1. Executive Summary & Purpose

Turbo Bot is a next-generation desktop application designed to empower users with fast, safe, and flexible trading of Solana tokens. By combining a modern, intuitive graphical user interface (GUI) with a powerful automated trading engine, Turbo Bot enables both novice and advanced crypto traders to participate in the rapidly evolving Solana ecosystem. The application supports both simulation (paper trading) and real-wallet trading, making it an ideal tool for learning, strategy development, and live execution. Turbo Bot's mission is to democratize access to advanced trading tools, reduce the risks of manual sniping, and provide a seamless, enjoyable user experience.

2. Target Audience & Market Rationale

Turbo Bot is built for:

- Crypto traders and enthusiasts seeking to capitalize on new Solana token launches and market opportunities.
- Beginners who want a safe, risk-free environment to learn trading strategies using simulation mode.
- Advanced users who require speed, automation, and granular control for real-wallet trading.
- Anyone frustrated by command-line tools or complex scripts, and who prefers a visually appealing, easy-to-use desktop application.

Market Rationale:

- The Solana ecosystem is fast-growing, with new tokens launching daily. Early access and automation are critical for success.
- Most existing tools are either too technical (CLI-based) or lack robust automation and risk controls.
- There is a strong demand for user-friendly, secure, and feature-rich trading bots that lower the barrier to entry.

3. Product Features & Requirements

3.1. User Interface (GUI)

Turbo Bot's interface is designed for clarity, speed, and ease of use, with a modern dark theme and Turbo branding. The sidebar navigation provides quick access to all major sections:

- Dashboard: Real-time overview of open/closed trades, PnL, win rate, and status.
- Settings: Configure all trading parameters, wallet details, and risk filters.
- Manual Buy: Instantly buy any Solana token by address, with live info and validation.
- Logs: View all bot actions, errors, and status updates in real time.
- License: Manage activation and view license status.
- About: App version, company info, support, and branding.

3.1.1. Settings

- Mode Selection: Toggle between Simulation (paper trading) and Real Wallet (live trading).
- Wallet Settings: Secure input for private key or seed phrase (hidden in simulation mode).
- Trading Settings:
    - Take Profit (%)
    - Stop Loss (%)
    - Min Liquidity (USD)
    - Min 5m Volume (USD)
    - Max Price (USD)
    - Min/Max Pair Age (seconds)
    - Min Buys (5m)
    - Min Tx Ratio
    - Duration (minutes)
    - Min % Burned
    - Require Immutable (checkbox)
    - Max % Top Holders
    - Block Risky Wallets (checkbox)
    - Position Size (USD)
- Persistence: All settings are automatically saved and loaded from `settings.json`, ensuring user preferences are never lost.

3.1.2. Manual Buy

- Token Address Input: Paste any Solana token address for instant lookup.
- Fetch Info: Retrieve and display token details (name, symbol, price, market cap, volume, liquidity) from trusted APIs.
- Buy Button: Execute a manual buy, bypassing filters for maximum flexibility.
- Error Handling: Clear, actionable messages for invalid addresses, missing pools, or failed transactions.

3.1.3. Dashboard

- Trade Monitoring: Comprehensive list of all open and closed trades, with detailed stats and PnL.
- Status Display: Shows current mode, wallet balance, profit/loss, win rate, and other key metrics.
- Open Position Tracking: Persistent tracking of all open positions, even across sessions, with the ability to sell any position from the GUI.

3.1.4. Logs

- Real-time Logging: All actions, errors, and status updates are displayed live in the GUI, with optional file logging for advanced users.

3.1.5. License

- License Key Input: Secure activation and validation of the app.
- Status Display: Immediate feedback on license status and any issues.

3.1.6. About

- App Info: Version, company, support contact, website, and logo for transparency and trust.

3.2. Trading Engine & Automation

3.2.1. Simulation Mode

- All trades are simulated using virtual balances, allowing users to test strategies without risk.
- No real transactions are sent to the blockchain, ensuring complete safety for beginners.

3.2.2. Real Wallet Mode

- Uses user-supplied private key or seed phrase for secure wallet management.
- Sends real transactions to the Solana blockchain, with robust error handling and transaction signing.
- Handles wallet initialization, balance checks, and transaction status tracking.

3.2.3. Automated Sniping

- Continuously polls Dexscreener and other APIs for new token pools and opportunities.
- Applies all user-configured filters (liquidity, volume, age, etc.) to identify the best trades.
- Executes buy/sell logic automatically, maximizing speed and minimizing manual intervention.

3.2.4. Manual Buy/Sell

- Allows users to manually buy or sell any token, bypassing filters for advanced control.
- Provides instant feedback and error handling for all manual actions.

3.2.5. Take Profit / Stop Loss

- Automatically sells tokens when profit or loss thresholds are reached, protecting user capital and locking in gains.

3.2.6. Risk Filters

- Advanced filters for burn percentage, top holders, risky wallets, and immutability, reducing exposure to scams and rug pulls.

3.3. Integrations

- Solana Blockchain: Secure wallet management and transaction execution.
- Dexscreener API: Real-time token pool discovery and analytics.
- Jupiter Aggregator API: Best swap quotes and transaction building for optimal execution.
- Solscan API: On-chain token holder and distribution analysis for risk management.

3.4. Error Handling, Logging & User Support

- All errors are logged in the GUI and optionally to a file for troubleshooting.
- User-friendly error messages for all common issues (invalid address, insufficient balance, API/network errors, etc.).
- Debug logs for advanced users, with toggleable verbosity.
- Comprehensive documentation and in-app help for onboarding and support.

3.5. Security & Privacy

- Sensitive data (private key/seed phrase) is never logged or stored unencrypted.
- All network requests use HTTPS for data security.
- License validation is performed securely with server-side checks.
- The app is packaged to prevent tampering and reverse engineering.

3.6. Platform, Packaging & Distribution

- Desktop application for Windows (with planned support for Mac/Linux).
- Distributed as a standalone executable with all dependencies bundled—no command-line or technical setup required.
- Automatic updates and version checks to ensure users always have the latest features and security patches.

4. Non-Functional Requirements

- Performance: Must poll APIs and execute trades with minimal latency, ensuring users can snipe new tokens as soon as they launch.
- Reliability: Handles API failures, network issues, and unexpected errors gracefully, with automatic retries and fallback logic.
- Usability: Intuitive GUI, clear error messages, persistent settings, and helpful onboarding for all user levels.
- Extensibility: Modular codebase designed for easy addition of new features, integrations, and future enhancements.
- Accessibility: Designed to be usable by people with varying levels of technical expertise.

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5. Out of Scope

- Trading on blockchains other than Solana (initial release).
- Advanced charting or technical analysis tools (focus is on automation and safety).
- Mobile app version (desktop only for now).
- Social trading or copy trading features.

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6. Future Enhancements & Roadmap

- Multi-wallet and multi-account support.
- Telegram/Discord notifications and trade alerts.
- Advanced analytics, trade history export, and performance dashboards.
- Customizable trading strategies and scripting support.
- Integration with additional DEXs and liquidity sources.
- Mobile app and web dashboard.

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7. Acceptance Criteria & Success Metrics

- All features and requirements above are fully implemented, tested, and documented.

- Users can run the app, configure settings, and trade in both simulation and real wallet modes with confidence.
- All errors are handled gracefully and communicated clearly to the user.
- Settings and open positions persist between sessions, ensuring continuity and reliability.
- No sensitive data is ever leaked, logged, or stored insecurely.
- User feedback is positive, with high satisfaction scores for usability, reliability, and support.
- The app demonstrates a clear advantage over existing tools in terms of speed, safety, and user experience.

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8. Value Proposition & Why Turbo Bot?

Turbo Bot stands out in the crowded crypto trading landscape by offering:

- Speed: Lightning-fast sniping and execution, giving users an edge in competitive markets.
- Safety: Advanced risk filters, robust error handling, and secure wallet management to protect users from scams and losses.
- Simplicity: A beautiful, intuitive GUI that makes advanced trading accessible to everyone, not just coders.
- Flexibility: Support for both simulation and real trading, manual and automated strategies, and persistent tracking of all positions.
- Trust: Transparent development, secure licensing, and responsive support.

Turbo Bot is not just a tool—it's a complete trading companion designed to help users succeed in the fast-paced world of Solana tokens, whether they are learning, experimenting, or trading for real profits.