Birla Institute of Technology & Science, Pilani
Work Integrated Learning Programmes Division
First Semester 2025-2026

Digital Learning Handout

Part A: Content Design

Course Title	Design of Conversational Experiences
Course No(s)	SE ZG530
Credit Units	4
Credit Model	3-1-0
Course Author	Prof. Shreyas Rao
Lead Instructor	R. Bharathi
Version No:	1.0
Date:	25/02/2025

Course Description:

Cognitive virtual assistant (CVA): Use-cases; Classification of conversational AI platforms; Architecture of Conversational Platform; Deployment and Pricing models; Platform landscape; Designing Bots: Bot Architecture; Bot Anatomy; Design process overview; Branding, Personality, and Human Involvement; Conversation; Rich interactions; Engagement methods; Use case definition and exploration; Conversation scripting; Context and Memory; User testing; Designing Voice User Interfaces(VUI): Conversational Voice User Interface(VUI); VUI Designer; VUI design principles; Designing effective process and dialogue; Personas, Avatars, Actors; Speech recognition technology; Advanced VUI Design; User testing; Development: Building and deploying conversational AI assistants (voice assistants & chatbots) using cloud native / open source platforms such as Google Dialogflow, RASA or MS Bot framework; Bot Discovery and installation; Monetization; Analytics and Continuous improvement; Trends: SuperBot Platforms; Multiplatform Bots; Identity consolidation; Voice-enabled Devices – Smart Homes and Smart Cars as example environments.

Course Objectives

No	Course Objective
CO1	Introduce the foundations of conversational AI and platforms
CO2	Understand key design concepts for Bots and Voice User Interfaces
CO3	Design Conversational Experiences across different use cases
CO4	Build AI chatbots and voice bots using practical toolkits

Text Book(s):

T1	"Designing Bots – Creating Conversational Experiences" by Amir Shevat. Publisher: O'Reilley, 2017
T2	"Designing Voice User Interfaces – Principles of Conversational Experiences" by Cathy Pearl. Publisher: O'Reilley, 2017

Reference Book(s) & other resources:

R1	"The Definitive Guide to Conversational AI with Dialogflow and Google Cloud" by Lee Boonstra. Publisher Apress, 2021
R2	"Cognitive Virtual Assistants Using Google Dialogflow" by Navin Sabharwal, Amit Agrawal. Publisher: Apress, 2020
R3	"Conversational AI - Chatbots that work" by Andrew Freed. Publisher: Manning, 2021
R4	"Build Better Chatbots - A Complete Guide to Getting Started with Chatbots" by Rashid Khan, Anik Das. Publisher: Apress, 2018
WR1	Enterprise Conversational AI Platform - https://www.cxtoday.com/data-analytics/gartner-magic-quadrant-for-enterprise-conversational-ai-platforms-2022/
WR2	Amazon Lex - https://docs.aws.amazon.com/pdfs/lexv2/latest/dg/lex2.0.pdf
WR3	Google DialogFlow https://landbot.io/blog/chatbot-using-dialogflow-integration https://medium.com/@dipan.saha/chatbot-development-made-easy-creating-a-simple-bot-with-dialogflow-ade69caac37d
WR4	Multi-lingual Bots Amazon Lex - https://aws.amazon.com/blogs/machine-learning/building-a-multilingual-question-and-answer-bot-with-amazon-lex/
WR5	LLMs in Conversational AI - https://www.analyticsvidhya.com/blog/2023/07/llms-in-conversational-ai/ No code LLM-based Chatbot - https://flowiseai.com/

Learning Outcomes: Students will be able to

LO1	Obtain understanding of the applications of Cognitive virtual assistants and chatbots
LO2	Apply knowledge of the design and process flows necessary for creating conversational experiences
LO3	Develop hands-on experience in implementation and deployment of chatbots and voice assistants
LO4	Gather knowledge of practical ways of testing, releasing, analysing and monetizing the conversational applications

Modular Content Structure

1. Introduction

- Conversational Interfaces
- Conversational Platforms: Characteristics, Classification and Landscape
- Virtual Assistant vs Chatbots
- Cognitive Virtual Assistants (CVA)
- Use cases for virtual assistants, chatbots and CVA
- Architecture of Conversational Platforms
- Overview of Deployment and Pricing models
- Enterprise Conversational AI platforms

- Natural-language-portfolio centric
- Business automation centric
- User-experience centric

2. Bot Basics

- Types of Bots
- Bot platforms
- Bot Anatomy
- Branding, Personality, and Human Involvement

3. Designing Bot Conversations

- Onboarding
- Functionality Scripting
- Task-led and topic-led conversations
  - Divergent flows and course correction
  - Entity extraction
  - Intent mapping
  - Conversational controls
  - Stories/ Flows
- Decoration
- Rich Interactions
- Context and Memory
- Bot Discovery and Installation
- Engagement Methods

4. Case studies on bot design

- Case Studies of PTOBot and VacationBot
- Use Case Definition and Exploration
- Conversation Scripting
- Designing and Testing

5. Bot Building and Deployment

- Bot building overview
- Comparison of bot builder frameworks and tools
  - Open source vs commercial
  - No code vs low code
- Bot deployment across multiple channels
- Demo of end-to-end conversation management using bot builders
- Monetization
- Analytics and Continuous Improvement

6. Designing Voice User Interfaces

- Conversational Voice User Interface (VUI)
- VUI Designer
- VUI Design Principles
- Conversational Design
  - Setting user expectations
  - Design tools
  - Confirmations

- Personas
- Avatars
- Pros and cons of Avatars
- Actors
- Speech Recognition Technology

7. Advanced VUI design

- Branching
- Disambiguation
- Negation Handling
- Sentiment Analysis and Emotion Detection
- Text-to-Speech Versus Recorded Speech
- Advanced Multimodal and NLU

8. Building, Testing and Deploying VUI Apps

- Overview of building voice assistants using cloud native / open source platforms
- Building a VUI Application
    - Utterance
    - Intents
    - Entities
    - Fulfilment
    - Integrations
    - Training
    - Validation
- Monetization of VUI application
- Analytics in VUI application
- User testing
- Early-Stage Testing
- Usability Testing
- Performance Measures
- Deployment channels

9. Building Multi-Lingual Virtual Agents

- Agent languages
- Building a Multi-lingual virtual agent
- Working with translation service
- Multi-language training and testing
- Discussion on frameworks and tools that support multi-lingual agent development

10. Trends

- Super Bot Platforms
- Multiplatform Bots
- User Identity Consolidation
- Voice-enabled Devices: Smart Homes and Smart Cars as example environments
- Building chatbots using Large Language Models (LLMs)
- RAG model for chatbot development
- Multimodality for improved Customer Experience (CX)

Part B: Learning Plan

Contact Session	List of Topic Title	Sub-Topics	Reference
1	**Introduction**	• Conversational Interfaces • Conversational Platforms: Characteristics, Classification and Landscape • Virtual Assistant vs Chatbots • Cognitive Virtual Assistants (CVA) • Use cases for virtual assistants, chatbots and CVA	R2 – Chapter 1 T1 – Chapter 4 Lecture Notes

2	**Introduction**	• Architecture of Conversational Platforms
		• Overview of Deployment and Pricing models
		• Enterprise Conversational AI platforms
		  ○ Natural-language-portfolio centric
		  ○ Business automation centric
		  ○ User-experience centric
			R2 – Chapter 1
			R3 – Chapter 1
			WR1
			Lecture Notes

3	**Bot Basics**	• Types of Bots • Bot platforms • Bot Anatomy • Branding, Personality, and Human Involvement	T1 - Chapters 2,3,5, 6

4	**Designing Bot Conversations**	• Onboarding
		• Functionality Scripting
		• Task-led and topic-led conversations
		  ○ Divergent flows and course correction
		  ○ Entity extraction
		  ○ Intent mapping
		  ○ Conversational controls
		  ○ Stories/ Flows
		• Decoration
			T1 – Chapter 8
			R4 - Chapters 3, 4

5	**Designing Bot Conversations**	• Rich Interactions • Context and Memory • Bot Discovery and Installation • Engagement Methods	T1 – Chapters 9, 10, 11,12
6	**Case Studies on Bot design**	• Case Studies of PTOBot and VacationBot • Use Case Definition and Exploration • Conversation Scripting • Designing and Testing	T1- Chapters 14, 15, 16, 17

7 & 8	**Bot Building and Deployment**	• Bot building overview
		• Comparison of bot builder frameworks and tools
		  ○ Open source vs commercial
		  ○ No code vs low code
		• Bot deployment across multiple channels
		• Demo of end-to-end conversation management
			T1 - Chapters 13, 18, 19
			R4 - Chapters 3,4
			Lecture Notes

		using bot builders • Monetization • Analytics and Continuous Improvement	

9	**Designing Voice User Interfaces (VUI)**	• Conversational Voice User Interface (VUI)
		• VUI Designer
		• VUI Design Principles
		• Conversational Design
		  ○ Setting user expectations
		  ○ Design tools
		  ○ Confirmations
			T2 - Chapters 1, 2

10	**Designing Voice User Interfaces (VUI)**	• Personas • Avatars • Pros and cons of Avatars • Actors • Speech Recognition Technology	T2- Chapters 3, 4
11	**Advanced VUI Design**	• Branching • Disambiguation • Negation Handling • Sentiment Analysis and Emotion Detection • Text-to-Speech Versus Recorded Speech • Advanced Multimodal and NLU	T2 - Chapter 5

12	**Building VUI applications**	• Overview of building voice assistants using cloud native / open source platforms
		• Building a VUI Application
		  ○ Utterance
		  ○ Intents
		  ○ Entities
		  ○ Fulfilment
		  ○ Integrations
		  ○ Training
		  ○ Validation
		• Monetization of VUI application
		• Analytics in VUI application
			R3 - Chapter 2
			WR2
			WR3
			Lecture Notes

13	**Testing and Deploying VUI applications**	• User testing • Early-Stage Testing • Usability Testing • Performance Measures • Deployment channels	T2 – Chapter 6 Lecture Notes
14	**Building Multi-Lingual Virtual Agents**	• Agent languages • Building a Multi-lingual virtual agent • Working with translation service • Multi-language training and testing • Discussion on frameworks and tools that support multi-lingual agent development	R1 – Chapter 8 R2 – Chapter 3 WR4 Lecture Notes

15	**Trends - I**	• Super Bot Platforms • Multiplatform Bots • User Identity Consolidation • Voice-enabled Devices: Smart Homes and Smart Cars as example environments	T2 – Chapter 6 Lecture Notes
16	**Trends - II**	• Building chatbots using Large Language Models (LLMs) • RAG model for chatbot development • Multimodality for improved Customer Experience (CX)	WR5 Lecture Notes

Experiential Learning Components:

1. Lab work: 4
2. Project work: 0
3. Case Study: 0
4. Simulation: 0
5. Work Integrated Learning Assignment- 1 Assignment
6. Design work/ Field work: 0

Objective of Experiential Learning Component:
Hands on sessions on implementation of
a) Text based chatbot
b) Voice based chatbot (VUI)
c) LLM based Chatbot, using no-code or low-code tools

Scope of Experiential Learning Component:
Programming language - Python
Tools and libraries: Python 3.12, Visual Studio Code, Git, RASA, Google DialogFlow, Engati, LangChain, Open AI APIs
AWS Services: Amazon Lex, AWS Lambda, IAM, AWS CloudWatch

Lab Infrastructure:
Online/ Open source/ Virtual Lab/ Google Colab

List of Experiments:

Lab No	Lab Objective	Session Reference
1	Demonstrate the design and development of a text-based bot for a simple use case. Deploy the bot on any one channel	7
2	Demonstrate the design and development of a virtual agent answering queries in both text and voice modes	12

	(English language). Deploy on any two channels	
3	Extend the second experiment to include one more language (preferably Indian origin). Deploy on any two channels. [Optional]	13 or 14
4	Create a simple chatbot using any large language model, employing no-code or low-code methods	15

Evaluation Scheme:

Legend: EC = Evaluation Component; AN = After Noon Session; FN = Fore Noon Session

Evaluation Component	Name (Quiz, Lab, Project, Mid-term exam, End semester exam, etc.)	Type (Open book, Closed book, Online, etc.)	Weight	Duration	Day, Date, Session, Time
EC – 1*	Assignment/Lab Assignment (3 Assignments)	Online	35 %	30 days	September 01-10, 2025
EC - 2	Mid-Semester Test	Closed Book	30%	2 hours	20/09/2025 (AN)
EC - 3	Comprehensive Exam	Open Book	35%	2 ½ Hours	29/11/2025 (AN)

EC1* (20% - 35%): Quiz (optional): 5-10 %, Lab Assignment/Assignment: 20% - 35%
Syllabus for Mid-Semester Test (Closed Book): Topics in Contact session: 1 to 8
Syllabus for Comprehensive Exam (Open Book): All topics

Important Links and Information:

eLearn Portal: https://elearn.bits-pilani.ac.in
Students must visit the eLearn portal regularly and stay updated with the latest announcements and deadlines.

Contact Sessions: Students should attend the online lectures as per the schedule provided on the eLearn portal.

Evaluation Guidelines:

1. EC-1 consists of either two Assignments or three Quizzes. Students will attempt them through the course pages on the eLearn portal. Announcements will be made on the portal in a timely manner.
2. For Closed Book tests: No books or reference material of any kind will be permitted.
3. For Open Book exams: "open book" means text/ reference books (publisher copy only) and does not include any other learning material. No other learning material will be permitted during the open book examinations. For Detailed Guidelines refer to the attached document.
   EC3 Guidelines
4. If a student is unable to appear for the Regular Test/Exam due to genuine exigencies, the student should follow the procedure to apply for the Make-Up Test/Exam, which will be made available on the eLearn portal. The Make-Up Test/Exam will be conducted only at selected exam centres on the dates to be announced later.

It shall be the responsibility of the individual student to be regular in maintaining the self-study schedule as given in the course handout, attend the online lectures, and take all the prescribed evaluation components such as Assignments/Quizzes, Mid-Semester Tests and Comprehensive Exams according to the evaluation scheme provided in the handout.

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