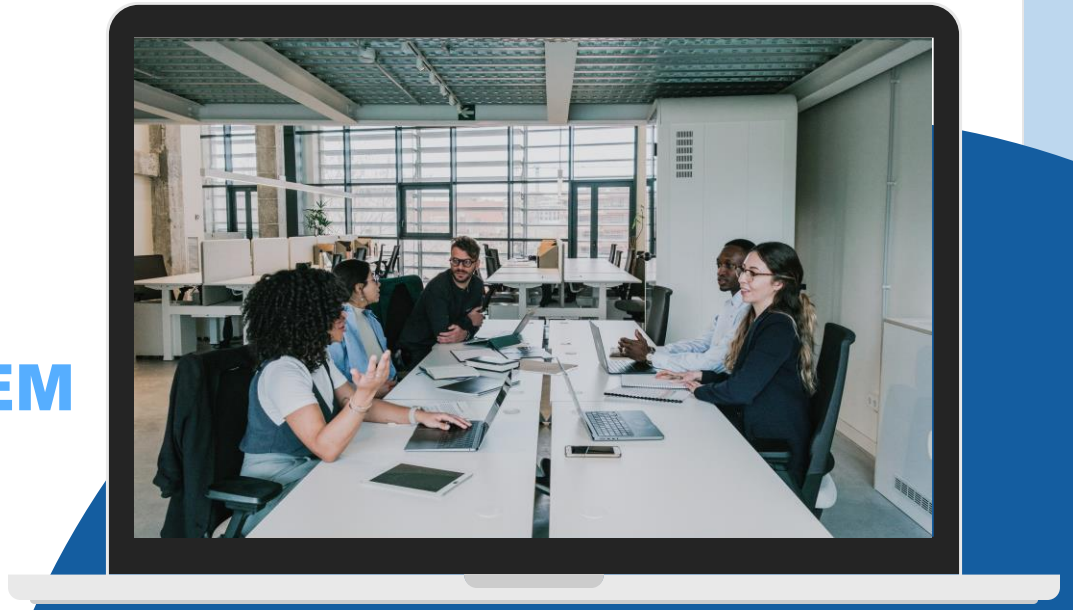
AUTOMATED

INTERVIEW PROCESSING SYSTEM

24-25J-047



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Team

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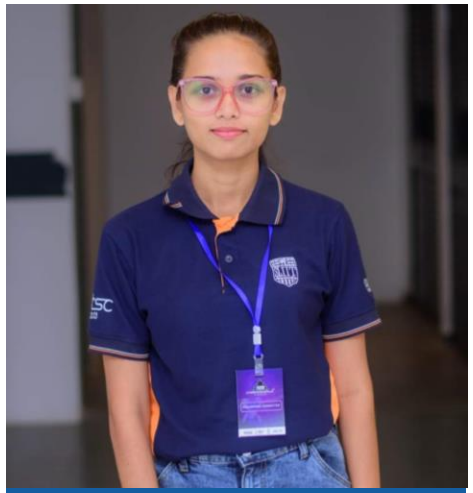

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INTRODUCTION

Traditional interview methods often fail to capture the complete picture of a candidate's capabilities and personality.

RESEARCH PROBLEM

- Current interview processes are often subjective and limited in scope, failing to provide a holistic assessment of candidates.
- There is a need for an automated tool that integrates multiple evaluation techniques to offer a comprehensive and objective analysis of candidates' capabilities and suitability for roles.

Team

Pinsara A.R.D IT 21158186	VIDEO BASED MOCKUP EXAM
Thennakoon T.M.I.C IT 21170986	ASSESS STRESS IN GAMIFIED ENVIRONMENT
Anjalie P.M.R.S IT 21167232	ASSESS CODE COMPLEXITY AND MAINTAINABILITY
Gunarathna N.W.P.B.M IT 21197598	ASSESS CONFIDENCE LEVEL FROM VOICE FREQUENCY

RESEARCH OBJECTIVES

To develop an automated interview process tool that provides a comprehensive and objective assessment of candidates by evaluating personality traits, technical skills, problem-solving abilities, code complexity, maintainability, and non-verbal communication aspects.

- To create algorithms that assess personality traits and confidence levels from vocal features.
- Integrate emotional analysis and gamified assessments for evaluate technical skills.
- Assesses the complexity and maintainability of code submissions.
- create video-based mockup tests and cover letters to evaluate candidates' Background suitability to the company.
- Validate the effectiveness of the integrated tool against traditional assessment methods and industry benchmarks.

WHAT THIS SYSTEM WILL EVALUATE

During Interview Process

PERSONALITY TRAITS

TECHNICAL SKILLS,

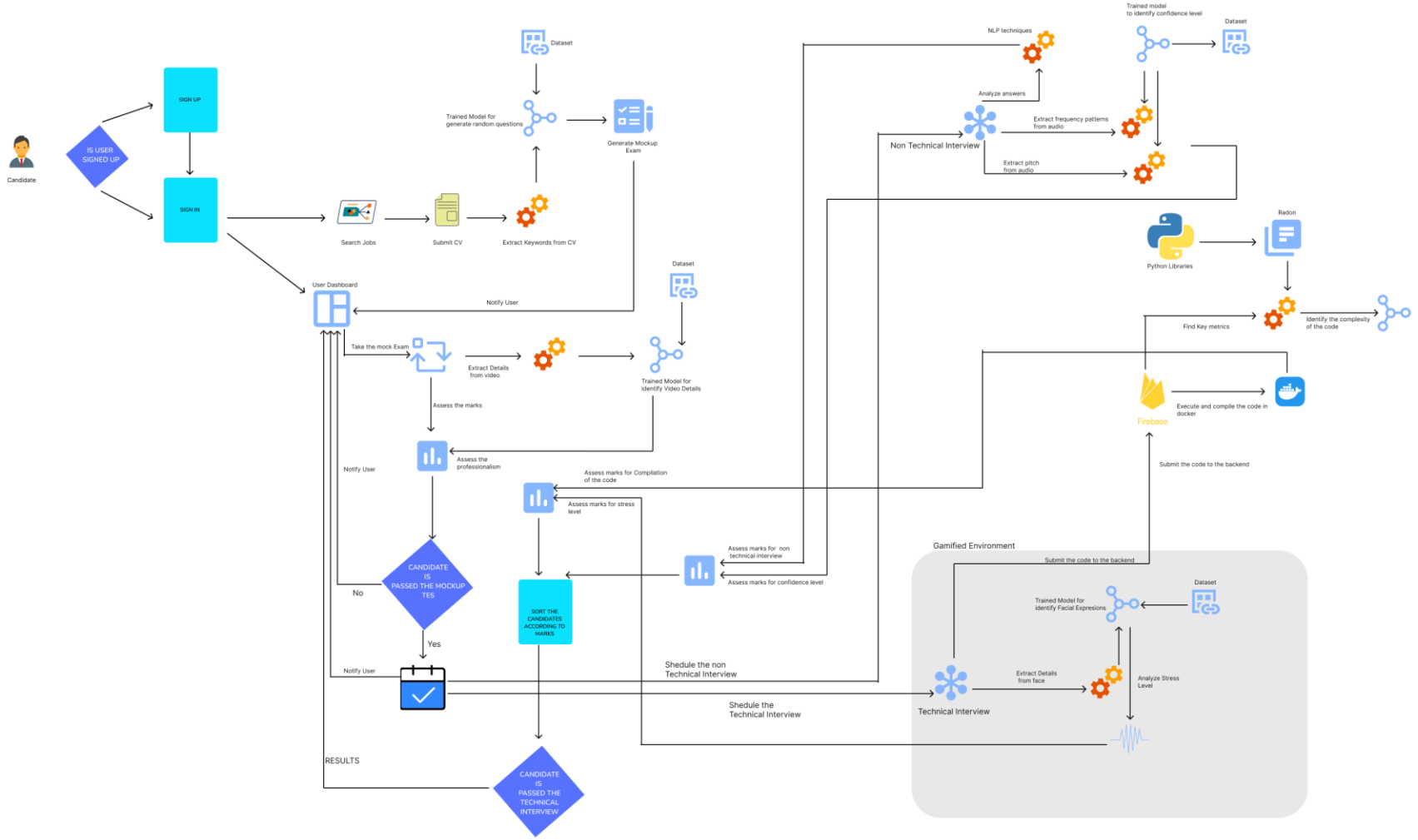
PROBLEM-SOLVING ABILITIES

CODE COMPLEXITY & MAINTAINABILITY

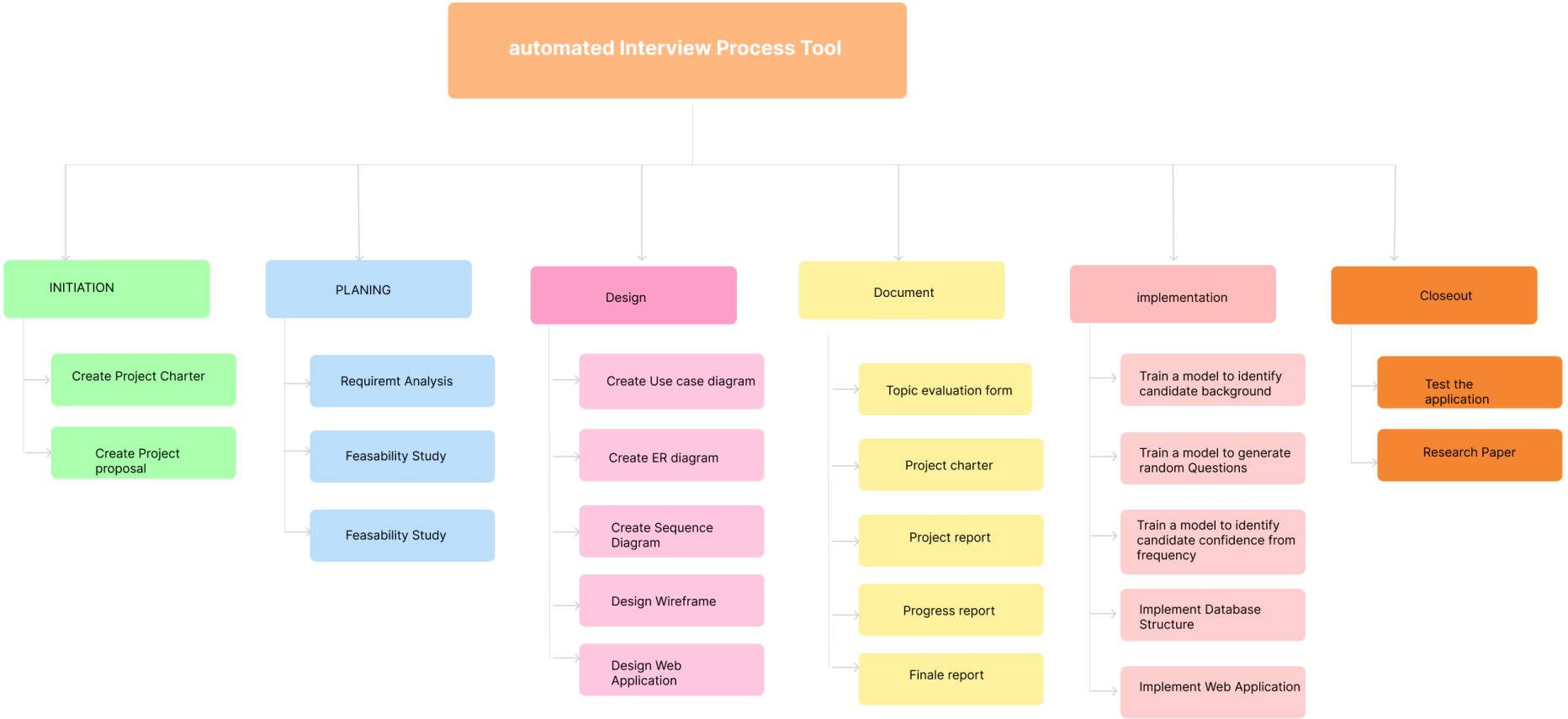
STRESS LEVEL

CONFIDENCE LEVELS

OVERALL SOLUTION



Workload Distribution



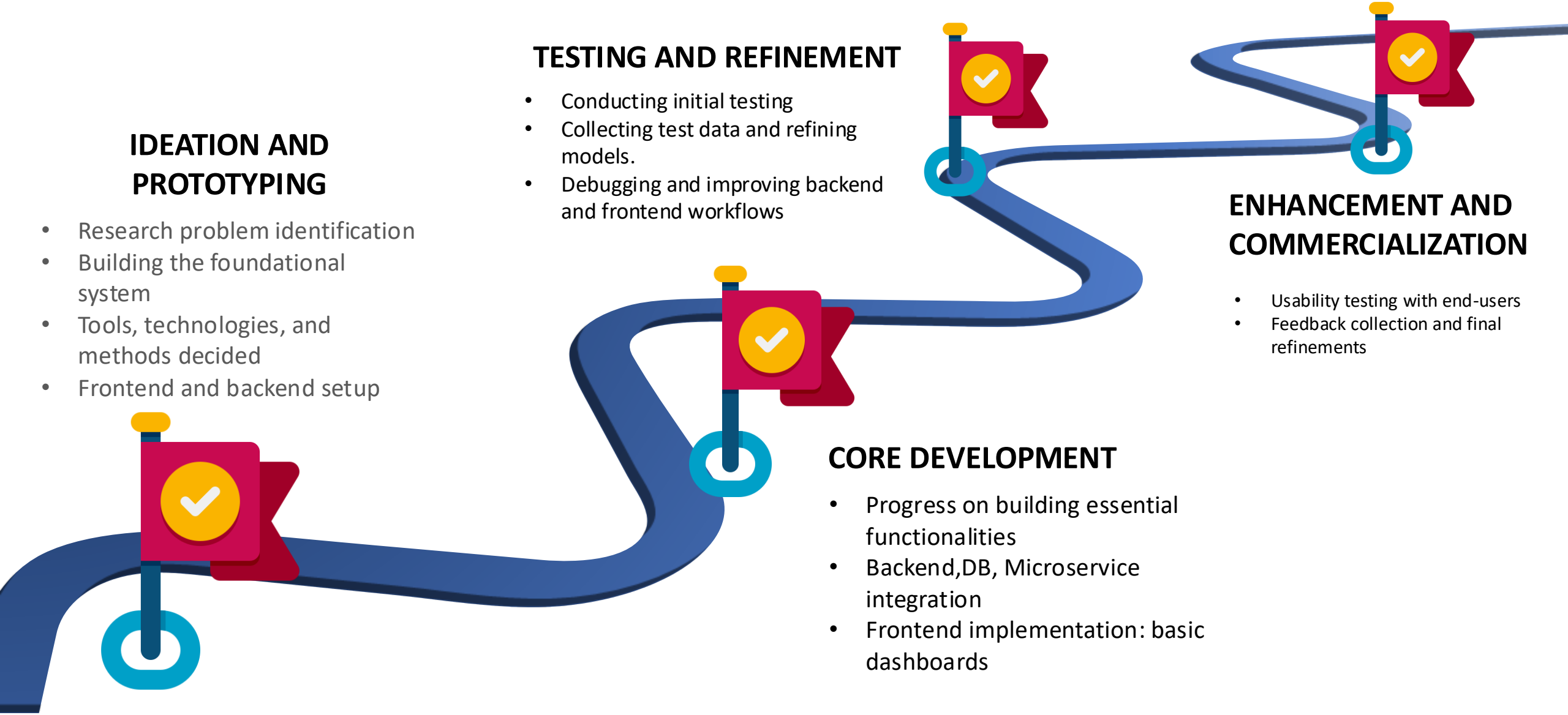
Road Map

IDEATION AND PROTOTYPING

- Research problem identification
- Building the foundational system
- Tools, technologies, and methods decided
- Frontend and backend setup

TESTING AND REFINEMENT

- Conducting initial testing
- Collecting test data and refining models.
- Debugging and improving backend and frontend workflows



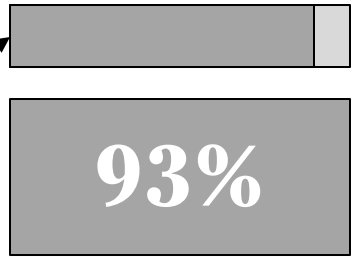
CORE DEVELOPMENT

- Progress on building essential functionalities
- Backend,DB, Microservice integration
- Frontend implementation: basic dashboards

ENHANCEMENT AND COMMERCIALIZATION

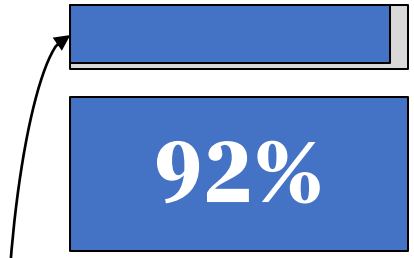
- Usability testing with end-users
- Feedback collection and final refinements

Individual Component Progress



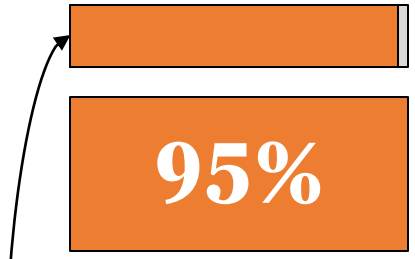
Funtion 1: VIDEO BASED MOCKUP EXAM

Completed Over 60%



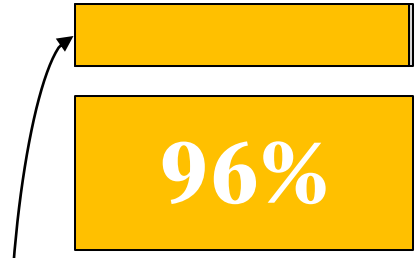
Function 2: ASSESS STRESS IN GAMIFIED ENVIRONMENT

Completed Over 55%



Function 3: ASSESS CODE COMPLEXITY AND MAINTAINABILITY

Completed Over 55%



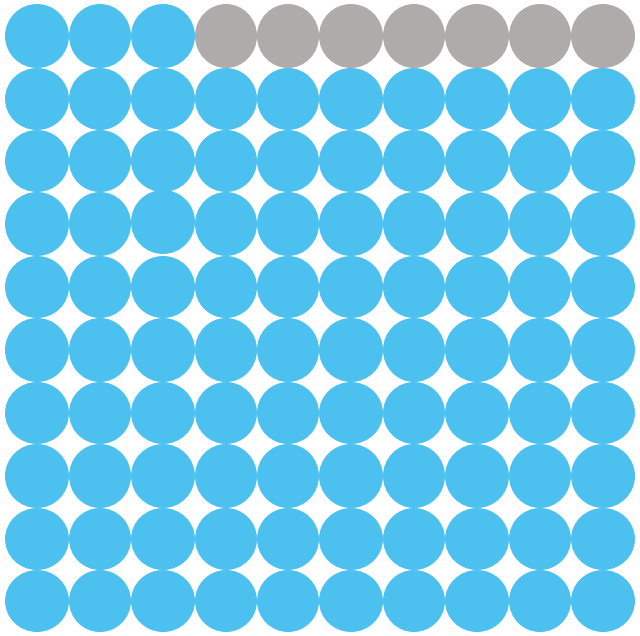
Function 4 : ASSESS CONFIDENCE LEVEL FROM VOICE FREQUENCY

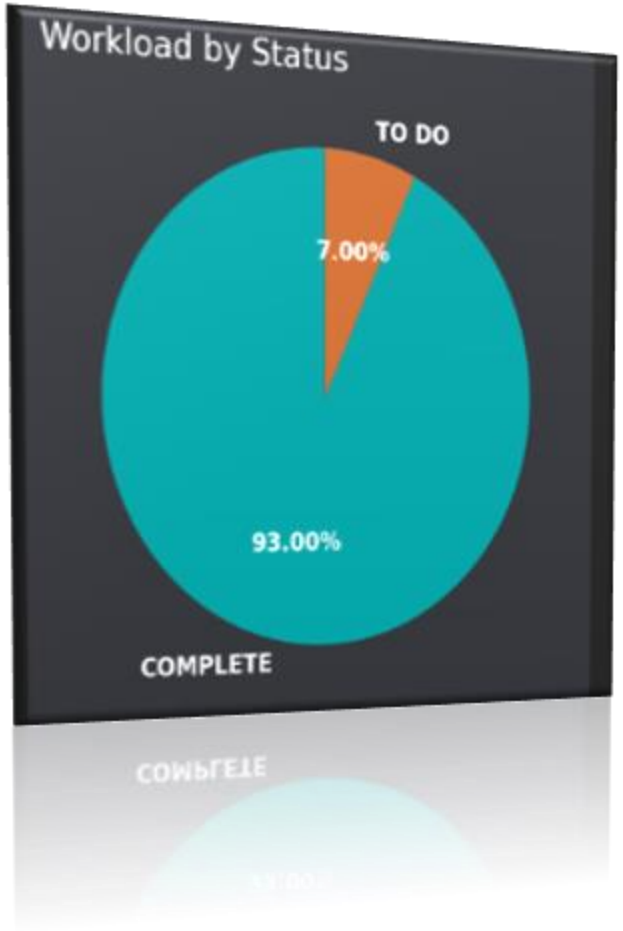
Completed Over 65%

Project Progress

Over 93%

Overall Project Has Completed Over 63% without Any delays





Core Technology Used

01 Front End

02 Back End

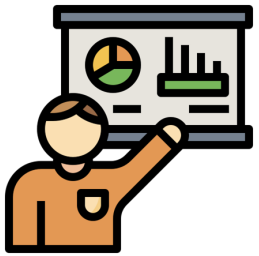
03 Data Base

04 Libraries

05 Version Control

IT21158186 | Pinsara A.R.D

Specialization : Information Technology



INTRODUCTION

"Introducing an innovative system that evaluates candidates primarily on their skills through a video-based mock-up test. Additionally, it assesses grooming, professionalism, and the working environment to provide a comprehensive candidate evaluation."

RESEARCH QUESTION

"How effective are video-based mockup tests in shortlisting candidates based on skill evaluation and assessing grooming, professionalism, and working environment? This research aims to address the reliance on subjective evaluations in current methods."

Research Area Concepts Used

NLP

NLP is used to analyze text-based responses from candidates in the mock-up test. It extracts critical insights, evaluates language skills, and ensures a detailed assessment of written answers.

Supervised Learning

A custom machine learning model is trained using labeled data to classify candidates based on grooming and environment. This ensures accurate and unbiased evaluations tailored to hiring requirements.

Autonomous Decision Making

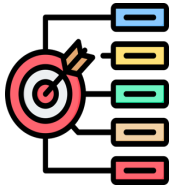
The system automates candidate evaluations by making independent decisions. This reduces human intervention, minimizes bias, and ensures consistent results in shortlisting.

Computer Vision

Computer Vision techniques analyze snapshots from candidate videos, focusing on grooming and environment classification. This approach improves processing speed and evaluation accuracy.

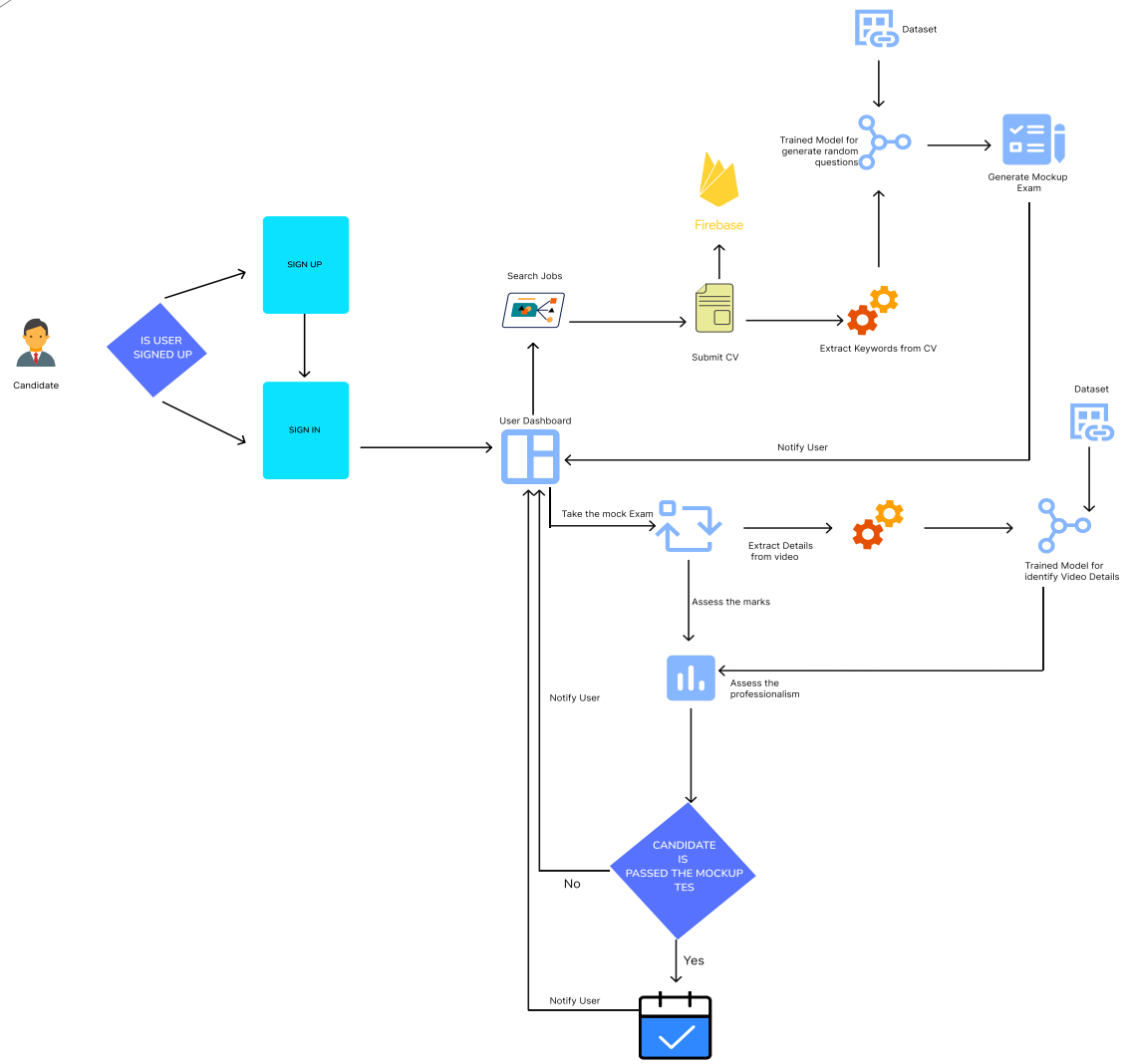
SPECIFIC AND SUB OBJECTIVES

- Specific Objective:
  - •To develop a system that uses video-based mock-up tests to objectively assess candidates' skills. The system will also evaluate grooming, professionalism, and working environment as supplementary criteria.

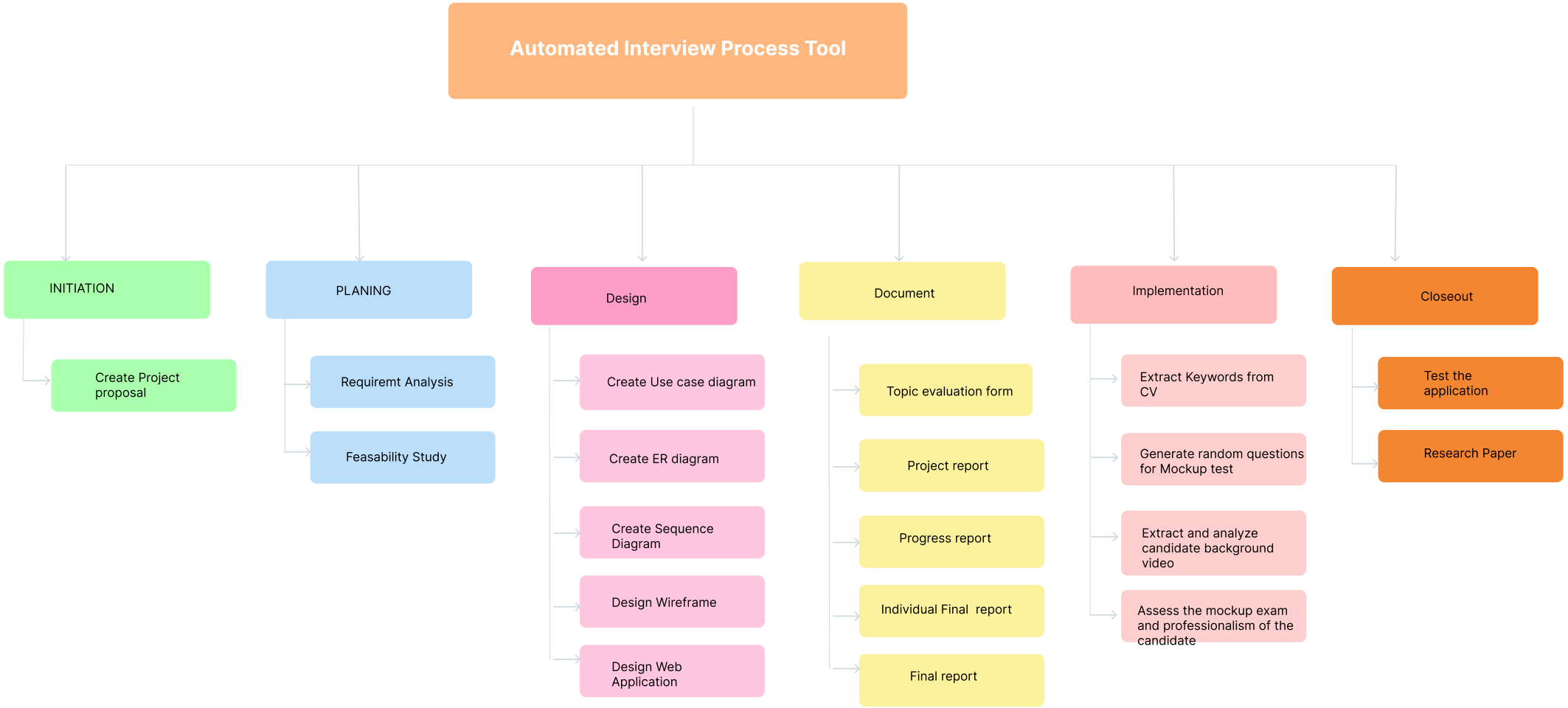


- Sub Objectives:
  - To identify key skills from candidates' CVs and generate relevant mockup test questions.
  - To develop machine learning algorithms for assessing grooming, professionalism, and work environment.
  - To validate the effectiveness of this integrated evaluation system.

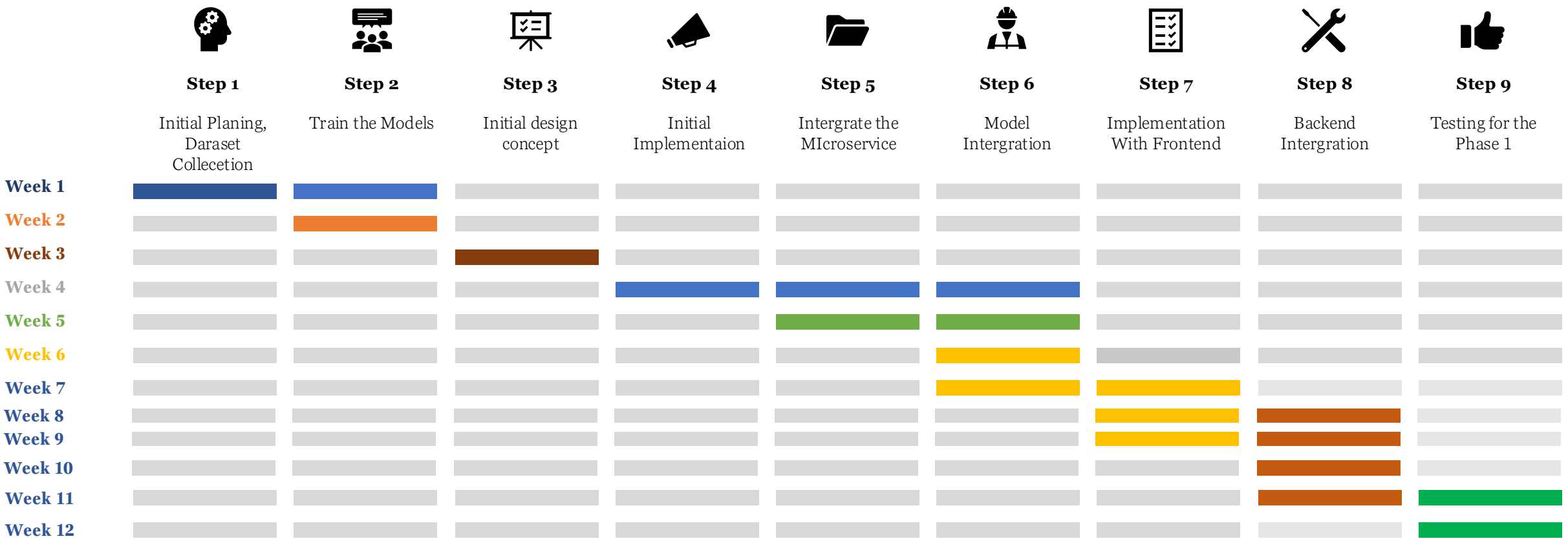
METHODOLOGY



Workload Distribution



Timeline So far



Technologies, Techniques, Algorithms

Technologies

Backend:
- **Python-Flask**
- **DB - Firebase**

Frontend:
- **React**

Text Processing:
- **PyPDF2:** Extracts text from PDFs.
- **spaCy:** NLP for extracting entities from CVs.
- **pandas:** Manages and analyzes data.

Machine Learning & Video Analysis:
- **TensorFlow:** Builds and trains ML models.
- **OpenCV:** Analyzes video frames for grooming and environment.

Additional Tools:
- **sklearn:** Advanced analysis and evaluation.

Techniques

NLP:
- Named Entity Recognition
- Text Extraction

Machine Learning:
- Model Training
- Feature Extraction

Data Processing:
- Data Cleaning
- Random Question Generation

Evaluation:
- Scoring Algorithms
- Threshold Setting

Algorithms & Architecture

Text Extraction:
- **PDF/Text Conversion**: Converts documents into text.

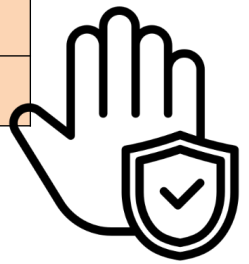
NLP:
- **Entity Recognition**: Identifies key CV elements (skills, experience).

Machine Learning:
- **Classification/Regression**: Evaluates candidate responses and professionalism.

Video Processing:
- **Frame Extraction**: Analyzes video for grooming and environment.

System, Personnel, and Software Specification Requirement

		Server	Client Machines
Hardware	**Processor**	Multi-core CPU (e.g., Intel Xeon or AMD Ryzen)	Dual-core CPU
	RAM	Minimum 16 GB	Minimum 4 GB
	Storage	SSD with at least 500 GB of space	At least 10 GB free space
	Network	High-speed internet connection	Stable internet connection
	Camera		HD + quality web camera
Security	**Data Encryption:**	HTTPS for secure data transmission	
	Authentication:	Secure login mechanisms (e.g., JWT or OAuth)	
	Authorization	Role-based access control	

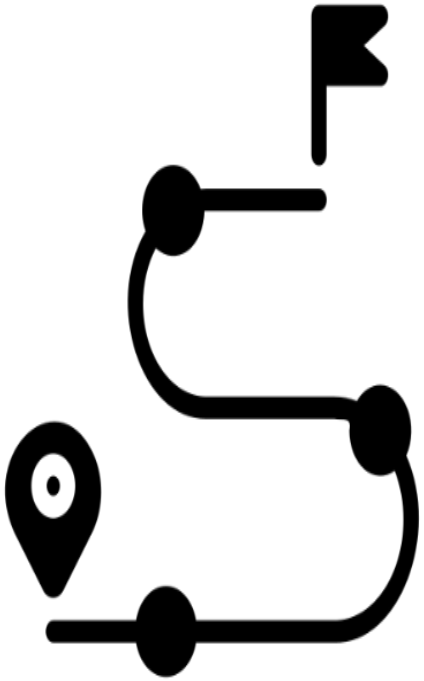


Progress Highlights

Key Achievements:

Candidate Grooming & Environment Classification:

- Custom model trained to analyze grooming and working environment of the candidate.
- Classifies candidates into *clean* and *formally dressed by classes through the model*.



Node.js Backend & React Frontend:

- Fully developed system with:
  - MCQ mock-up test interface.
  - Candidate Dashboard - Home
  - Evaluation results of this phase.
  - Employer module backend for custom questions.

Python Backend (microservice):

- APIs for classification prediction handling

What's Next

- Remaining tasks are minor and straightforward.
- Confident in delivering a robust, efficient solution on time.
- Revolutionizing hiring with automated, fair evaluations.

IT21170966 | Thennakoon T.M.I.C.

Specialization : Information Technology

INTRODUCTION

- The fusion of emotional analysis with gamified assessments offers a novel approach to evaluating technical skills and problem-solving abilities.
- By leveraging emotional cues and interactive, game-based tasks, this method provides a dynamic and engaging way to assess candidates' competencies beyond traditional testing.

Research Area
Concepts Used

Facial Expression Analysis

Leveraged facial recognition models, such as OpenCV to analyze candidates' real-time facial expressions. These models categorize stress levels into low, moderate, and high, ensuring precise emotional insights.

Stress Detection

Implemented machine learning models trained on stress detection datasets to categorize stress levels (low, moderate, and high) based on facial expressions. Threshold values are determined using model evaluation techniques for high accuracy.

Gamified Skill Assessment

Designed a gamified environment using Unity to evaluate candidates' technical skills (programming and database knowledge) through interactive problem-solving scenarios, minimizing traditional interview stress.

Autonomous Decision Making

Developed a system integrating emotional and technical performance metrics. This automated evaluation helps recruiters make informed decisions about candidates' ability to handle industry-level stress without bias.

RESEARCH GAP

- Existing research often focuses on isolated aspects of emotional analysis or gamified assessments.

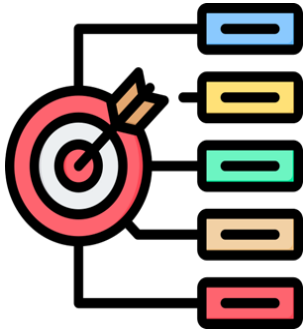
Reference	Research Paper 1	Research Paper 2	Research Paper 3	Proposed Function
Emotional Analysis	✓	X	✓	✓
Gamified Assessments	X	✓	X	✓
Integration of Emotional and Performance Data	X	X	✓	✓
Evaluation of Technical Skills	X	✓	X	✓
Evaluation of Problem-Solving Abilities	X	✓	X	✓

RESEARCH QUESTION

How effective is the integration of emotional analysis and gamified assessments in evaluating technical skills and problem-solving abilities of candidates?

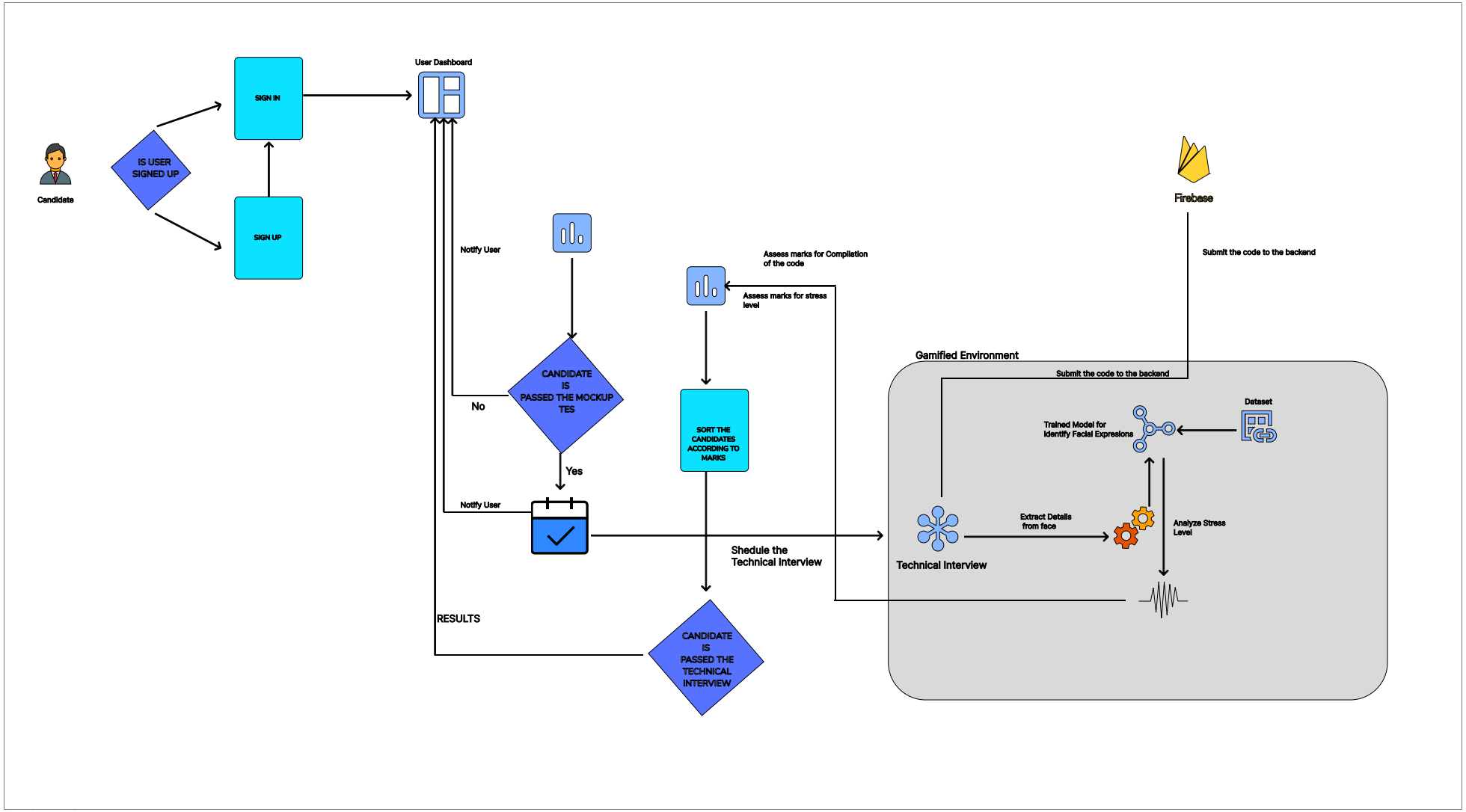
SPECIFIC AND SUB OBJECTIVES

- Specific Objective:
  - To develop a system that evaluates technical skills and problem-solving abilities while using emotional analysis within a gamified environment.

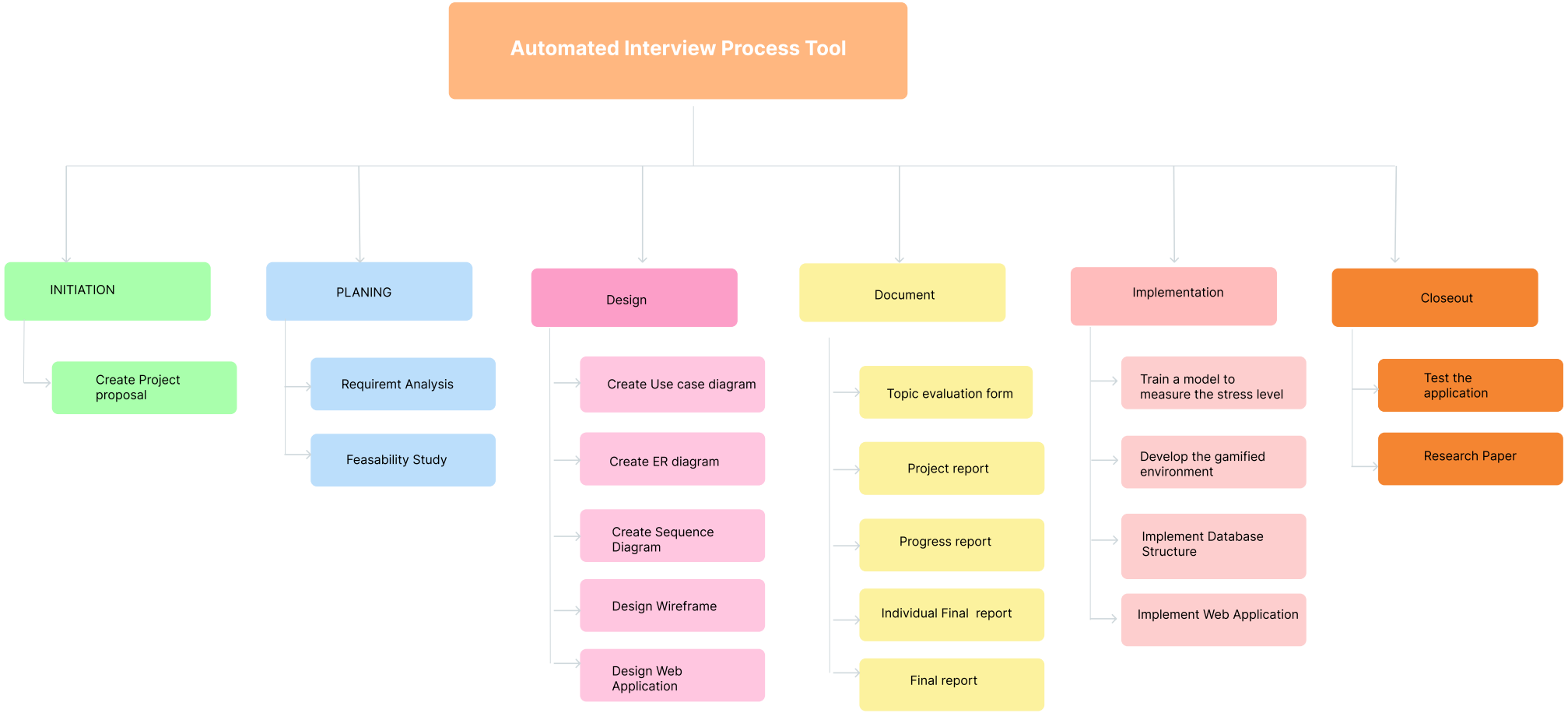


- Sub Objectives:
  - To enhance candidate's experience
  - To design gamified assessments that accurately evaluate technical skills.
  - Measure stress levels during problem-solving tasks

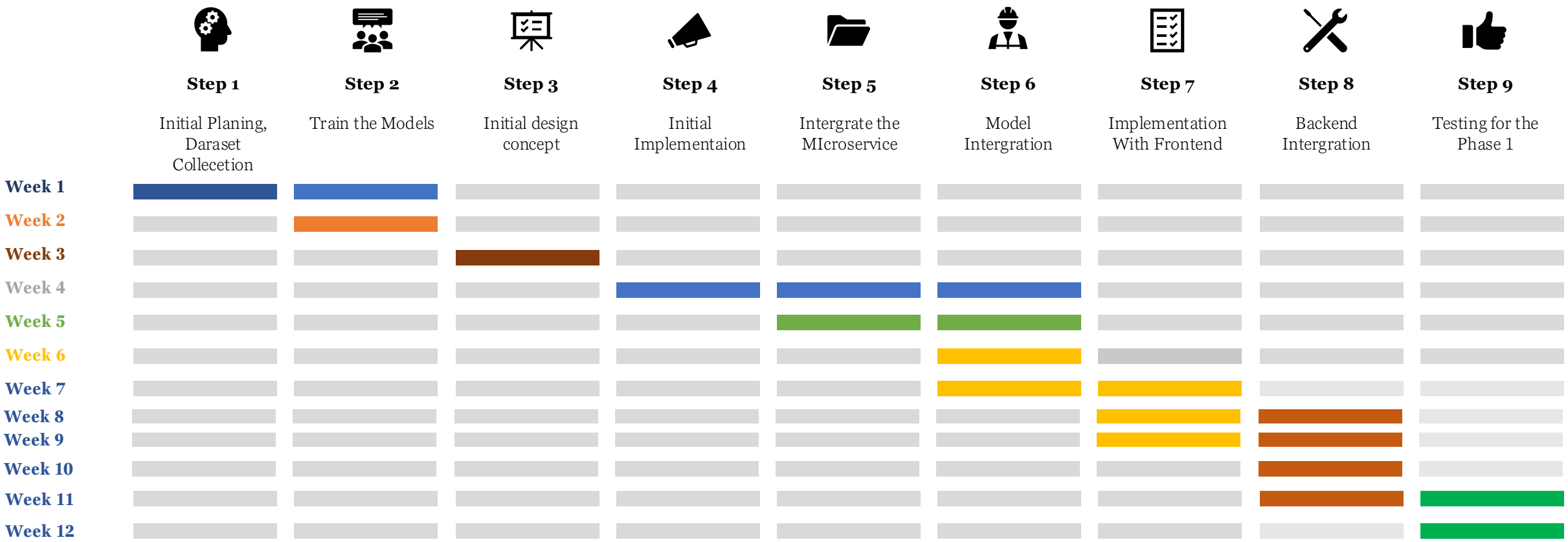
METHODOLOGY



Workload Distribution



Timeline So far



System and Software Specification Requirement

Functional Requirements

- Real-time Facial Expression Analysis
- Stress Level Measurement
- Problem-Solving Skill Assessment
- Integration with Gamified Environment
- Data Storage and Management

Non-Functional Requirements

- User-Friendly Interface
- Real-Time Processing
- High Accuracy and Reliability
- Security and Privacy

Software Requirements

- Jupyter Notebook
- VS Code

Technologies, Techniques, Algorithms

Technologies

- TypeScript
- Python
- Tensorflow
- MongoDB
- OpenCv

Algorithms & Architecture

- Convolutional Neural Network (CNN)

Techniques

- Transfer Learning
- Data Augmentation

What's Next

- Game Level Map
- Continue the Gaming Environment Process

REFERENCES

[1] J. Smith, R. Brown, and L. Wang, "Real-Time Emotional Analysis in Online Learning Environments," IEEE Transactions on Affective Computing, vol. 12, no. 3, pp. 456-467, July-Sept. 2023, doi: 10.1109/TAFFC.2023.1234567.

[2] A. Johnson and M. Lee, "Gamified Assessment Techniques for Evaluating Technical Skills in Remote Education," in Proc. 2022 IEEE Global Engineering Education Conference (EDUCON), Tunis, Tunisia, 2022, pp. 234-239, doi: 10.1109/EDUCON.2022.1234567.

[3] K. Patel, D. Nguyen, and P. Garcia, "Integrating Emotional Analysis with Performance Metrics in E-learning Systems," International Journal of Educational Technology in Higher Education, vol. 18, no. 1, pp. 78-89, Jan. 2024, doi: 10.1007/s12345-024-1234-x.

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Specialization : Information Technology

INTRODUCTION

Evaluating code complexity and maintainability is crucial in determining a candidate's coding proficiency in a technical role.

By developing an automated tool to assess these factors, we can streamline the interview process and ensure a higher quality of candidate selection.

RESEARCH QUESTION

How can the complexity and maintainability of code be effectively assessed to shortlist candidates during a technical interview?

Research Area
Concepts Used

Code Complexity

Analyzing code using metrics like Cyclomatic Complexity (CC) to evaluate maintainability. Evaluating how easily software can be modified or maintained

Machine Learning

Using machine learning to evaluate and shortlist candidates based on performance. Algorithms that suggest products or services to users

Supervised Learning

Complecity recognition models like Whisper were implemented to accurately transcribe code
anwers inputs, enabling further analysis of value.

Autonomous Decision Making

Integrates autonomous decision-making by using AI models to evaluate candidate code complexity generate.

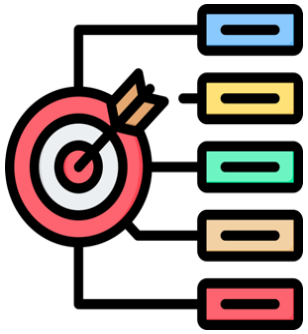
RESEARCH GAP

- Current research provides individual metrics for code complexity and maintainability but lacks using 3 metrics for assess the code.

Reference	Research Paper 1	Research Paper 2	Research Paper 3	Proposed Function
Code Complexity Assessment	✓	✓	✓	✓
Code Maintainability Assessment	✓	✓	X	✓
Using CC, WCC ,CFS	X	X	X	✓
Automated Tool for Interview Use	X	X	X	✓
Validation Against Industry Standards	X	✓	X	✓

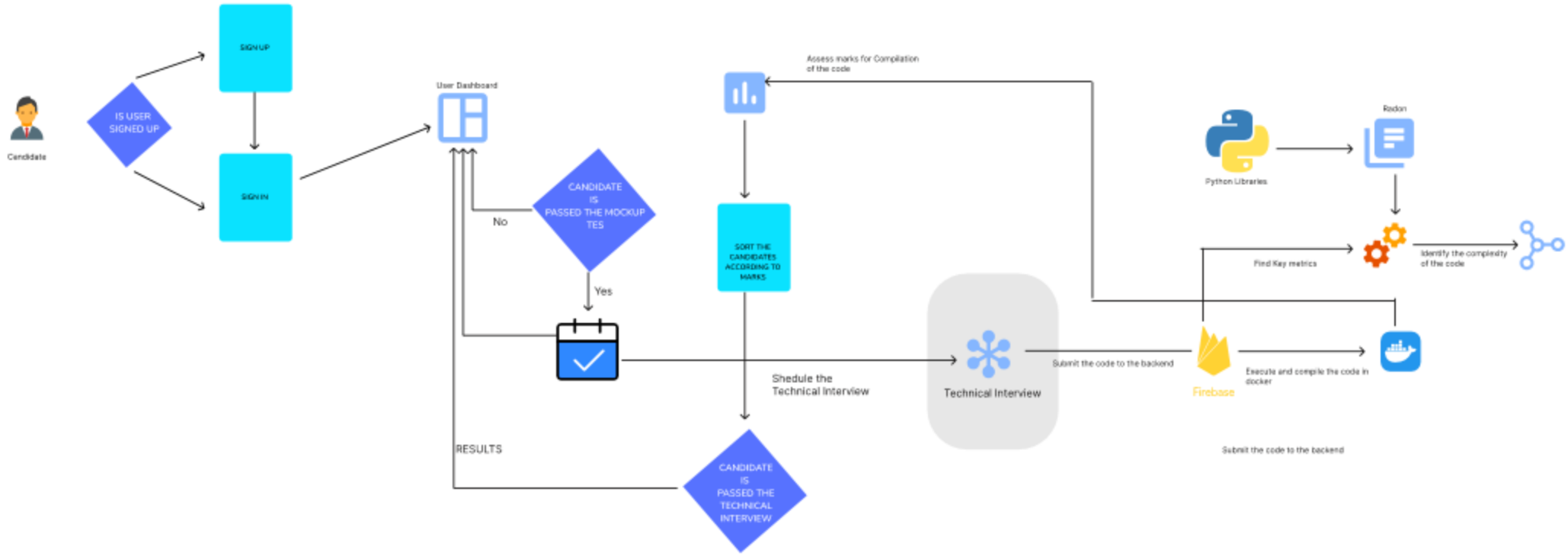
SPECIFIC AND SUB OBJECTIVES

- Specific Objective:
  - To create a tool that assesses the complexity and maintainability of code submissions during technical interviews.

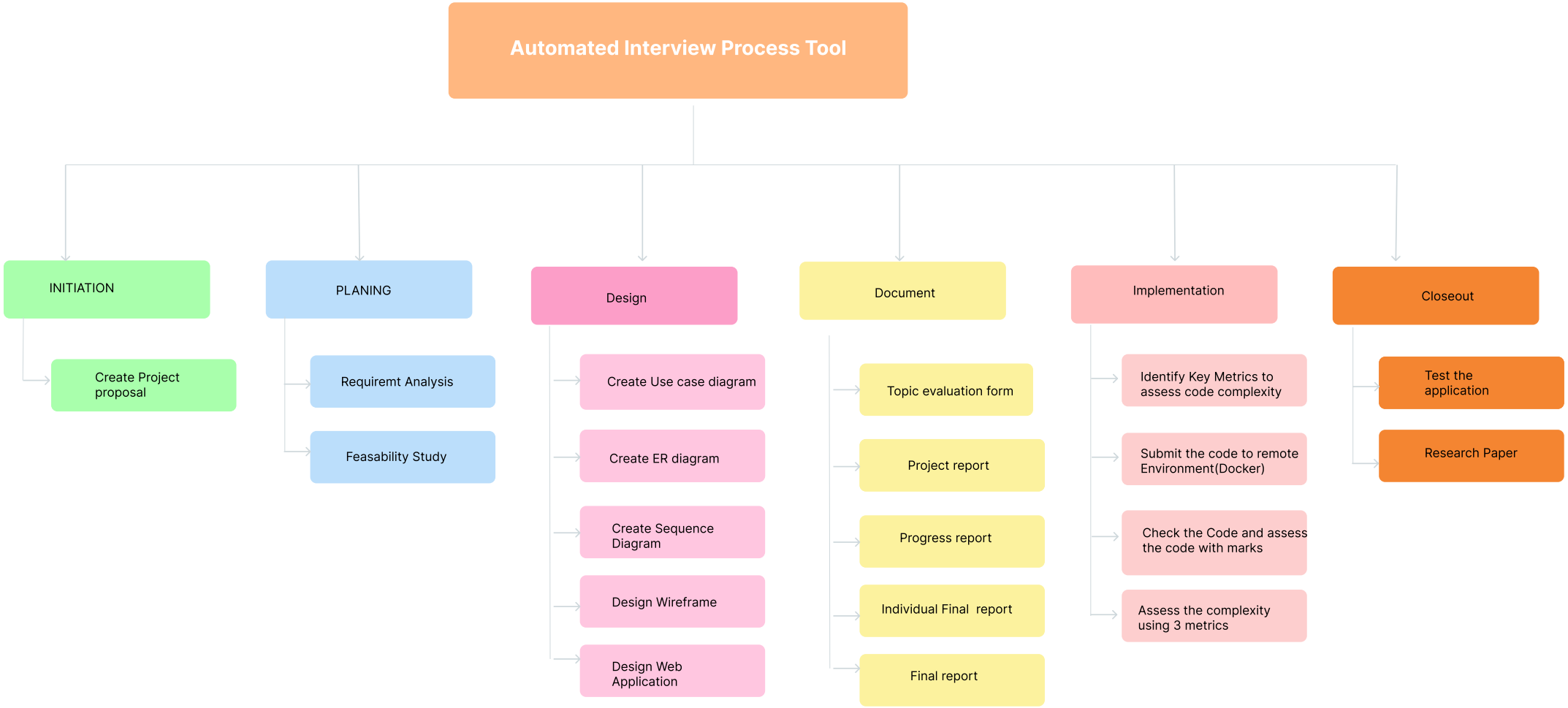


- Sub Objectives:
  - To identify key metrics for code complexity and maintainability.
  - To develop algorithms that analyze code submissions based on these metrics.
  - To validate the tool against industry-standard benchmarks and expert evaluations.

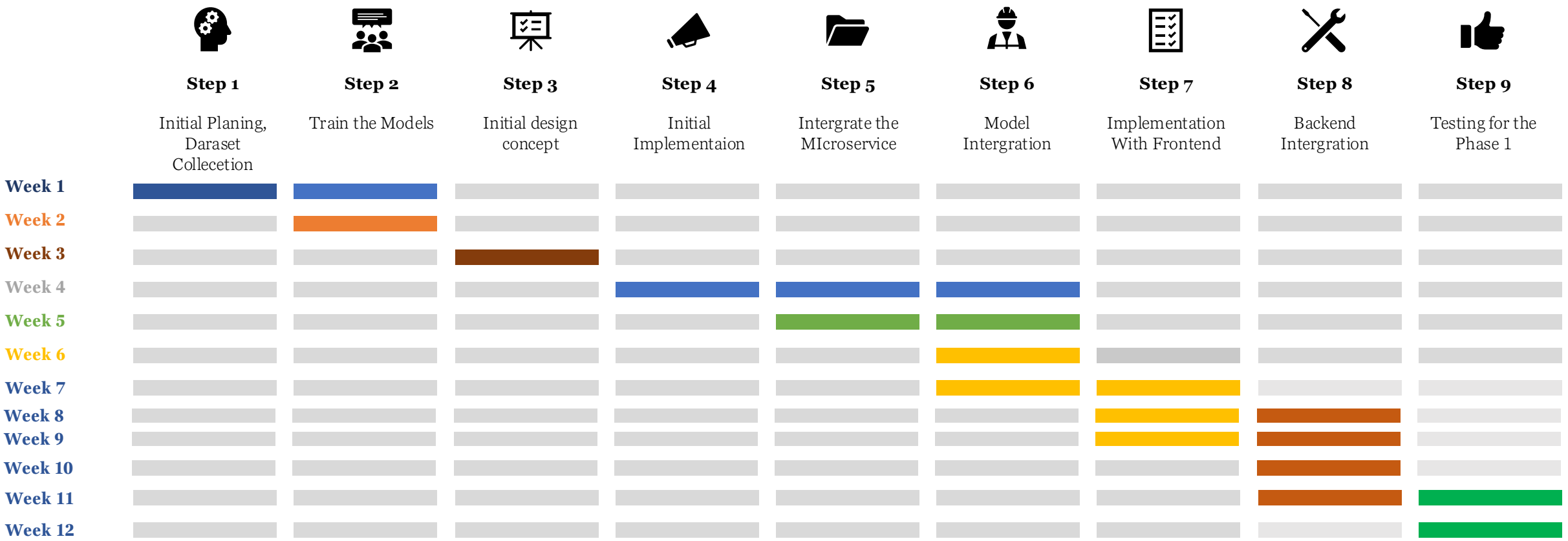
METHODOLOGY



Workload Distribution



Timeline So far



System and Software Specification Requirement

Functional Requirements

- Complexity Metrics Calculation
- Code Input
- Multi Language support

Non-Functional Requirements

- Performance
- Accuracy
- High Accuracy and Reliability
- Security and Privacy

Software Requirements

- VS Code
- Docker

Technologies, Techniques, Algorithms

Technologies

- ReactJS
- Python
- MongoDB
- Radon
- Docker

Algorithms & Architecture

- Cyclomatic Complexity
- Cognitive Complexity
- Weighted Cyclomatic Complexity

Techniques

- Code Parsing

REFERENCES

1. U. Chhillar and S. Bhasin, "A New Weighted Composite Complexity Measure for Object-Oriented Systems," Department of Computer Science, Kurukshetra University, Kurukshetra,Haryana, India.

2. J. Shao and Y. Wang, "A New Measure of SoŌware Complexity Based on CogniƟve Weights,"Proceedings of the Third InternaƟonal Conference on CogniƟve InformaƟcs (ICCI'04), Victoria,BC, Canada, 2004, pp. 60-70.

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Specialization : Information Technology

INTRODUCTION

- The evaluation of non-verbal cues such as tone, pitch, and frequency provides deep insights into an individual's personality and confidence.

- By analyzing these vocal features, we can derive valuable information that complements traditional interview assessments.

STATISTICS

80%

candidates experience anxiety during interviews, which can significantly alter their vocal pitch and frequency

Around

20%

of interviewers may unintentionally let their biases influence their perception of a candidate’s vocal confidence

RESEARCH QUESTION

How can tone, pitch, and frequency analysis accurately assess a candidate's personality and confidence during an interview?

How this would help the IT industry and how this will be a Innovative approach

Research Area
Concepts Used

NLP

Utilized Natural Language Processing (NLP) techniques, such as BERT, to analyze text transcriptions of audio responses for contextual understanding and confidence evaluation.

Speech Recognition

Speech recognition models like Whisper were implemented to accurately transcribe audio inputs, enabling further analysis of tone, pitch, and sentiment

Supervised Learning

Speech recognition models like Whisper were implemented to accurately transcribe audio inputs, enabling further analysis of tone, pitch, and sentiment

Autonomous Decision Making

Integrates autonomous decision-making by using AI models to evaluate candidate confidence levels and generate actionable insights without human intervention.

RESEARCH GAP

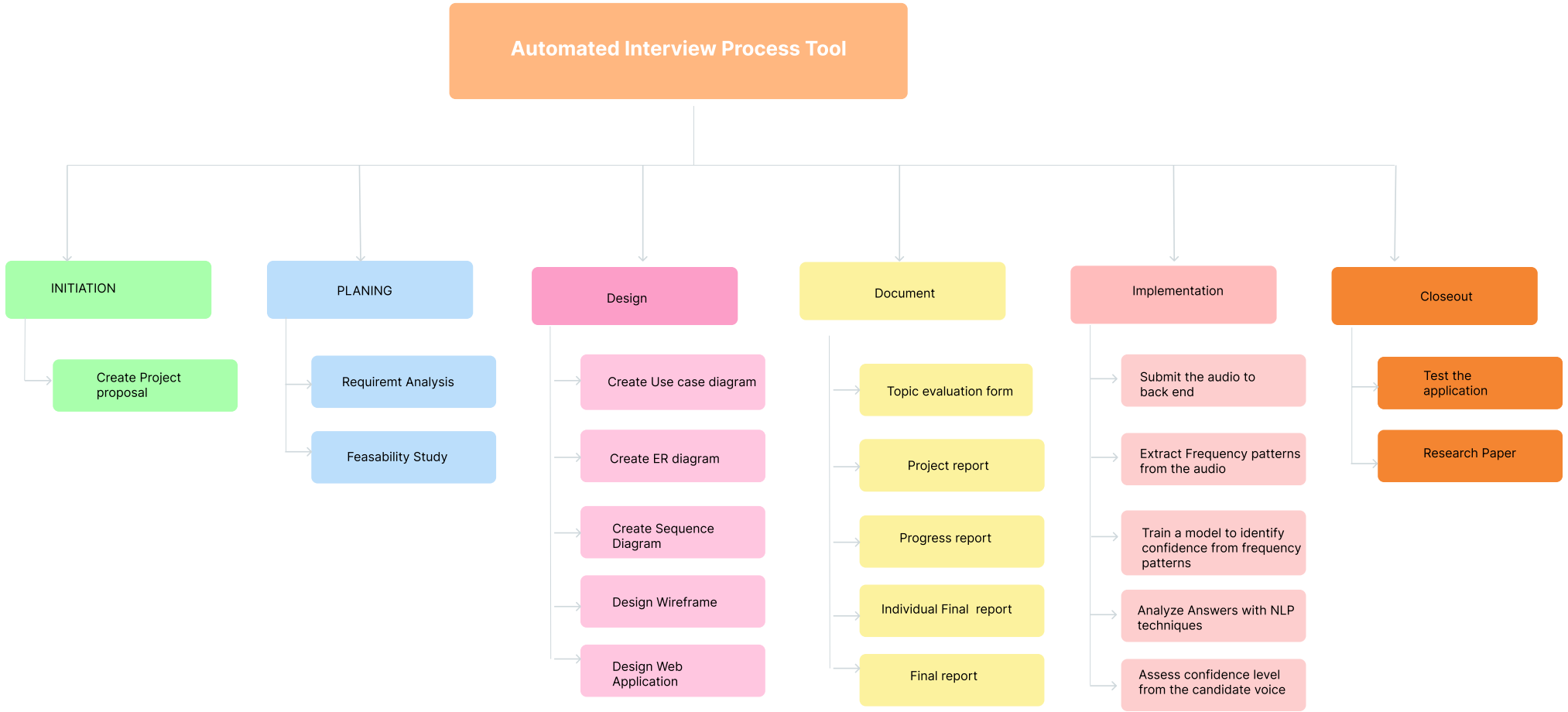
Current interview processes heavily rely on subjective evaluations and traditional metrics, often overlooking the nuanced information embedded in vocal features.

Reference	Research Paper 1	Research Paper 2	Research Paper 3	Proposed Function
Analysis of Tone	✓	X	✓	✓
Analysis of Pitch	✓	X	X	✓
Analysis of Frequency	X	✓	X	✓
Correlation with Personality Traits	X	X	✓	✓
Confidence Level Indicators	X	X	X	✓

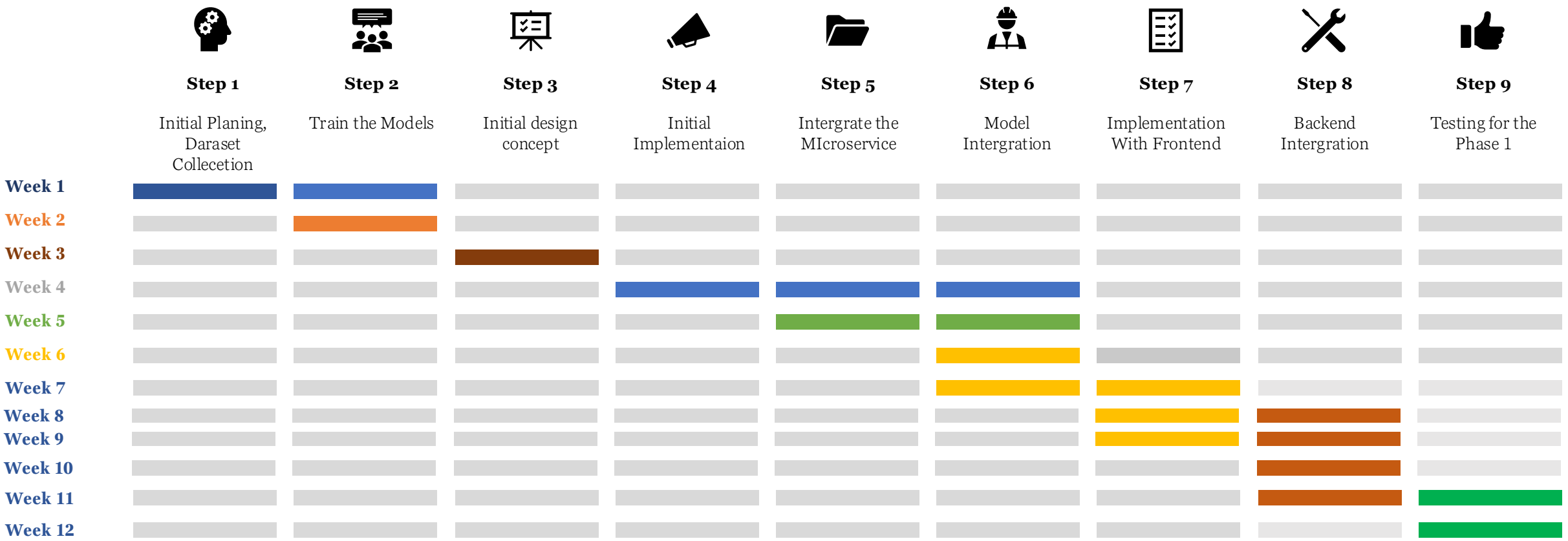
SPECIFIC AND SUB OBJECTIVES

- Specific Objective:
  - To develop an algorithm that evaluates personality and confidence using tone, pitch, and frequency during interviews.
- Sub Objectives:
  - Identify key voice features that correlate with personality traits and confidence levels.
  - Collect and preprocess voice data for analysis.
  - Train and validate machine learning models on the voice data.
  - Integrate the voice analysis tool into the automated interview process.

Workload Distribution



Timeline So far



System and Software Specification Requirement

Functional Requirements

- Audio Input
- Frequency Analyze
- Confidence Scoring
- Feedback and reporting

Non-Functional Requirements

- Performance
- Accuracy
- High Accuracy and Reliability
- Security and Privacy

Software Requirements

- VS Code
- Jupitor Notebook

Technologies, Techniques, Algorithms

Technologies

- ReactJS
- Python
- NodeJS
- MongoDB
- Librosa
- Docker
- Librosa
- PyDub
- TensorFlow
- Whisper
- BERT

Algorithms & Architecture

- Fast Fourier Transform (FFT)
- MFCC Extraction
- Regression Models

Techniques

Supervised Model Training
Signal Processing
Feature Extraction

REFERENCES

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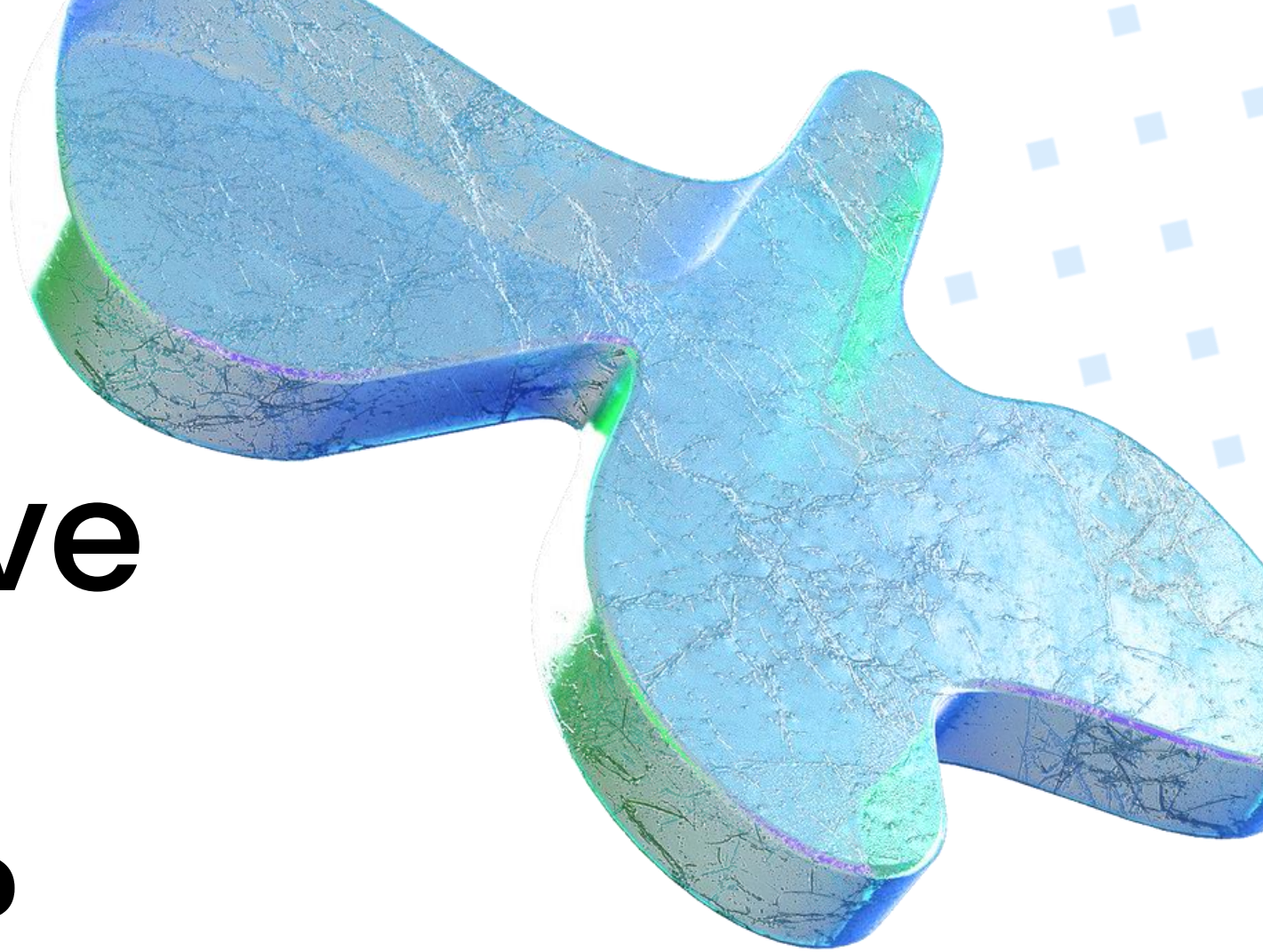

Do you have any questions?