



# **PUSL3190 Computing Project**

## **Project Proposal**

**JobForge- Personal Interview Coach**

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## Chapter 01.- Problem Statement.

The growing competitiveness of the software industry has led to the rise of technical interviews as the main gatekeepers to getting hired. Candidates often do not fail interviews due to a lack of technical proficiency but due to weak confidence levels and failure to articulate pertinent answers when feeling the pressure. Industry reports indicate that behavioral and technical interviews fail roughly 60% of qualified candidates because of weak soft skills and interview prep instead of lack of technical knowledge. (Huffcutt & Arthur, 1994; Levashina et al., 2014)

There are considerable constraints with conventional interview prep. Peer mock interviews often do not include objective evaluation and professional critique. Career counselors and interview coaches are financially unavailable to recent graduates and entry-level professionals, as their fees between \$50 to \$200 a session, which is why session rates escalate. YouTube videos and generic interview prep guides provide cookie-cutter advice that does not account for an individual's specific confidence and clarity issues, and the relevancy of their answers to the questions. There are no real-time feedback loops for candidates to rectify mistakes in their practice sessions, which is a feedback and correction dynamic absence in most interfaces.

This issue becomes much heavier concerning software engineering, where interviewees must prove both their technical skills as well as their communication abilities at the same time. Candidates need to explain complex algorithms, rationalize decisions at the software architectures, and present problem-solving frameworks with clear and confident articulation. Without specific practice and feedback repeatedly failing on these aspects leads to the same mistakes in interviews. This causes longer job hunts, a sense of helplessness, and lost job opportunities.

Market offerings today still do not provide software specific interview prep resources that are comprehensive and also do not break the bank. There are AI tools, but they usually only provide question banks or focus on technical assessments entirely missing the soft skills that are the real deal breakers in interviews. There is no complete system that tracks confidence levels through voice analysis, assesses answer clarity and relevance, and provides a unique path of improvement with tools such as flashcards and progress tracking.

**JobForge** fills this space as the first affordable AI interview coaching system tailored to the software profession. It utilizes AI voice analysis and natural language processing to evaluate the candidate speech in real time.

## **Chapter 02-Project description.**

### **2.1 Background and Rationale**

The acute need to close the communication skills gap that leaves technically skilled software engineering graduates unemployed led to the creation of JobForge. Current approaches to interview preparation completely concentrate on gaining expertise through peer research and self-practice, leaving little opportunity for the candidate to evaluate his or her communication style objectively. Despite having sufficient technical expertise, Most of competent candidates fail first-round interviews because they are evasive, shy, and fail to adequately explain themselves. This research aims to remedy this recognized problem.

JobForge transforms theoretical interview preparation to a data-driven, actionable method of skill development tailored to IT careers.

### **2.2 Project Goals**

The primary objective is to develop an intelligent web application that provides an objective, real-time assessment of interview performance along three key dimensions: confidence measurement, answer clarity rating, and relevancy score.

The system will use voice analysis and artificial intelligence to provide quantifiable feedback that candidates may track and improve continuously.

The development of a microphone-based voice analysis engine that gauges vocal confidence by analyzing voice steadiness, speech rate, and hesitation patterns; the creation of an artificial intelligence (AI)-driven natural language processing system that assesses the clarity of responses based on sentence structure, usage of technical jargon, and logical coherence; creating an interactive flashcard tool that reduces preparation drudgery by providing quick, engaging study sessions for technical subjects; creating a competitive leaderboard that shows user rankings to encourage consistent practice through peer review; creating a questionnaire module with depth in data structures, algorithms, system design, and behavior-based questions pertinent to software roles; and creating a relevance scoring algorithm that compares candidate answers against expected answer frameworks for typical software engineering interview questions.

## 2.3 Project Scope

JobForge will be created as a website for software related roles and students studying software engineering.

Three key components form the core of the system:

1. Leaderboard Feature, displaying user rankings based on cumulative performance statistics;
2. Flashcard System, which offers interactive lessons with software-related technical topics to break preparation boredom
3. Interactive Questionnaire Module, where the user answers carefully selected interview questions while the app listens to their oral response and provides real-time confidence, clarity, and relevance scores.

Program code execution settings, video physique analysis, and live mock interviews with human evaluators are purposefully left out of the project scope. Only verbal responses to theoretical and conceptual software engineering problems are evaluated in the first version.

## 2.4 Expected Outcomes-

The final solution will be a fully functional online application with three key elements that offer quantifiable interview preparation capabilities. To help them pinpoint their areas of weakness and monitor quantitative progress, the candidates will receive numerical confidence ratings, clarity scores, and relevance percentages for every questioning session. During prolonged practice periods, the flashcard mode will keep users engaged, and the leaderboard function will promote competitive motivation to encourage regular use. Increased interview passing rates for recent graduates in software engineering are anticipated as a result of regulated communication skill improvement, which will ultimately reduce the time-to-hire gap and enhance career options.

## 2.5 Project Keywords

- Linked domains include voice analysis.
- Natural language processing
- Artificial intelligence
- Interview readiness
- Gamification.

## Chapter 03-Research Gap

### 3.1 Literature Review

Academic research into interview preparation has long centered on technical competency assessment and testing for cognitive ability. Research into computerized interview systems has been focused on algorithmic problem-solving assessment and code quality assessment, with communication delivery assessment receiving relatively less attention. Recent research into technical interview platforms based on AI has centered on testing for code correctness and paid no heed to vocal confidence or response clarity. Recent studies in professional settings on speech analysis have been exploring emotion detection and stress indicators in voice trends. (Schuller et al., 2013) These studies have not been applied to particular interview preparation rooms in which real-time assessment of confidence could provide actionable improvement recommendations. This is a knowledge gap area—there isn't sufficient research that looks at voice analysis technology being coupled with interview preparation systems, particularly for software engineer roles where technical correctness alone cannot be the sole requirement for passing an interview.

### 3.2 Existing Solutions

Websites offering a variety of coding tasks with automated judging systems, such as LeetCode and HackerRank, are leaders in the field for advanced interview preparation. With real-time feedback on code correctness, these websites are excellent at evaluating technical problem-solving skills through algorithmic and data structure difficulties. Candidates can interview other users and get human feedback on their interviewing skills using Pramp's peer-to-peer mock interview practice. However, because this procedure is solely dependent on the availability and experience of peers, the evaluation's quality is erratic and arbitrary. Technical questions and learning routes are combined in Interview Bit, but written responses are solely considered; there is no communication evaluation component. These current solutions reveal a basic technological shortcoming: none of the platforms offer quantifiable, objective feedback on vocal confidence levels, response relevance grading, or answer clarity determination. Additionally, there is a methodological gap because current applications use either subjective peer review (which lacks objectivity and consistency in communication assessment) or automated code review (which ignores communication), rather than AI-powered real-time.

### **3.3 How JobForge Differs.**

JobForge uses four technologies to fill these identified imperfections. In order to measure speaking confidence in terms of objective vocal parameters such as tone steadiness, speech rate, and hesitation frequency, it first bridges the technological gap by introducing microphone-based voice analysis. This results in numerical confidence scores that candidates can track over time. By using AI-powered natural language processing to assess the relevance and clarity of answers in real-time during practice sessions, it bridges the methodology gap by providing immediate objective scoring in place of subjective or delayed feedback mechanisms. Third, JobForge addresses contextual deficit by providing a free, online service specifically designed for Sri Lankan software development students and young developers. The incorporated structure combines questionnaire module, software-specialized flashcards, voice analysis, and leaderboard functionality into a single application—eliminating both economic disadvantages and fragmentation that forces applicants to utilize several isolated resources to prepare comprehensively for interviews

## **Chapter 04 – Requirement Analysis .**

### **4.1 Introduction**

JobForge requirements analysis categorizes the functional characteristics, non-functional features, and user interface requirements necessary to deliver an effective interview preparation system. The analysis makes that the system complies with usability, performance, and accessibility requirements suitable for the Sri Lankan context while filling the identified communications skills gap from this documentation.

### **4.2 Specialized Knowledge and Devices Required**

Development of JobForge requires technical skills.

speech processing and voice analysis algorithms need to be available to detect confidence indicators from audio inputs, - pitch variation analysis, speech rate computation, and pause detection.

Natural Language Processing (NLP) competencies are needed for answer clarity and relevance checking.

Web application framework, machine learning libraries (TensorFlow or PyTorch), and audio processing libraries (Web Audio API) skills are needed.

Hardware requires microphone-enabled devices and regular development laptops for voice recording testing capability.

Additional technical requirements include integrating speech-to-text APIs (Whisper, Google Speech API).

Database administrator systems (MongoDB, PostgreSQL)

Cloud infrastructure services (Firebase AWS and Google Cloud)

NLP libraries and tools (Hugging Face Transformers, NLTK )

Several web browsers that are cross-platform.

### **4.3 Requirements Collection Methods.**

- Analyzing current systems to find gaps in functionality.
- An extensive review of the relevant academic literature on speech analysis and interviewing methods

#### 4.4 Functional Requirements .

<i>ID</i>	<i>Requirement</i>
FR-01	System shall allow users to create accounts and log in securely using email and password.
FR-02	System shall capture user voice responses during practice sessions through microphone access.
FR-03	System shall analyze voice recordings and generate numerical confidence scores based on vocal parameters.
FR-04	System shall evaluate the clarity of the response by NLP algorithms to parse sentence structure and logical flow.
FR-05	System shall provide relevance scores comparing responses against expected answer frameworks.
FR-06	System shall maintain curated software engineering interview questions categorized by topic
FR-07	System shall present technical concept flashcards organized by topic and difficulty level.
FR-08	System shall display performance analytics showing confidence trends, clarity scores, and relevance metrics.
FR-09	System shall rank users anonymously on leaderboards based on practice performance scores.
FR-10	The system shall, upon completion of a response, provide instant feedback on confidence, clarity, and relevance within 3 seconds.

#### 4.5 Non-Functional Requirements .

<i>ID</i>	<i>Requirement</i>
NF-01	System shall load pages within 3 seconds under normal network conditions. Voice analysis results shall be delivered within 5 seconds of recording completion.
NF-02	System shall support at least 100 concurrent users without performance degradation.
NF-03	System shall function correctly on Chrome and Edge browsers .
NF-04	System interface shall adapt seamlessly to desktop,, and mobile screen sizes.
NF-05	System shall encrypt user credentials and store data securely with industry-standard protocols.
NF-06	System shall maintain 95% uptime excluding scheduled maintenance periods.

#### **4.6 User Requirements.**

<i>ID</i>	<i>Requirement</i>
UR-01	Users should be able to create accounts within 2 minutes without complicated processes for verification.
UR-02	The user shall be able to move between features of the solution without necessarily having to take any documentation.
UR-03	Understanding Users must understand straight away their scores on confidence, clarity, and relevance without technical explanation.
UR-04	Users should clearly see their improvement trends through simple visualizations
UR-05	Users should be allowed to stop and resume practice sessions at any time, not losing any progress.
UR-06	There should be encouragement in practicing regularly through leaderboard rankings and achievement indicators.
UR-07	Users should be able to go over concepts using flashcards in 5-10 minute sessions .

#### **4.7 Limitations and Presumptions.**

Limitations:

- Utilizing open-source or free technologies for development and implementation is a budget constraint.

Presumptions:

- Users have access to devices with internet connectivity and a basic understanding of computers.
- The microphones on users' devices are operational. Users consent to the microphone access required for voice analysis functions.

## Chapter 05 -Finance

- *Indirect Costs:* Web hosting.

Platform	Monthly
Vercel	0.00
Railway	0.00
Render	Rs. 5,778.256 (\$19 USD)

Selected Platform: Vercel

Total:0.00

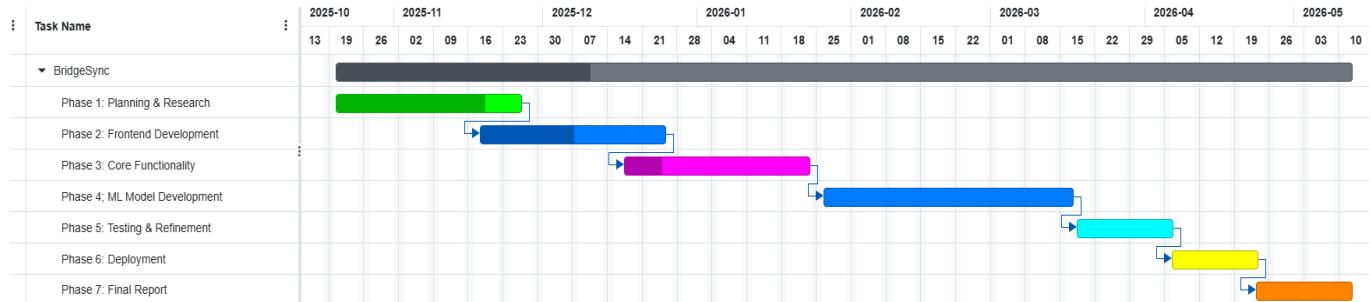
## Chapter 06- External Organizations.

Technology Platform Providers.

Organization	Role and contribution
Vercel Inc.	Provides free-tier cloud hosting infrastructure for web application deployment. Continuous Integration / Continuous Deployment (CI/CD) Pipeline Support Global content delivery network (CDN) for optimized performance Community support resources.
TensorFlow Communities	Open Source Machine Learning Frameworks . Extensive documentation and implementation examples Tech problem-solving and guidance community forums
Open Source Natural Language Processing Projects Tools: NLTK, Hugging Face Transformers	NLP libraries - text processing and analysis tools Pre-trained language models - answer evaluation Regular updates and bug fixes .

## Chapter 07-Time Frame

### 7.1 Gantt Chart.



### 7.2 Duration and deliverables

Phase	Duration – weeks	Deliverable
1	1-4	Requirement Document
2	5-8	Frontend
3	8-14	-
4	14-16	ML Model
5	16-20	Test Report
6	20-22	Deployed system
7	22-24	Final Report

## Referencing / Bibliography.

- 01) Campion, M.A., Palmer, D.K. and Campion, J.E. (1997) 'A review of structure in the selection interview', *Personnel Psychology*, 50(3), pp. 655-702.
- 02) Chou, Y-C., Wongso, F., Chao, C-Y. and Yu, H-Y. (2022) 'An AI Mock-interview Platform for Interview Performance Analysis', *Proceedings of the IEEE International Conference on Industrial Engineering and Engineering Management*, 9-12 December, Singapore, pp. 37-41. doi: 10.1109/ICIET55102.2022.9778999.
- 03) Huffcutt, A.I. and Arthur, W. Jr. (1994) 'Hunter and Hunter (1984) revisited: Interview validity for entry-level jobs', *Journal of Applied Psychology*, 79(2), pp. 184-190. Available at: <https://doi.org/10.1037/0021-9010.79.2.184>
- 04) Levashina, J., Hartwell, C.J., Morgeson, F.P. and Campion, M.A. (2014) 'The structured employment interview: Narrative and quantitative review of the research literature', *Personnel Psychology*, 67(1), pp. 241-293. Available at: <https://doi.org/10.1111/peps.12052>
- 05) Lunn, S.J., Dillon, E. and Sadid, Z.A. (2024) 'Educational expertise: Faculty insights on preparing computing students to navigate technical interviews', in *2024 ASEE Annual Conference & Exposition*. Washington, DC: ASEE.
- 06) Lunn, S.J., Ross, M., Hazari, Z., Weiss, M.A., Georgopoulos, M. and Christensen, K. (2021) 'The Impact of Technical Interviews, and other Professional and Cultural Experiences on Students' Computing Identity', *Proceedings of the 26th ACM Conference on Innovation and Technology in Computer Science Education*, Vol. 1, pp. 415-421.
- 07) Naim, I., Tanveer, M.I., Gildea, D. and Hoque, M.E. (2018) 'Automated analysis and prediction of job interview performance', *IEEE Transactions on Affective Computing*, 9(2), pp. 191-204. <https://doi.org/10.1109/TFFC.2016.2614299>
- 08) Schuller, B., Rigoll, G. and Lang, M. (2013) 'Hidden Markov model-based speech emotion recognition', *Proceedings of the 1st Amrita ACM-W Celebration on Women in Computing in India*, pp. 1-6. doi:
- 09) Rai, M., Abhiram, R., Padthe, A. and Hrithik, R. (2024) 'AI Based Interview Evaluator: An Emotion and Confidence Classifier', *IJARCCE*, 13, doi: 10.17148/IJARCCE.2024.134109.
- 10) Vaishampayan, S., Farzanehpour, S. and Brown, C. (2023) 'Procedural justice and fairness in automated resume parsers for tech hiring: Insights from candidate perspectives', *Proceedings of the 2023 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC)*, IEEE, pp. 103-108.