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Algorithm based Automatic Trading System

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Abstract: Automatic trading, also known as algorithmic trading, represents the pinnacle of technological advancement in financial markets. Through the utilization of sophisticated algorithms, automatic trading systems execute trades with unparalleled speed and efficiency, operating 24/7 across global markets. These systems remove the human element from decision-making, eliminating emotional biases and executing trades based solely on pre-defined rules and criteria. By leveraging historical data, technical indicators, and statistical models, automatic trading systems can identify and capitalize on market opportunities that may be imperceptible to human traders. However, with the potential for high-speed execution comes inherent risks, including technical glitches, data inaccuracies, and susceptibility to unforeseen market events. Consequently, successful implementation of automatic trading requires meticulous development, rigorous testing, and ongoing monitoring to ensure optimal performance and risk management. Despite these challenges, automatic trading continues to revolutionize the financial landscape, offering both institutional and retail investors unprecedented access to sophisticated trading strategies and opportunities.

Keywords: Algorithm, Automatic, Flutter Framework, Risk Management, Stock Market, Strategies, Trading Bots.

I. INTRODUCTION

Automated trading, especially prevalent in electronic markets like the stock market, relies heavily on autonomous software agents. Crafting successful trading strategies requires a deep understanding of market mechanisms and strategic considerations. With the rise of the Internet and online trading platforms, the financial market, particularly the stock market, has become a dynamic and lucrative arena, processing billions of dollars in transactions daily. This globalized economy offers stock investment as a swift and enticing route to potentially lucrative returns [1]. By removing human emotions and biases from trading decisions, automatic trading systems can operate around the clock, executing trades with precision and agility. This method demands a comprehensive understanding of market dynamics and strategic considerations to design effective trading strategies. With the advent of the Internet and online trading platforms, automatic trading has gained even more prominence, offering investors access to global markets and the potential for substantial profits in a condensed timeframe.

In basic automatic trading, several trends are reshaping trading strategies, reflecting advancements in technology and data analysis. One notable trend is the increasing adoption of simple, yet effective algorithmic strategies tailored for novice traders. These strategies often focus on basic technical indicators like moving averages, support and resistance levels, and simple momentum indicators. Additionally, there's a growing emphasis on user-friendly trading platforms and interfaces that allow retail investors to automate their trading without extensive programming knowledge. Another trend is the integration of risk management features directly into automatic trading systems, helping users mitigate potential losses and adhere to predefined risk parameters [2].

II. LITERATURE SURVEY

SR. NO	NAME OF PAPER	AUTHOR	SUMMARY
1.	Design and Evaluation of Automatic Agents for Stock Market Intraday Trading	Eduardo Jabbur, Everton Silva, Douglas Castilho, Adriano Pereira, and Humberto Brandao	Market making is a strategy used in trading where a trader continually provides liquidity to a market by quoting both buy and sell prices for a financial instrument.

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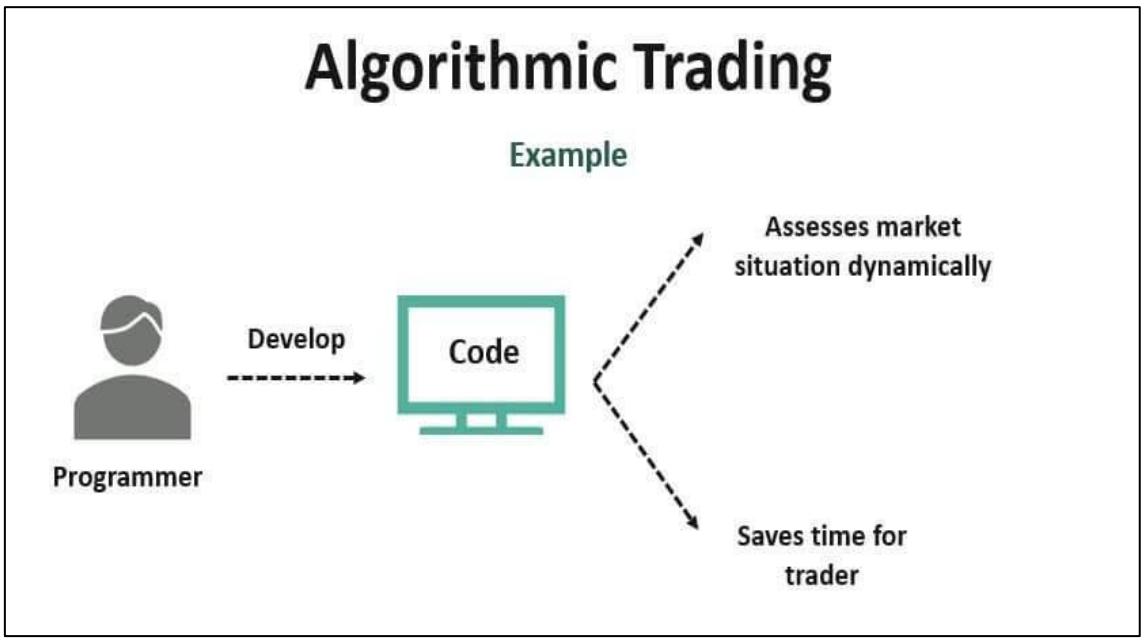
2.	The Application of Trend Following Strategies in Stock Market Trading	Simon Fong, Jackie Tai	Trend-following (TF) strategies are a type of trading approach that aim to capitalize on long-term market movements, regardless of past price performance.
3.	Algorithmic Trading and Strategies	Dr. Sachin Napate, Mukul Thakur	The research paper focuses on modeling the underlying market oscillating between two states: uptrend and downtrend. It aims to explore Algorithmic Trading and trading strategies.
4.	A Study of Key Technical Indicators for Effective and Profitable Strategy in Option Trading of Nifty	Dr. Bhaskar V. Patil Dr. Deepali M. Gala	Profitable strategies for automatic trading involve the use of algorithms and automated systems to execute trades based on predefined criteria.
5.	Algorithmic Trading Bot	Medha Mathur, Satyam Mhadalekar, Sahil Mhatre, Vanita Mane	Automatic trading bots offer several potential advantages, including the ability to execute trades with speed and precision, remove emotional bias from trading decisions, and operate 24/7 in global markets.

III. DIAGRAMS

1 **System Architecture:**



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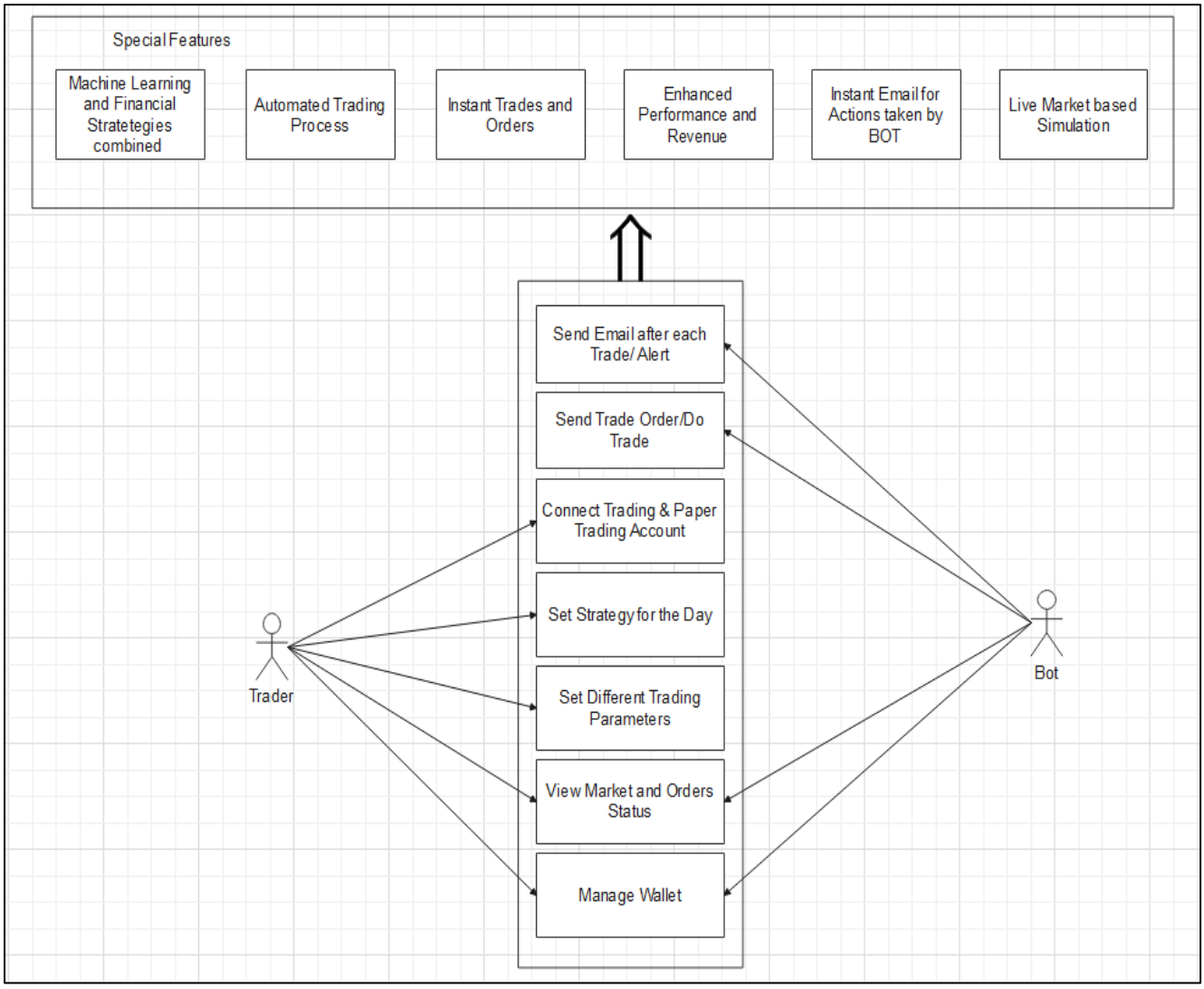
2 **Use Case:**



IV. ALGORITHMS

Automated trading employs a variety of strategies designed to capitalize on market opportunities while minimizing risk. One prevalent approach is trend-following, where algorithms identify and exploit directional price movements based on historical data analysis. These systems aim to enter trades in the direction of established trends, riding momentum for profit. Another common strategy is mean reversion, which seeks to capitalize on the tendency of asset prices to revert to their mean or average value after deviating. These algorithms identify overbought or oversold conditions and execute trades accordingly, anticipating price corrections. Arbitrage strategies exploit price discrepancies between related assets or markets, leveraging technology to capitalize on fleeting opportunities for risk-free profit [4].

4.1. EMA (Exponential moving average)

In automated trading, the EMA (Exponential Moving Average) strategy is a powerful tool utilized to identify and capitalize on trends in financial markets. This strategy involves the calculation of EMAs, which assign more weight to recent price data, thereby making them highly responsive to short-term market movements. Automated systems employ EMAs to discern the direction of market trends, typically by comparing the values of short-term and long-term EMAs. When the short-term EMA crosses above the long-term EMA, it signals a potential uptrend, prompting automated systems to generate buy orders. Conversely, a crossover where the short-term EMA falls below the long-term EMA suggests a potential downtrend, prompting sell orders [2].

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These signals form the basis for automated trading decisions, allowing systems to swiftly enter and exit positions in response to changing market conditions. Moreover, risk management measures are often integrated into automated EMA strategies, such as setting stop-loss orders and adjusting position sizes, to mitigate downside risk.

Through rigorous back testing and optimization, automated systems fine-tune EMA parameters to maximize profitability and adapt to evolving market dynamics. Overall, the EMA strategy in automated trading empowers investors with a systematic and disciplined approach to capitalize on trend-following opportunities in financial markets [4].

Fig -1: EMA (Exponential moving average) graph

4.2. RSI (Relative strength index)

Relative Strength Index (RSI) strategy serves as a valuable tool for identifying potential market reversals and overbought/oversold conditions. This strategy relies on the calculation of the RSI, a momentum oscillator that measures the speed and change of price movements [4]. Typically calculated over a specified period, often 14 periods, the RSI ranges from 0 to 100. When the RSI surpasses certain thresholds, such as 70 for overbought and 30 for oversold conditions, it suggests potential shifts in market sentiment.

Automated trading systems utilize these thresholds as signals for generating buy or sell orders. For instance, when the RSI crosses above 70, indicating overbought conditions, it prompts the system to consider selling, anticipating a potential downward reversal [7]. Conversely, when the RSI falls below 30, signaling oversold conditions, the system may initiate buy orders in anticipation of an upward reversal. To mitigate risk, automated systems often integrate risk management measures.

like stop-loss orders and position size adjustments. Before deployment, rigorous back testing and optimization are conducted to fine-tune parameters and enhance strategy effectiveness. Once operational, automated systems continuously monitor market conditions, adapting their approach to evolving trends. Overall, the RSI strategy in automated trading offers a systematic and disciplined method for identifying potential trading opportunities and managing risk effectively in dynamic markets [5].

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Fig -2: RSI (Relative strength index) graph

4.3. Supertrend

The Supertrend indicator is like a guide for traders, helping them understand the current trend in the market. It's straightforward and reliable. Imagine it as a tool that highlights whether the market is going up or down. Now, this tool is built using two main settings: the period and the multiplier. The period is like a window of time that the indicator looks at to assess the market, and the multiplier helps adjust the sensitivity of the indicator to price changes.

By default, the Supertrend uses a period of 10 and a multiplier of 3. These values are common but can be adjusted based on a trader's preference or the specific market conditions [7].

Fig -3: Supertrend graph

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V. METHODOLOGY

An automatic trading system, also referred to as algorithmic trading or algo-trading, automates the process of trading financial instruments using complex algorithms and computer programs. The methodology for developing such a system involves several critical stages, starting with data collection and analysis. Historical and real-time market data, including prices, volumes, and other relevant financial metrics, are gathered from various sources. This data is then processed using advanced statistical methods, technical indicators, and machine learning models to identify patterns, trends, and potential trading opportunities.

The next step involves the development of a trading strategy based on the insights gained from data analysis. This strategy is articulated through a set of rules and conditions that determine when to enter or exit trades. These rules are encoded into a computer algorithm, creating the core of the automatic trading system. The strategy often incorporates various trading signals derived from technical analysis indicators like moving averages, Bollinger Bands, and Relative Strength Index (RSI), as well as fundamental analysis and market sentiment indicators. Risk management is a fundamental aspect of the methodology. The system is designed to assess the risk associated with each trade, setting stop-loss and take-profit levels to minimize potential losses and lock in profits. Position sizing and diversification rules are also integrated to manage exposure and ensure the system's stability. Once the algorithm is developed, backtesting is performed using historical data to evaluate the strategy's performance. Backtesting helps identify any flaws or weaknesses in the strategy and provides insights into its potential profitability under different market conditions. The algorithm is refined and optimized based on the backtesting results to enhance its accuracy and reliability. After successful backtesting, the algorithm undergoes paper trading or simulated trading in a real-time environment without actual capital at risk. This phase helps verify the system's functionality and responsiveness to live market conditions, ensuring it can operate effectively without human intervention.

Implementation involves deploying the algorithm on a trading platform with direct market access. The system continuously monitors the market, executing trades automatically when predefined conditions are met. Low-latency connections and robust infrastructure are crucial to ensure fast and accurate trade execution, reducing the risk of slippage and other execution-related issues. Continuous monitoring and maintenance of the automatic trading system are essential. Market conditions can change rapidly, and algorithms must be regularly updated and adjusted to adapt to new market dynamics. Performance metrics are tracked, and any deviations from expected behavior are investigated and rectified promptly. Security measures are implemented to protect the system from cyber threats and unauthorized access, ensuring the integrity and confidentiality of trading data.

By automating the trading process, these systems can operate with high efficiency, executing trades at speeds unattainable by human traders, and allowing for the exploitation of market opportunities around the clock.

VI. RESULTS

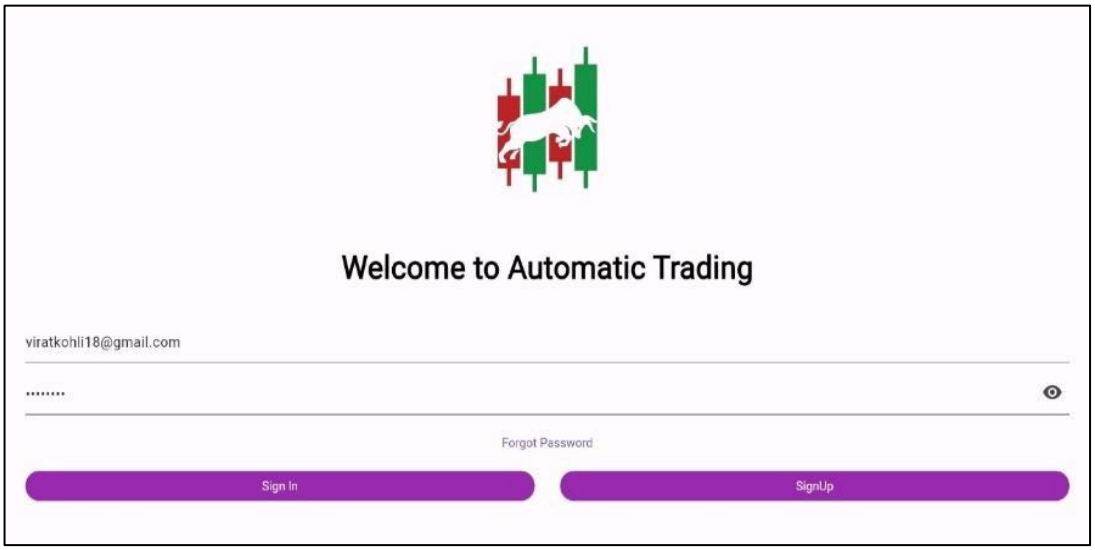

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Fig -5: Trading application UI for Calls

Creating an automatic trading application using Flutter involves integrating several key components to provide a seamless trading experience. The project begins with setting up the Flutter environment and designing a user-friendly interface that includes screens for authentication, portfolio management, and real-time market data. Implementing state management with solutions such as Provider, River pod, or Bloc ensures efficient state handling across the app. The application UI in Dart uses flutter framework, which will automatically execute trades based on predefined criteria. This systematic approach ensures the creation of a robust and user-centric automatic trading application using Flutter.

Fig – 6: Buy – Sell calls for various trades

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Automatic trading systems generate buy/sell calls using algorithms based on technical indicators and risk management rules, executing trades automatically when predefined criteria are met, with continuous monitoring and adjustment.

VII. CONCLUSION

In conclusion, developing an automatic trading system using Flutter offers a powerful combination of user- friendly interfaces and robust trading functionalities. By harnessing the capabilities of Flutter for seamless cross- platform development, along with integrating reliable brokerage APIs, real-time data feeds, and strategic trading algorithms, you can create a sophisticated trading application. Effective state management, thorough testing, and real- time notifications ensure the application remains efficient and responsive. This approach not only empowers users with automated trading capabilities but also provides a secure and efficient platform for managing their investments, ultimately enhancing their trading experience and financial decision-making.

VIII. ACKNOWLEDGMENT

We acknowledge the invaluable support and guidance from our mentors and colleagues, whose expertise and insights were instrumental in developing and refining our automatic trading system. Thank you for your contributions.

IX. FUTURE SCOPE

The future scope of automated trading is expansive and driven by rapid advancements in technology, particularly in AI, machine learning, and big data analytics. As these technologies evolve, trading algorithms will become more sophisticated, capable of analyzing vast amounts of data and making real-time, data-driven decisions with minimal human intervention. High-frequency trading will benefit from reduced latency and enhanced regulatory compliance, while blockchain and cryptocurrencies will open new avenues in decentralized finance and 24/7 trading environments. The integration of ESG factors into trading strategies will promote sustainable investing, and the rise of robo-advisors will make advanced trading strategies more accessible to retail investors. Overall, automated trading is set to become more adaptive, efficient, and personalized, navigating a complex landscape of global markets and regulation.

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