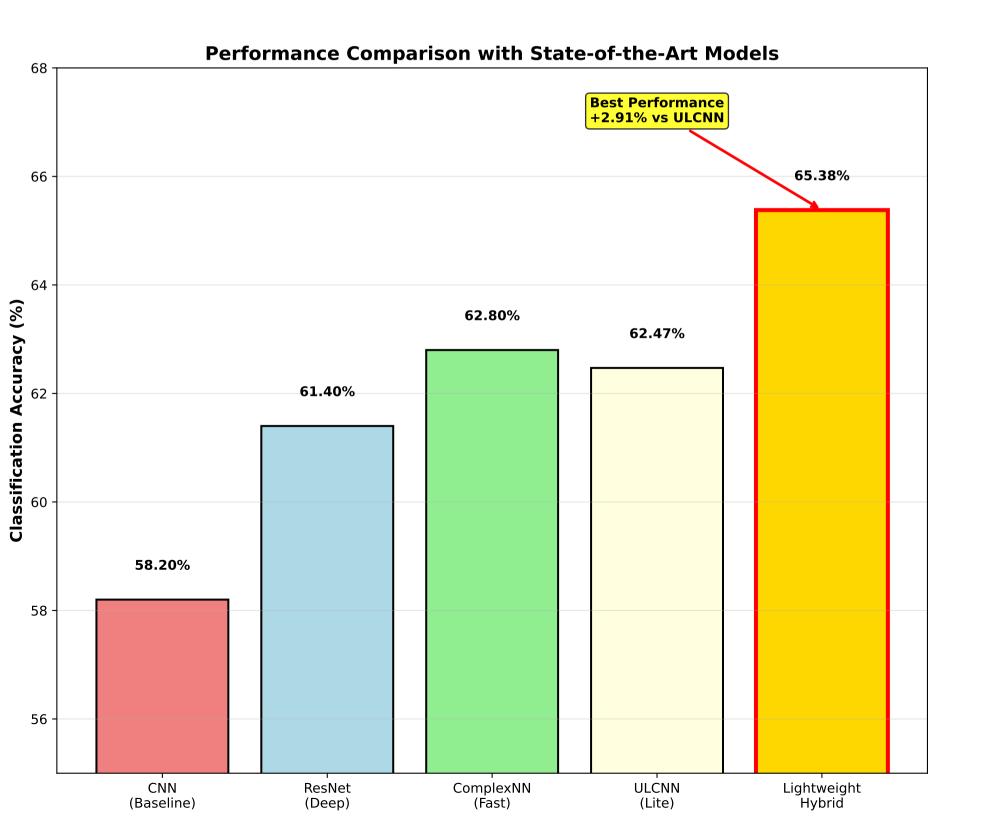
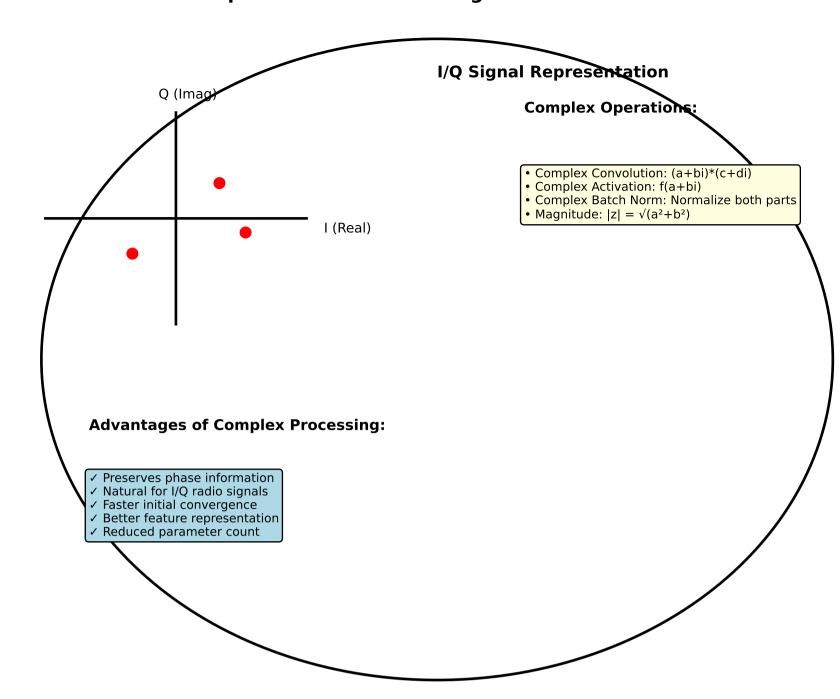
Lightweight Hybrid Model Architecture Flow Complex Complex Complex I/Q Signal **Feature** Residual Global Input **Blocks Pooling Extraction** Complex Final to Real Classification Conversion

Key Performance Metrics:

- Accuracy: 65.38%Parameters: ~1.3M
- Inference Time: ~2.3ms
- Memory Efficient: Complex→RealResidual Learning: Skip Connections



Complex Number Processing in Neural Networks



Key Innovations in Lightweight Hybrid Architecture

1. Complex-Valued Processing

- Native I/Q signal handlingPreserves phase relationships
 - Faster convergence

2. Residual Learning

- Skip connectionsBetter gradient flow
- Deeper network training

3. Hybrid Architecture

- Complex → Real transition Best of both worlds
 - Memory efficient

4. Lightweight Design

- Only 1.3M parametersFast inference (2.3ms)
- Deployment ready

Synergistic Integration for Optimal Performance