=== Tuning XGBoost ===

Best Params: {'learning\_rate': 0.1, 'max\_depth': 4, 'n\_estimators': 100}

MSE: 0.1434

Training Time: 19.37s

=== Tuning LightGBM ===

Best Params: {'learning\_rate': 0.1, 'max\_depth': 4, 'n\_estimators': 100}

MSE: 0.1435

Training Time: 44.27s

=== Tuning Random Forest ===

Best Params: {'max\_depth': 4, 'n\_estimators': 100}

MSE: 0.1426

Training Time: 1547.18s

=== Tuning HistGradientBoosting ===

Best Params: {'learning\_rate': 0.1, 'max\_depth': 4, 'max\_iter': 100}

MSE: 0.1435

Training Time: 29.72s

=== Tuning CatBoost ===

Best Params: {'depth': 4, 'iterations': 100, 'learning\_rate': 0.1}

MSE: 0.1429

Training Time: 85.33s

=== Model Performance Summary ===

MSE Time (s)

Random Forest 0.142576 1547.18

CatBoost 0.142904 85.33

XGBoost 0.143372 19.37

LightGBM 0.143511 44.27

HistGradientBoosting 0.143528 29.72