Final Year Project: Strategic Roadmap (Feb 9 – April 3)

1. Project Overview & "93+" Strategy

The goal for the final phase is to move from a working prototype to a high-level research project that satisfies the **Technical Expertise**, **Complexity**, and **Software Engineering** mastery required for a top-tier grade.

2. Week-by-Week Implementation Schedule

Phase 4: Hybrid Ensemble Surge (Feb 9 – Feb 22)

- **Objective**: Demonstrate that a dual-backbone system (ResNet50 + MobileNetV2) provides better clinical stability than standalone models.
- **Tasks**:
    - Execute the 30-run sequence (2 models × 5 datasets × 3 seeds) using run_benchmarks_all.bat.
    - Evaluate if the learnable α gating mechanism breaks the 67% ceiling on the Pitt Corpus.
    - **FYP Marker Focus**: Technical Decision Making and Critical Analysis.

Phase 5: Selective Attention Integration (Feb 23 – Mar 8)

- **Objective**: Inject Coordinate Attention (CA) and CBAM into backbones to capture subtle acoustic textures.
- **Tasks**:
    - Conduct an **Ablation Study** (Baseline vs. Baseline + Attention).
    - Place Attention Gates before the fusion layer in the Hybrid model to prune irrelevant features.
    - **FYP Marker Focus**: Complexity and Software Engineering (Design Patterns/UML).

Phase 6: State-of-the-Art Push – Swin Transformer (Mar 9 – Mar 22)

- **Objective**: Compare hierarchical "Shifted Window" attention against standard CNN Global Average Pooling.
- **Tasks**:
    - Implement a **Swin Transformer** prototype for the Pitt Corpus and ESC-50.
    - Research and document the "Spectrogram-as-Image" debate for clinical audio.
    - **FYP Marker Focus**: Technical Expertise ("Mastery at a high level").

Phase 7: Synthesis & Final Submission (Mar 23 – April 3)

- **Objective**: Finalize 15,000-word report and record a high-quality demonstration.
- **Tasks**:

- Draft the **Professional Issues** section (~1,000 words) focusing on AI ethics and data privacy.
- Record a 5–10 minute project video explaining features and technologies.
- Finalize **Bibliography and Citations** to ensure technical specification compliance.

3. High-Grade Alignment Checklist

Criteria	**Strategy for 90%+ Grade**
Technical Expertise	Benchmark CNNs against Swin Transformers to show expertise above year 2 level.
Software Engineering	Use branches and tags in GitLab; document refactoring and data structures.
Critical Analysis	Analyze *why* models fail on 33% of the Pitt Corpus rather than just reporting accuracy.
Stability & Usability	Include regression testing and provide clear installation/usage instructions.
Professionalism	Maintain the reflective Project Diary to avoid a zero mark for this category.