

# Paragraph view of the full system

## 1. Feature / Data Layer

*This layer collects and cleans all relevant inputs – macroeconomic indicators (like VIX, DXY, inflation releases, Fed speech sentiment embeddings), technical execution features (ATR, spreads, order book depth, time-of-day), and regime context tags (risk-on/off, volatility state). The goal is to provide a rich but aligned dataset that captures both fundamental and short-term trading conditions.*

## 2. Prediction Layer (LightGBM + small ensemble + calibration)

*At its core, LightGBM models are trained on historical, regime-labelled data to predict the probability of gold moving up or down within your chosen horizon. Instead of relying on a single model, a small ensemble of three LightGBM variants (different seeds or feature subsamples) is averaged to smooth noise. The raw probabilities are then calibrated (using isotonic regression) to better reflect true likelihoods, producing an accurate, interpretable prediction.*

## 3. Dynamic Weighting Layer

*Here, the system interprets the contribution of each indicator dynamically. Using SHAP values, the model identifies which features matter most in the current environment (e.g., VIX spike outweighs inflation stability). These contributions are further stabilized with an EWMA reliability tracker that downweights features losing relevance. This ensures that the system adapts naturally to regime changes and avoids over-relying on outdated signals.*

## 4. Confidence + Risk Layer (merged)

*Predictions are filtered through a strict safety and confidence gate. The model's confidence score (variance of ensemble + calibration output) is combined with trading rules: minimum  $R:R \geq 1.2$ , max 5% capital at risk, volatility-adjusted stops,*

*liquidity checks, and event blackout windows. Micro-confirmation is also enforced – short-term (5–15m) market behavior must align with the trade idea before final approval. The output is a clear approve/reject decision, position size, and an explanation of why the decision was made.*

## **5. Execution / Human Mentor Layer**

*You receive the full pre-trade snapshot: model decision, confidence, top contributing factors, and expected R:R. You manually execute the trade, ensuring you remain in full control while benefiting from the bot's guidance. This protects against automation errors and allows you to learn from each signal.*

## **6. Monitoring / Retraining Layer**

*Finally, the system monitors its own performance. It tracks feature drift, recalibrates feature weights, and periodically retrains models with purged walk-forward validation. This guarantees that the decision logic stays current and robust, avoiding decay as markets shift.*