Dissertation Project Plan

"Identifying Depression Through Speech: A Feature Importance Analysis"

Student: Nile
University: University of Glasgow
Deadline: ~2 months (early April 2026)
Target: Complete 1 week early

Research Question

> "Which acoustic features of speech are most predictive of depression, and how do they differ between read and spontaneous speech?"

Timeline Overview

Week	Dates	Phase	Key Deliverables
1	Feb 2-8	Foundation	Data downloaded, background drafted
2	Feb 9-15	Technical Setup	Feature extraction pipeline working
3	Feb 16-22	Analysis I	Baseline models, initial results
4	Feb 23-Mar 1	Analysis II	Feature importance, comparison
5	Mar 2-8	Writing I	Methodology, Results drafted
6	Mar 9-15	Writing II	Analysis/Discussion drafted
7	Mar 16-22	Integration	Full draft assembled
8	Mar 23-29	Polish	Final edits, formatting
Buffer	Mar 30+	Contingency	Presentation prep

Detailed Task Breakdown

Week 1: Foundation (Current)

- [x] Literature review notes
- [x] Thesis summary (Tao PhD)
- [x] Dataset summaries (DAIC-WOZ, ANDROIDS)
- [x] Research angle decided
- [x] Advisor approval
- [ ] ANDROIDS corpus downloaded
- [ ] Data structure documented
- [x] Background chapter drafted

Week 2: Technical Setup

- [ ] OpenSMILE installed and configured
- [ ] Feature extraction script working
- [ ] All audio files processed
- [ ] Features saved to CSV/pickle
- [ ] Data preprocessing pipeline
- [ ] Train/test split following Tao's protocol

Week 3: Analysis I

- [ ] Baseline SVM classifier
- [ ] Baseline Random Forest classifier
- [ ] Cross-validation setup (5-fold, speaker-independent)
- [ ] Initial accuracy metrics
- [ ] Read vs spontaneous comparison (basic)

Week 4: Analysis II

- [ ] SHAP value analysis
- [ ] Permutation importance
- [ ] Feature ranking (read task)
- [ ] Feature ranking (spontaneous task)
- [ ] Statistical significance tests
- [ ] Visualisations (feature importance plots)

Week 5: Writing I

- [ ] Methodology chapter complete
- [ ] Results chapter drafted
- [ ] All figures generated
- [ ] Tables formatted

Week 6: Writing II

- [ ] Analysis/Discussion chapter
- [ ] Critical evaluation
- [ ] Limitations section
- [ ] Future work section

Week 7: Integration

- [ ] Introduction finalised
- [ ] Abstract written
- [ ] All chapters integrated
- [ ] References complete
- [ ] Formatting checked

Week 8: Polish

- [ ] Proofreading
- [ ] Advisor review incorporated
- [ ] Final formatting
- [ ] PDF generated
- [ ] Submission preparation

Technical Stack

Data

- **Corpus:** ANDROIDS (118 participants, Italian)
- **Tasks:** Read speech + Interview (spontaneous)
- **Labels:** Binary (depressed vs control, psychiatric diagnosis)

Tools

- **Feature extraction:** OpenSMILE
- **Analysis:** Python (scikit-learn, SHAP, pandas)
- **Statistics:** scipy, statsmodels
- **Visualisation:** matplotlib, seaborn
- **Writing:** LaTeX (Glasgow template)

Key Libraries

opensmile
scikit-learn
shap
pandas
numpy
scipy
matplotlib
seaborn

Expected Outputs

Quantitative

- Classification accuracy (read vs spontaneous)
- Feature importance rankings
- Statistical comparisons (t-tests, effect sizes)
- Cross-validation results

Visualisations

- Feature importance bar charts
- SHAP summary plots
- Confusion matrices
- ROC curves
- Read vs spontaneous comparison plots

Qualitative

- Discussion of which features matter and why
- Clinical implications
- Comparison with literature
- Limitations and future directions

Risk Mitigation

Risk	Likelihood	Impact	Mitigation
Data issues	Low	High	ANDROIDS is well-documented
Poor accuracy	Medium	Medium	Focus is on interpretability, not SOTA
Time overrun	Medium	High	1-week buffer built in
Technical issues	Low	Medium	Use established tools (OpenSMILE)
Writer's block	Medium	Medium	Drafts started early

Communication Plan

- **Daily:** Progress logged in memory files
- **Major milestones:** Slack update to Nile
- **Weekly:** Summary of completed/upcoming tasks
- **Advisor:** Check-ins as needed (Nile to schedule)

File Structure

```
dissertation/
├── data/
│   └── androids_corpus/      # Raw audio data
├── features/                 # Extracted features
├── models/                   # Trained models
├── results/                  # Analysis outputs
├── figures/                  # Generated plots
├── drafts/
│   └── sections/             # Chapter drafts
├── pdfs/                     # Readable documents
├── references/
│   └── dissertation.bib      # Bibliography
└── final/                    # Submission-ready files
```

Success Criteria

For an A grade:

1. Clear, well-defined research question ✓
2. Rigorous methodology
3. Meaningful results (even if accuracy isn't SOTA)
4. Critical analysis and discussion
5. Well-written, properly formatted
6. Addresses limitations honestly
7. Places work in context of literature

Plan created: February 2, 2026
Last updated: February 2, 2026