ViQu – A smart viva and quizzing solution

Capstone Project Proposal

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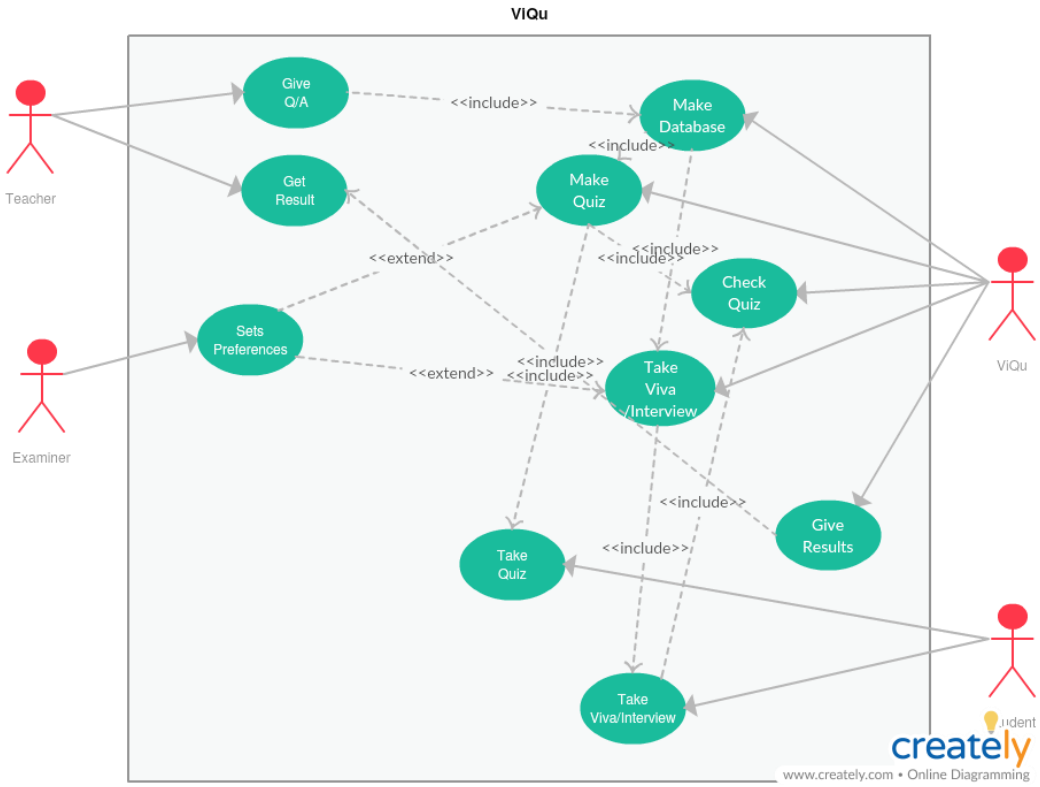
Use Case Diagram:



Use Case Template:

Use Case ID:	UID-101		
Use Case Name:	Interviewing/Viva and Quiz system		
Created By:	CPG28	Last Updated By:	CPG28
Date Created:	April 2nd, 2018	Date Last Updated:	April 3rd, 2018

Primary Actor:	Examiner
Secondary Actor:	Student, Teacher,ViQu
Description:	Teacher needs to submit questions and answers to ViQu, ViQu will make the database of these Q/A.ViQu will use the database for quizzing and taking interview/viva, Students will take the interview and quiz and ViQu will evaluate them for interview/viva it will use text summarization (using natural language processing) and for quiz it will use image processing to find out marked answers, these answers will be submitted to teacher.
Preconditions:	1. Hardware should be working correctly. 2. Interview/Viva should be in English. 3. Proper image should be provided for checking the quizzes. 4. Q/A should be provided by the teacher. 5. Extra disk space may be required. 6. Presence of the examiner may be required.
Postconditions:	1. ViQu can calculate the marks according to the students' performance.

	2. Teacher can view the marks allotted by the ViQu. 3. Teacher can update the marksheet, if needed. 4. Question bank can also be generated using the database.
Minimal Condition:	1. Database will be generated. 2. Quizzes will be generated. 3. Results will be provided.
Frequency of Use:	1. The process of Interviewing/Viva and Quiz depends upon the number of participants. 2. Question/Answer and updating of database will occur every month.
Trigger:	1. Providing Q/A will trigger Database. 2. Database will trigger Quiz making. 3. Taking interview will trigger taking interview/viva by ViQu. 4. Providing quiz pictures will trigger checking quizzes. 5. Any kind of evaluation will result in result generation.
Variations:	1. Question/Answer can be provided as text file or as excel file. 2. Pictures may be directly provided to the system instead of making ViQu take them.
Extensions:	End session if input not provided for too long.
Assumptions:	1. Students responds in English. 2. Pictures provided for checking viva should be in good quality.

Tasks and Subtasks:

1. Identification of project

2. Planning of project and need analysis
   2.1. Planning
   2.2. Scope plan

3. Study
   3.1. NLP
   3.2. Image Analysis
   3.3. Raspberry Pi

4. Designing of various diagrams
   4.1. Use-case diagram
   4.2. Activity diagram
   4.3. Work Breakdown Structure

5. Hardware interfacing
   5.1. Setup of Raspberry Pi 3
      5.1.1. Setup sensors
         5.1.1.1. Camera
         5.1.1.2. Mic
      5.1.2. Setup Actuators
         5.1.2.1. Speaker
      5.1.3. Validating interfacing

6. Software interfacing
   6.1. Setup Module
      6.1.1. Create GUI (using Python – Tkinter library)
      6.1.2. Create Different modules for Viva/Interview and Quiz setup

   6.2. Viva/Interview Module
      6.2.1. Viva/Int erview Generator
         6.2.1.1. Question Bank Creation
         6.2.1.2. Question Selector based on difficulty
      6.2.2. Viva/Interviewing process module
         6.2.2.1. Text-to-speech module (for asking questions)
         6.2.2.2. Speech-to-text module (for registering response)
         6.2.2.3. Storage module
      6.2.3. Viva/Interview Processor
         6.2.3.1. Text-summarization module (using NLP)
         6.2.3.2. Keyword Extractor

6.2.3.3. Grade Analyzer
6.2.3.4. Spreadsheet Creator

6.3. Quiz Module
6.3.1. Quiz Generator
6.3.1.1. Question Bank Creation
6.3.1.2. Question Selector based on difficulty
6.3.2. Quiz Analyzer
6.3.2.1. Image Capturing module (using object recognition)
6.3.2.2. Roll no./Candidate ID detection module (using ODR)
6.3.2.3. Blue Tick Detection module (using Image analysis)
6.3.2.4. Marking module
6.3.2.5. Spreadsheet Creator

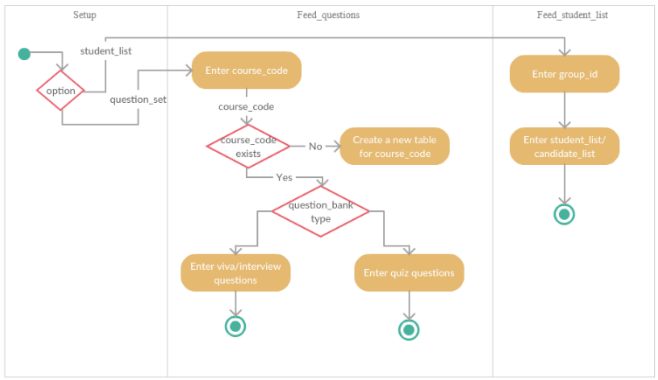
7. Integration
   7.1. Software and Hardware integration
   7.2. Module integration

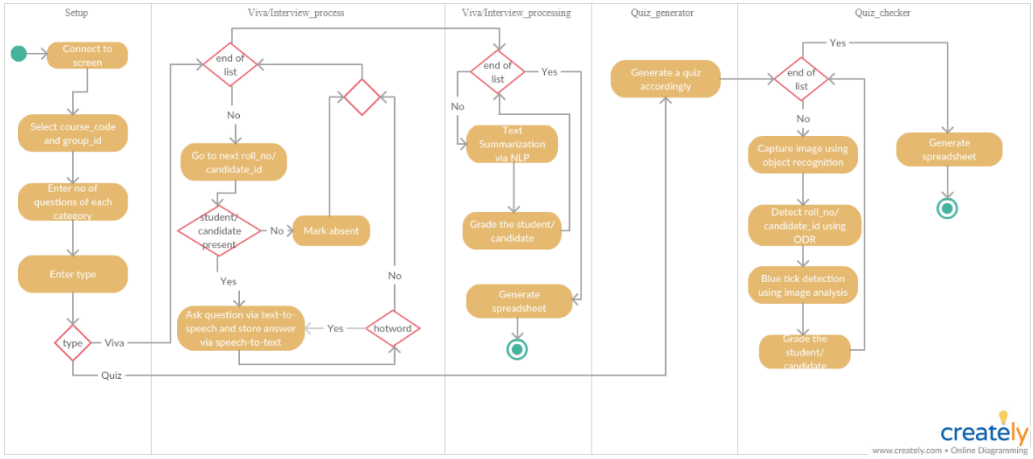
8. Testing
   8.1. Unit testing
   8.2. Module testing
   8.3. System testing
   8.4. Acceptance testing

9. Deployment
   9.1. Beta testing
   9.2. Modifications

10. Evaluations

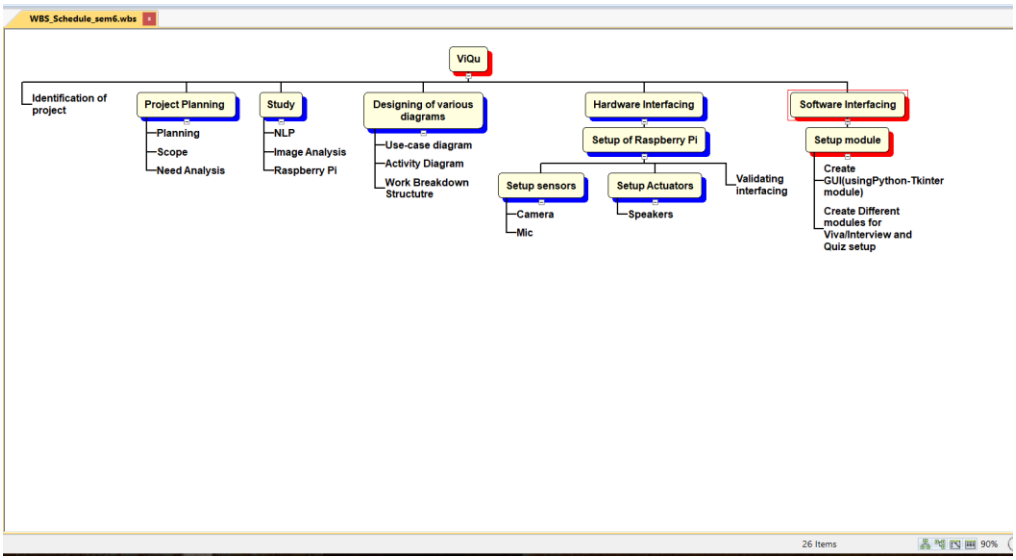
Activity Diagram:



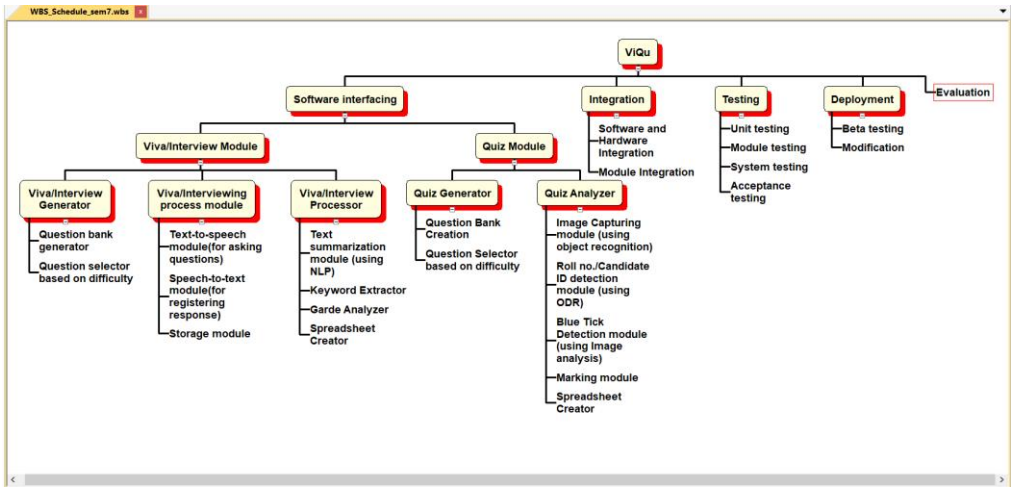


Work Breakdown Structure:

Semester 6

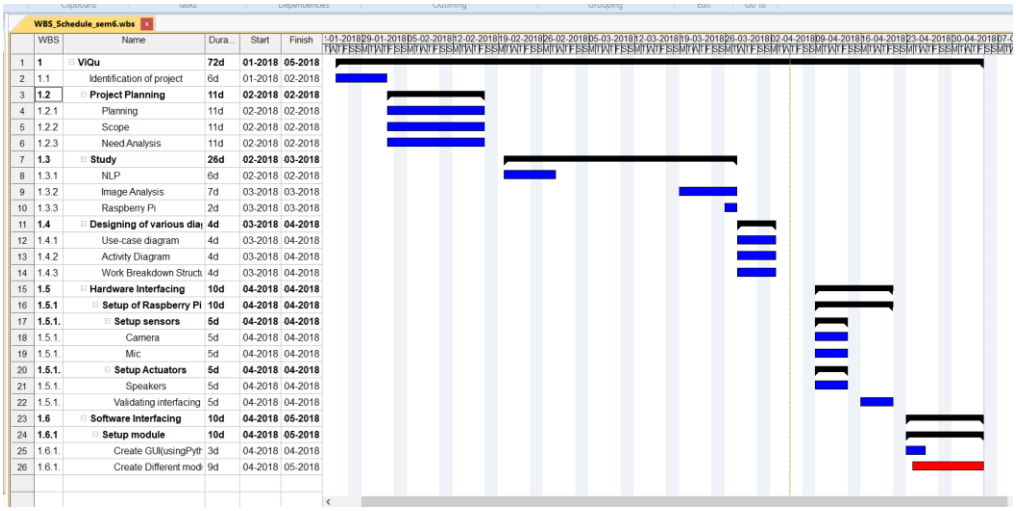


Semester 7



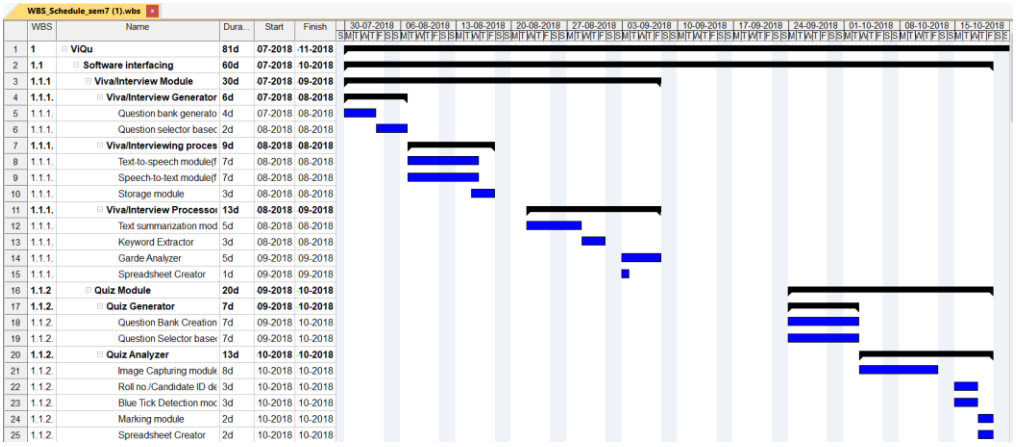
Gantt Chart:

Semester 6

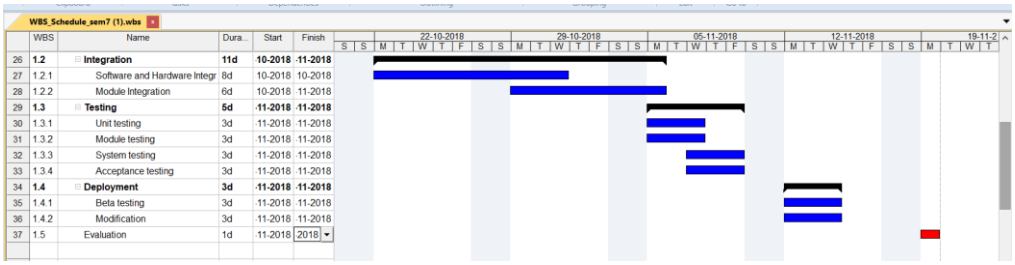


	WBS	Name	Dura...	Start	Finish
1	1	ViQu	72d	01-2018	05-2018
2	1.1	Identification of project	6d	01-2018	02-2018
3	1.2	Project Planning	11d	02-2018	02-2018
4	1.2.1	Planning	11d	02-2018	02-2018
5	1.2.2	Scope	11d	02-2018	02-2018
6	1.2.3	Need Analysis	11d	02-2018	02-2018
7	1.3	Study	26d	02-2018	03-2018
8	1.3.1	NLP	6d	02-2018	02-2018
9	1.3.2	Image Analysis	7d	03-2018	03-2018
10	1.3.3	Raspberry Pi	2d	03-2018	03-2018
11	1.4	Designing of various dia	4d	03-2018	04-2018
12	1.4.1	Use-case diagram	4d	03-2018	04-2018
13	1.4.2	Activity Diagram	4d	03-2018	04-2018
14	1.4.3	Work Breakdown Struct	4d	03-2018	04-2018
15	1.5	Hardware Interfacing	10d	04-2018	04-2018
16	1.5.1	Setup of Raspberry Pi	10d	04-2018	04-2018
17	1.5.1.	Setup sensors	5d	04-2018	04-2018
18	1.5.1.	Camera	5d	04-2018	04-2018
19	1.5.1.	Mic	5d	04-2018	04-2018
20	1.5.1.	Setup Actuators	5d	04-2018	04-2018
21	1.5.1.	Speakers	5d	04-2018	04-2018
22	1.5.1.	Validating interfacing	5d	04-2018	04-2018
23	1.6	Software Interfacing	10d	04-2018	05-2018
24	1.6.1	Setup module	10d	04-2018	05-2018
25	1.6.1.	Create GUI(usingPyth	3d	04-2018	04-2018
26	1.6.1.	Create Different modi	9d	04-2018	05-2018

Semester 7



	WBS	Name	Dura...	Start	Finish
1	1	ViQu	81d	07-2018	11-2018
2	1.1	Software interfacing	60d	07-2018	10-2018
3	1.1.1	Viva/Interview Module	30d	07-2018	09-2018
4	1.1.1.	Viva/Interview Generator	6d	07-2018	08-2018
5	1.1.1.	Question bank generato	4d	07-2018	08-2018
6	1.1.1.	Question selector basec	2d	08-2018	08-2018
7	1.1.1.	Viva/Interviewing proces	9d	08-2018	08-2018
8	1.1.1.	Text-to-speech module(f	7d	08-2018	08-2018
9	1.1.1.	Speech-to-text module(f	7d	08-2018	08-2018
10	1.1.1.	Storage module	3d	08-2018	08-2018
11	1.1.1.	Viva/Interview Processor	13d	08-2018	09-2018
12	1.1.1.	Text summarization mod	5d	08-2018	08-2018
13	1.1.1.	Keyword Extractor	3d	08-2018	08-2018
14	1.1.1.	Garde Analyzer	5d	09-2018	09-2018
15	1.1.1.	Spreadsheet Creator	1d	09-2018	09-2018
16	1.1.2	Quiz Module	20d	09-2018	10-2018
17	1.1.2.	Quiz Generator	7d	09-2018	10-2018
18	1.1.2.	Question Bank Creation	7d	09-2018	10-2018
19	1.1.2.	Question Selector base	7d	09-2018	10-2018
20	1.1.2.	Quiz Analyzer	13d	10-2018	10-2018
21	1.1.2.	Image Capturing module	8d	10-2018	10-2018
22	1.1.2.	Roll no./Candidate ID de	3d	10-2018	10-2018
23	1.1.2.	Blue Tick Detection moc	3d	10-2018	10-2018
24	1.1.2.	Marking module	2d	10-2018	10-2018
25	1.1.2.	Spreadsheet Creator	2d	10-2018	10-2018



	WBS	Name	Dura...	Start	Finish
26	1.2	Integration	11d	10-2018	11-2018
27	1.2.1	Software and Hardware Integr	8d	10-2018	10-2018
28	1.2.2	Module Integration	6d	10-2018	11-2018
29	1.3	Testing	5d	11-2018	11-2018
30	1.3.1	Unit testing	3d	11-2018	11-2018
31	1.3.2	Module testing	3d	11-2018	11-2018
32	1.3.3	System testing	3d	11-2018	11-2018
33	1.3.4	Acceptance testing	3d	11-2018	11-2018
34	1.4	Deployment	3d	11-2018	11-2018
35	1.4.1	Beta testing	3d	11-2018	11-2018
36	1.4.2	Modification	3d	11-2018	11-2018
37	1.5	Evaluation	1d	11-2018	2018

Functional Analysis:

Viva/Interview module:

- This module will fetch questions from the database to create a set of questions to be asked based on examiner preferences of difficulty level in the viva/interview.
- It will ask the candidate the set of questions created above using text-to-speech software module.
- It will record the response of the candidate to the asked question using speech-to-text software module.
- The recorded text above will then be summarized using the text-summarization software module.
- Also, the desired keywords will be searched in the candidate's response.
- Based on certain parameters of marking such as number of keywords required and relevance to the actual answer, marks will be awarded on a scale of 5.
- Finally, when all the questions have been asked a summary of the viva/interview is created with the final score.
- Also, in case of multiple candidates a spreadsheet can also be created with the details of all the candidates.

Quiz module:

- This module will fetch questions from the database to create a set of questions to be asked based on examiner preferences of difficulty level in the viva/interview.
- A quiz will be generated according to the difficulty required.

- After the candidates have taken the quiz, the quiz sheet is scanned via the camera attached to the device.
- The module scans the roll number/candidate id from the sheet using ODR software module.
- Now it detects the blue colored ticks on the multiple-choice questions and evaluates it.
- Finally, it enters the score of the candidate in the spreadsheet.

Setup module:

- This module is used by the examiner to setup the device for various requirements of the viva/interview/quiz.
- The examiner can enter the number of questions to be asked.
- The examiner can enter the difficulty level of the viva/interview/quiz required.

Non-Functional Analysis:

Performance requirement:

- This is a hardware-based project, so the actual performance of the device is dependent on the hardware we choose to build it.
- Moreover, the project has various resource hungry software modules like text summarizer, ODR ,etc hence hardware is to be chosen careful.

Product Cost:

Since it is a hardware-based project various device must be bought to create it.

The estimated budget related to these devices are as follows:

1.	Raspberry Pi 3	-	₹3150
2.	Mic	-	₹500
3.	Camera	-	₹1000
4.	Speakers	-	₹350
	Total	-	**₹5000**

Hardware used:

1. Raspberry Pi
2. Mic
3. Camera
4. Speakers

Software used:

1. Python Language

2. Python libraries
    2.1. Tkinter
    2.2. Keras
    2.3. Pytessaract
    2.4. Text-to-speech library
    2.5. Speech-to-text library
3. OS for Raspberry Pi 3

Security:

Since the device is always in the control of examiner, the students can never temper with it. Also to make it more secure we will be providing a feature where the final spreadsheet of marks can only be open with the help of a password, further making the data more secure.

Moreover, the device is not connected to the network, so it is not hackable.