

Sign Sync

Demo 2

Gendac

Progression from demo 1

- ASL gesture recognition
 - 37 glosses, 75% accuracy
- Text to ASL grammar
- Text-to-sign translation
- User preferences



Quality Requirements and Architectural Strategies

Decomposition Design Strategy and Microservice architecture significantly improves both maintainability, scalability and modularity:

- Services can be developed, tested, deployed, and scaled independently.
- Developers can work on their assigned service without being blocked by others.
- Bug fixes or enhancements in one component have minimal risk of breaking others.



Quality Requirements

1. Usability
2. Reliability
3. Scalability
4. Security
5. Maintainability



Usability

- 3 theme modes: Light, Dark, and High Contrast
- customizable font size: small, medium, or large
- A help menu and user guide are accessible via the main UI
- Meets accessibility standards via user testing



Reliability

- AI models for Sign-to-Text and Speech-to-Text must achieve $\geq 85\%$ accuracy on test datasets
- Translation outputs must be consistently correct under all real-time usage conditions



Scalability

- The system must support ≥ 10 concurrent users submitting translation requests (speech, text, or sign)
- Average response time per request ≤ 2 seconds under this load



Security

- Strong hashing algorithm for passwords
- Database connection strings and other sensitive configuration data must be stored in environment variables.
- Sensitive information must not be exposed in API responses, logs or client-side code.
- Verified via manual code review and security test cases



Maintainability

- All services must follow a modular, single-responsibility architecture
- All APIs and use cases must be fully documented (Swagger or markdown)
- At least 90% of logic-layer functions must be covered by unit tests, measured using coverage tools
- CI/CD pipelines must run on every commit to verify regressions



Live Demo



Unit Testing

```
===== test session starts =====
platform win32 -- Python 3.11.0, pytest-8.3.5, pluggy-1.6.0
rootdir: C:\Users\mikes\Documents\University\Year_3\Semester_1\COS301\Capstone\Sign-Sync\Sign-Sync\backend\textToAslGloss-service
plugins: anyio-4.9.0
collected 18 items

glossConversion_unitTests.py ..... [100%]

===== warnings summary =====
..\..\..\venv\Lib\site-packages\spacy\cli\_util.py:23
  C:\Users\mikes\Documents\University\Year_3\Semester_1\COS301\Capstone\Sign-Sync\venv\Lib\site-packages\spacy\cli\_util.py:23: DeprecationWarning: Importing
  g 'parser.split_arg_string' is deprecated, it will only be available in 'shell_completion' in Click 9.0.
    from click.parser import split_arg_string

..\..\..\venv\Lib\site-packages\weasel\util\config.py:8
  C:\Users\mikes\Documents\University\Year_3\Semester_1\COS301\Capstone\Sign-Sync\venv\Lib\site-packages\weasel\util\config.py:8: DeprecationWarning: Import
  ing 'parser.split_arg_string' is deprecated, it will only be available in 'shell_completion' in Click 9.0.
    from click.parser import split_arg_string

-- Docs: https://docs.pytest.org/en/stable/how-to/capture-warnings.html
===== 18 passed, 2 warnings in 3.55s =====
```

Integration Testing

```
PASS __tests__/userAPI_IntegrationTest.test.js
User API Routes
  POST /auth/register
    ✓ should register a new user successfully (152 ms)
    ✓ should return 400 if email already exists (6 ms)
    ✓ should auto-increment userID correctly (108 ms)
  POST /auth/login
    ✓ should login successfully with correct credentials (102 ms)
    ✓ should return 400 if email does not exist (53 ms)
    ✓ should return 401 if password is incorrect (100 ms)
    ✓ should return 400 for missing email (53 ms)
  DELETE /auth/deleteAccount/:userID
    ✓ should delete an account successfully (6 ms)
    ✓ should return 404 for non-existent user (4 ms)
    ✓ should handle invalid userID format (3 ms)
  GET /auth/preferences/:userID
    ✓ should get user preferences successfully (4 ms)
    ✓ should return empty preferences if none set (4 ms)
    ✓ should return 404 for non-existent user (4 ms)
    ✓ should update preferences successfully (4 ms)
    ✓ should return 404 for non-existent user (3 ms)
    ✓ should handle empty preferences object (4 ms)
  Database Error Handling
    ✓ should return 500 if there is a database error during registration (37 ms)

Test Suites: 1 passed, 1 total
Tests:       17 passed, 17 total
Snapshots:   0 total
Time:        2.9 s, estimated 3 s
Ran all test suites.
```

