TECHNICAL SPECIFICATION SHEET

Product: Institutional-Grade Crypto Trading Bot

Version: Professional Enterprise System

Classification: Advanced Algorithmic Trading Platform

SYSTEM OVERVIEW

\*\*ARCHITECTURE SUMMARY\*\*

\*\*Type:\*\* Hybrid AI/ML Trading Platform

\*\*Design:\*\* Modular, Scalable, Enterprise-Ready

\*\*Deployment:\*\* Self-hosted, Cloud-Ready

\*\*License:\*\* Professional/Enterprise Source Code

🖥 SYSTEM REQUIREMENTS

\*\*MINIMUM REQUIREMENTS\*\*

\*\*OS:\*\* Windows 10/11, Linux Ubuntu 18+, macOS 10.15+

\*\*RAM:\*\* 8GB (16GB recommended)

\*\*CPU:\*\* Intel i5/AMD Ryzen 5 (8+ cores recommended)

\*\*Storage:\*\* 10GB free space (SSD recommended)

\*\*Network:\*\* Stable internet connection (low latency preferred)

\*\*RECOMMENDED SPECIFICATIONS\*\*

\*\*OS:\*\* Windows 11 Pro, Ubuntu 22.04 LTS

\*\*RAM:\*\* 32GB DDR4

\*\*CPU:\*\* Intel i7/AMD Ryzen 7 (16+ cores)

\*\*Storage:\*\* 100GB SSD NVMe

\*\*Network:\*\* Fiber/Business internet (< 50ms latency)

TECHNICAL STACK

\*\*BACKEND TECHNOLOGIES\*\*

🐍 Python 3.8+

├── FastAPI (High-performance API framework)

├── SQLite/PostgreSQL (Database management)

├── Pandas/NumPy (Data processing)

├── Scikit-learn (Machine learning)

├── LightGBM/XGBoost (Gradient boosting)

├── Requests (API communication)

├── Schedule (Task automation)

└── Logging (System monitoring)

\*\*FRONTEND TECHNOLOGIES\*\*

Plotly Dash

├── Bootstrap 5 (UI framework)

├── Plotly.js (Interactive charts)

├── Dash Bootstrap Components

├── JavaScript (Client-side interactions)

├── CSS3 (Custom styling)

└── HTML5 (Structure & layout)

\*\*AI/ML LIBRARIES\*\*

Machine Learning Stack

├── Scikit-learn (Core ML algorithms)

├── LightGBM (Gradient boosting)

├── XGBoost (Extreme gradient boosting)

├── Pandas (Data manipulation)

├── NumPy (Numerical computing)

├── Joblib (Model persistence)

└── Feature-engine (Feature engineering)

AI/ML SYSTEM ARCHITECTURE

\*\*HYBRID LEARNING ORCHESTRATOR\*\*

ENSEMBLE SYSTEM

├── Batch Models (70% weight)

│ ├── LightGBM Classifier

│ ├── Random Forest Classifier

│ └── XGBoost Classifier

├── Online Learning Models (30% weight)

│ ├── SGD Classifier

│ ├── Passive Aggressive Classifier

│ └── MLP Neural Network

└── Transfer Learning System

├── Knowledge Transfer

├── Regime Detection

└── Model Adaptation

\*\*MODEL FEATURES\*\*

\*\*Input Features:\*\* 50+ technical indicators

\*\*Target Prediction:\*\* Binary classification (Buy/Sell)

\*\*Training Data:\*\* Historical OHLCV + volume data

\*\*Update Frequency:\*\* Online (30 min), Batch (24 hours)

\*\*Performance Tracking:\*\* Real-time accuracy monitoring

DATA MANAGEMENT

\*\*DATA SOURCES\*\*

\*\*Primary:\*\* Binance API (spot & futures)

\*\*Timeframes:\*\* 1m, 5m, 15m, 1h, 4h, 1d

\*\*Symbols:\*\* BTC, ETH, major altcoins

\*\*Historical:\*\* 2+ years of data storage

\*\*DATABASE SCHEMA\*\*

CORE TABLES

├── trades (transaction records)

├── market\_data (OHLCV data)

├── predictions (ML model outputs)

├── portfolio (balance tracking)

├── notifications (alert system)

├── model\_performance (ML metrics)

└── system\_logs (monitoring data)

\*\*DATA PIPELINE\*\*

FLOW: API → Validation → Processing → Storage → ML → Predictions

TRADING FEATURES

\*\*TRADING CAPABILITIES\*\*

\*\*Spot Trading\*\* - Traditional buy/sell operations

\*\*Futures Trading\*\* - Leveraged positions (up to 10x)

\*\*Auto Trading\*\* - Automated strategy execution

\*\*Manual Trading\*\* - User-controlled operations

\*\*Virtual Trading\*\* - Risk-free paper trading

\*\*Backtesting\*\* - Historical strategy validation

\*\*SUPPORTED EXCHANGES\*\*

\*\*Binance\*\* (Spot & Futures) - Full integration

\*\*Coinbase\*\* - Planned integration

\*\*Kraken\*\* - Planned integration

\*\*FTX\*\* - Future consideration

\*\*ORDER TYPES\*\*

Market Orders

Limit Orders

Stop Loss Orders

Take Profit Orders

OCO (One-Cancels-Other)

Trailing Stop

RISK MANAGEMENT

\*\*POSITION SIZING\*\*

\*\*Kelly Criterion\*\* - Optimal bet sizing

\*\*Fixed Percentage\*\* - Conservative approach

\*\*Volatility Scaling\*\* - Risk-adjusted sizing

\*\*Maximum Position\*\* - Hard limits

\*\*Portfolio Limits\*\* - Total exposure control

\*\*RISK CONTROLS\*\*

\*\*Stop Loss\*\* - Automatic loss limitation

\*\*Take Profit\*\* - Profit securing

\*\*Maximum Drawdown\*\* - Portfolio protection

\*\*Position Limits\*\* - Single trade caps

\*\*Correlation Limits\*\* - Diversification rules

\*\*MONITORING\*\*

\*\*Real-time Risk Metrics\*\* - Live monitoring

\*\*Risk Dashboard\*\* - Visual indicators

\*\*Alert System\*\* - Threshold notifications

\*\*Performance Attribution\*\* - Risk/return analysis

USER INTERFACE

\*\*DASHBOARD COMPONENTS\*\*

🖥 MAIN INTERFACE

├── Real-time Trading Dashboard

├── Portfolio Management Panel

├── AI/ML Control Center

├── Risk Management Interface

├── Performance Analytics

├── Notification Center

└── System Configuration

\*\*KEY FEATURES\*\*

\*\*Responsive Design\*\* - Works on all devices

\*\*Real-time Updates\*\* - Live data streaming

\*\*Interactive Charts\*\* - Advanced visualizations

\*\*Customizable Layout\*\* - User preferences

\*\*Dark/Light Themes\*\* - Visual comfort

\*\*Multi-tab Interface\*\* - Organized workflow

SECURITY & COMPLIANCE

\*\*SECURITY MEASURES\*\*

\*\*API Key Encryption\*\* - Secure credential storage

\*\*HTTPS Communication\*\* - Encrypted data transfer

\*\*Input Validation\*\* - XSS/injection prevention

\*\*Error Handling\*\* - Secure error management

\*\*Audit Logging\*\* - Complete activity tracking

\*\*Access Controls\*\* - User authentication

\*\*DATA PROTECTION\*\*

\*\*Local Storage\*\* - No cloud data exposure

\*\*Encrypted Databases\*\* - Secure data at rest

\*\*Secure APIs\*\* - Protected communications

\*\*Privacy Controls\*\* - Data anonymization

\*\*Backup Systems\*\* - Data recovery options

PERFORMANCE SPECIFICATIONS

\*\*SYSTEM PERFORMANCE\*\*

\*\*API Response Time:\*\* < 100ms average

\*\*Data Processing:\*\* 10,000+ records/second

\*\*Model Inference:\*\* < 50ms per prediction

\*\*UI Updates:\*\* Real-time (2-second intervals)

\*\*Memory Usage:\*\* 2-8GB typical operation

\*\*CPU Usage:\*\* 10-30% during normal operation

\*\*TRADING PERFORMANCE\*\*

\*\*Order Execution:\*\* < 500ms from signal

\*\*Data Latency:\*\* < 1 second from exchange

\*\*Uptime Target:\*\* 99.9% availability

\*\*Error Rate:\*\* < 0.1% transaction errors

\*\*Recovery Time:\*\* < 30 seconds from failure

INSTALLATION & SETUP

\*\*INSTALLATION PROCESS\*\*

1. Prerequisites - Python 3.8+, pip, git

2. Download - Source code package

3. Dependencies - pip install requirements

4. Configuration - API keys, settings

5. Database - Initial setup & migration

6. Testing - Verification & validation

7. Launch - System startup

\*\*CONFIGURATION FILES\*\*

📁 CONFIG STRUCTURE

├── config.py (Main settings)

├── api\_config.py (Exchange settings)

├── ml\_config.py (AI/ML parameters)

├── risk\_config.py (Risk management)

├── email\_config.py (Notifications)

└── database\_config.py (Data settings)

\*\*DEPLOYMENT OPTIONS\*\*

\*\*Local Development\*\* - Single machine setup

\*\*Production Server\*\* - Dedicated hardware

\*\*Cloud Deployment\*\* - AWS, GCP, Azure

\*\*Docker Container\*\* - Containerized deployment

\*\*Kubernetes\*\* - Orchestrated scaling

🎓 DOCUMENTATION & SUPPORT

\*\*INCLUDED DOCUMENTATION\*\*

📖 \*\*Installation Guide\*\* - Step-by-step setup

\*\*User Manual\*\* - Complete operation guide

\*\*Technical Reference\*\* - API documentation

\*\*Strategy Guide\*\* - Trading methodology

🛠 \*\*Troubleshooting\*\* - Problem resolution

\*\*Performance Tuning\*\* - Optimization guide

\*\*SUPPORT MATERIALS\*\*

🎥 \*\*Video Tutorials\*\* - Visual learning

💬 \*\*FAQ Database\*\* - Common questions

📧 \*\*Email Support\*\* - Technical assistance

\*\*Update Notifications\*\* - Version releases

\*\*Customization Guide\*\* - Modification help

UPDATE & MAINTENANCE

\*\*UPDATE SYSTEM\*\*

\*\*Automatic Checks\*\* - Version monitoring

\*\*Manual Updates\*\* - Controlled upgrades

\*\*Rollback Support\*\* - Previous version restore

\*\*Testing Framework\*\* - Update validation

\*\*Backup Creation\*\* - Pre-update protection

\*\*MAINTENANCE FEATURES\*\*

\*\*Health Monitoring\*\* - System status checks

\*\*Performance Logging\*\* - Optimization data

\*\*Error Tracking\*\* - Issue identification

\*\*Database Cleanup\*\* - Storage optimization

\*\*Cache Management\*\* - Performance tuning

INTEGRATION CAPABILITIES

\*\*API INTEGRATIONS\*\*

\*\*Exchange APIs\*\* - Trading connectivity

\*\*Data Providers\*\* - Market data feeds

\*\*Notification Services\*\* - Alert systems

\*\*Cloud Storage\*\* - Backup solutions

\*\*Analytics Platforms\*\* - External analysis

\*\*EXTENSIBILITY\*\*

\*\*Plugin Architecture\*\* - Custom modules

\*\*Strategy Framework\*\* - User algorithms

\*\*Indicator Library\*\* - Technical analysis

\*\*Model Integration\*\* - Custom AI/ML

\*\*Dashboard Widgets\*\* - UI extensions

TECHNICAL SPECIFICATIONS SUMMARY

\*\*SYSTEM RATINGS\*\*

\*\*Performance:\*\* 9.8/10

\*\*Reliability:\*\* 9.6/10

\*\*Scalability:\*\* 9.5/10

\*\*Security:\*\* 9.4/10

\*\*Usability:\*\* 9.2/10

\*\*Maintainability:\*\* 9.7/10

\*\*IDEAL FOR:\*\*

Hedge funds & investment firms

High net worth crypto traders

Quantitative trading companies

Technology-savvy investors

Research institutions

Trading education providers

Document Classification: Technical Specification

Audience: Technical Decision Makers

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