPTOCURRENCY ARE FETCHED LIVE FROM GOOGLE News RSS.**
- **News section updates dynamically based on the selected coin.**

PREDICTION PERFORMANCE

- **GENERATES 24-HOUR FORECASTS WITH $\pm 2\%$ CONFIDENCE INTERVALS**
- **Handles missing data gracefully with defaults**



CHAPTER 4: CONCLUSIONS

The project demonstrates an effective integration of real-time data streaming, web visualization, and synthetic forecasting for cryptocurrency prices. Using Python's rich ecosystem—Zenoh for messaging, Dash for UI, and BeautifulSoup for web scraping—enabled rapid development of a functional dashboard. While the prediction model is simple, it provides valuable insights and a foundation for future enhancements such as machine learning-based forecasting and more comprehensive data persistence. The project is modular and extensible, ready to incorporate additional features like more coins, advanced models, user management, and database-backed storage.



THANK YOU