BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

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CSIW ZG628T DISSERTATION

<u>Dissertation Outline</u>

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<u>Title of Dissertation:</u> IT Support Assist: AI-Powered Co-Pilot for Support Engineers Using Large Language Models (LLM) and Offline Retrieval-Augmented Generation (RAG)

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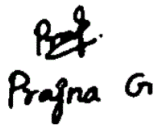**Designation of Second Examiner**: IT Operations Manager

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Supervisor's rating of the Technical Quality of this Dissertation Outline

EXCELLENT / GOOD / FAIR/ POOR (Please specify):   EXCELLENT

Supervisor's suggestions and remarks about the outline: The project is relevant and well-aligned with industry needs, especially with its use of AI, RAG & ServiceNow integration. Suggestions include narrowing the scope, highlighting practical use cases and ensuring the feedback loop is measurable. Overall, the approach is promising and feasible.

(Signature of Student)   (Signature of Supervisor)

Date:02-08-2025   Date: 02-08-2025

Table of Content –

1. Introduction

Modern IT support teams are under constant pressure to resolve incidents quickly and accurately. However, engineers often face delays due to outdated knowledge bases (KBs), misrouted tickets, or reliance on senior resources for known solutions. To address these challenges, this project proposes **IT Support Assist** — an AI-powered co-pilot that aids support engineers with real-time summarization, solution recommendations, and knowledge reinforcement. This project aligns with the growing industry focus on leveraging GenAI for ITSM (IT Service Management), automating Tier-1 resolutions, and promoting digital upskilling among frontline support teams.

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2. Problem Statement

Current IT support processes often lack intelligent systems capable of understanding incident context, extracting relevant resolutions, and offering reliable fallback mechanisms. Knowledge Base (KB) articles are frequently static, outdated, or incomplete. As a result, engineers spend valuable time searching for solutions externally, leading to increased misrouting and delayed resolutions. Moreover, the absence of formalized upskilling paths contributes to steep learning curves for junior staff. Finally, the use of external AI tools for analyzing internal tickets raises concerns regarding data privacy and organizational compliance.

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3. Objectives of the Project

- To create an AI-powered co-pilot tailored for support engineers
- To minimize misrouted incidents by providing contextual summaries and guidance
- To suggest relevant KB articles and troubleshooting steps using LLMs
- To enable offline access to essential knowledge during outages
- To support continuous growth through interactive quiz modules
- To ensure data privacy by keeping the system locally hosted within the organization.

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4. Overview of Existing System and Limitations

Most IT support teams operate using a mix of static knowledge bases, SOP documents, and informal support from experienced engineers. While functional, these systems face serious challenges:

- **Outdated or Incomplete KBs**: Many recurring issues are undocumented or not updated regularly.
- **Manual Troubleshooting**: Engineers often rely on Google or senior staff to find resolutions.
- **Customer Escalations and DSATs**: Delayed or incorrect fixes lead to escalations and dissatisfaction.
- **Unnecessary Escalations to Higher Teams**: Basic issues often get routed to L3 or specialist teams due to lack of knowledge.
- **Increased Ticket Misrouting**: Without intelligent triage, tickets land in the wrong queues, wasting time.
- **Resource Misutilization**: High-level teams are overburdened with basic issues, reducing their availability for actual critical cases.
- **Data Security Risks**: Using external AI tools raises concerns about leaking internal ticket data.

These limitations contribute to slow resolution, customer dissatisfaction, inconsistent service quality, and operational inefficiencies.

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5. Proposed Solution: IT Support Assist

IT Support Assist is an AI-powered co-pilot designed to transform how support engineers handle incidents. By integrating Large Language Models (LLMs) with offline Retrieval-Augmented Generation (RAG), it helps engineers quickly understand, resolve, and learn from incidents — without depending on external systems or higher-tier teams.

Key Capabilities:

- **LLM-Powered Case Summarization**: Translates verbose incident logs into concise summaries for quicker understanding.
- **RAG-Enhanced Answer Accuracy:** Uses Retrieval-Augmented Generation to fetch and reference trusted internal KBs before responding — ensuring answers are both context-aware and factually grounded, even in offline mode.
- **ServiceNow Integration :** The assistant integrates with ServiceNow using secure APIs to fetch incident data and enable automatic summarization, KB retrieval, and solution suggestion — mimicking real-world enterprise workflows.
- **Contextual KB and SOP Suggestion**: Finds relevant internal resources without manual searching.
- **Offline Fallback Support**: Enables essential KB access even during internet or API outages.
- **Smart Troubleshooting Tips**: Suggests extra resolution steps based on similar past incidents.

- **Knowledge Assessment Module:** Offers short, scenario-based quiz built into the assistant UI — triggered on demand or during idle moments.
- **Reduced Escalation Load**: Helps frontline agents handle more without escalating unnecessarily, preserving higher-tier capacity.
- **Locally Hosted for Security**: Ensures ticket data stays within the company and complies with internal governance.
- **Feedback Capture Loop**: Engineers can rate the usefulness of AI responses, helping continuously refine suggestions and identify knowledge gaps.

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7. Benefits and Expected Outcome -

The **IT Support Assist** system is designed to improve the productivity and efficiency of IT support engineers by delivering intelligent guidance and real-time context during issue resolution. Its expected benefits span across multiple operational and strategic areas:

Operational Benefits -

- **Reduced Resolution Time**: Engineers get faster access to summarized issues and relevant KBs.
- **Fewer Misrouted Tickets**: AI-assisted summaries and suggestions reduce incorrect triage.
- **Minimized Escalations**: Helps frontline teams solve more issues independently, without involving higher-tier engineers unnecessarily.
- **Improved Knowledge Retention**: The learning module promotes continuous self-improvement among support staff.

Business and Organizational Benefits -

- **Consistent Service Quality**: Reduces variation in how incidents are handled across teams.
- **Optimized Resource Usage**: Prevents overuse of senior engineering resources for basic issues.
- **Higher Customer Satisfaction**: Quicker fixes and accurate routing reduce DSATs and escalations.
- **Data Privacy**: Since the assistant is hosted locally, ticket data stays within organizational boundaries, eliminating external risk exposure.
- **Scalable Foundation for AI-Driven ITSM:** Establishes a reusable architecture for future integration with enterprise-grade automation, analytics, and employee self-service bots.

Work Plan and Implementation Timeline -

Task No.	Tasks	Duration (in Weeks)	Key Deliverables
1	Requirement Gathering & Planning	2	-Define problem statement, identify key features (AI assistant, ServiceNow integration, Feedback Loop), and finalize technology stack and scope
2	System Architecture & RAG Design	2	-Select appropriate LLM, embedding model, and design format for local KB storage.
3	LLM Prompt Engineering & Integration	2	-Prompt templates for simplifying KBs, generating troubleshooting tips, and creating quiz questions -LLM integration code -Output formatting for simplified KBs.
4	KB Retrieval & Simplification	2	-ServiceNow developer instance connected using API -Case ID to KB mapping logic implemented -Sample KBs fetched and simplified using LLM
5	Additional Troubleshooting & Quiz Generation	2	-Prompt logic to extract common extra fixes outside KB scope -Quiz generation feature based on simplified KB -Backend functions to store quiz questions, user answers, and scoring.
6	Web UI Development	2	-Web interface built for inputting case ID, displaying KB suggestions, extra tips, and quiz

			- Feedback submission UI
			- Responsive design with proper navigation between stages
			- Error handling and loading indicators
7	Offline Mode Setup	1	- Fallback logic when API fails or user is offline
			- Static cache of previously used KBs and their simplified outputs
			- Offline alerts and UI toggle for fallback mode
			-Limited case simulation without live API
8	Testing & Demo	2	- Unit tests for each module (LLM calls, KB fetch, feedback logging)
			-Integration testing with full case flow
			-Sample test cases with expected vs actual output
9	Final Documentation & Submission	1	- Compile all the documentation into a comprehensive project report post the deployment.