Bot Bridge: Multi-Agent Chatbot Platform

Comprehensive Project Documentation

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Project Type: Enterprise AI Chatbot Interface

**Executive Summary**

***Bot Bridge*** is an innovative unified point of entry multi-agent chatbot platform specifically designed for Eli Lilly and Company employees. This React-based web application provides seamless access to specialized AI agents through a unified, user-friendly interface. The platform integrates advanced voice recognition capabilities, enterprise-grade authentication, and intelligent agent routing to deliver contextual assistance across various business domains.

**Key Achievement**: Successfully developed a production-ready chatbot interface that connects Lilly employees to specialized AI agents via Cortex API, featuring voice interaction, multi-chat support, and enterprise security compliance.

**1. Project Overview**

**1.1 Business Problem**

Eli Lilly employees needed a centralized platform to access multiple specialized AI agents for different business functions including medical information, compliance guidance, web research, and travel assistance. The existing systems were fragmented and lacked intuitive user interfaces.

**1.2 Solution Delivered**

Bot Bridge provides a unified chatbot interface that intelligently routes queries to appropriate specialized agents while offering modern UX features including voice interaction, multi-chat management, and responsive design.

**1.3 Technology Stack**

* Frontend: React 19.1.0 with modern hooks (useState, useEffect, useCallback)
* Backend: Flask Python API with CORS support
* AI Integration: Lilly Light Client connecting to Cortex API
* Voice Features: Web Speech API (Speech Recognition & Synthesis)
* Authentication: Lilly email domain validation with session management
* Styling: Custom CSS with dark/light mode support

**2. Architecture & System Design**

**2.1 System Architecture**

**2.2 Agent Routing System**

* The platform includes four specialized agents:
* Medicine Bot - Medical information and drug-related queries
* Compliance Bot - Regulatory compliance and quality assurance
* Web Search & Scrape Bot - Real-time web search and regulation scraping
* Traveler Bot- Travel guidance and trip assistance

**2.3 Data Flow**

* User submits query through React interface
* Frontend sends POST request to Flask API
* Flask API forwards query to Cortex supervisor-bot
* Supervisor-bot routes to appropriate specialized agent
* Response formatted and displayed with agent identification

**3. Core Features Implementation**

**3.1 Multi-Agent Communication**

**Implementation**: Agent detection through response parsing with bracket notation [Agent Name]

**Business Value**: Users automatically receive responses from the most qualified agent without manual selection.

**3.2 Voice Integration**

* Speech-to-Text Features:
* Real-time voice input with visual feedback
* Browser-native Web Speech API integration
* Keyboard shortcut support (Ctrl+M)
* Text-to-Speech Features:
* Automatic response narration (optional)
* Customizable speech rate and volume
* Natural voice selection preference
* Accessibility Impact: Enables hands-free operation and supports users with disabilities.

**3.3 Multi-Chat Management**

Implementation: State-managed chat sessions with persistent message history

* Unlimited simultaneous conversations
* Smart suggestion display for new chats
* Automatic chat naming and organization

**Business Value**: Enables context switching between different topics/projects without losing conversation history.

**3.4 Enterprise Authentication**

Security Features:

* Lilly email domain validation (@lilly.com, @elililly.com)
* Session timeout management (24-hour expiration)
* "Remember Me" functionality with localStorage
* Profile management with avatar support

Compliance: Ensures only authorized Lilly employees can access the platform.

**4. User Experience Features**

**4.1 Responsive Design**

* Desktop-first approach with mobile compatibility
* Dark/Light mode toggle for user preference
* Adjustable font sizes (5 size options)
* Accessibility compliance with screen reader support

**4.2 Interactive Elements**

* Smart Suggestions: Pre-configured prompts for common queries
* Feedback System: Like/dislike buttons for response quality
* Typing Indicators: Two-stage loading with progress messages
* File Attachment: Prepared for document upload functionality

**4.3 Real-time Features**

* Live typing indicators showing agent selection process
* Timestamp display for all messages
* Voice status indicators for speaking/listening states
* Error handling with user-friendly messages

**5. Technical Implementation Details**

**5.1 State Management**

React Hooks Implementation:

* **useState** for component state management
* **useEffect** for lifecycle management and API initialization
* **useCallback** for performance optimization
* **useRef** for DOM element and API references

**5.2 Performance Optimizations**

* Memorized callbacks prevent unnecessary re-renders
* Efficient re-rendering through proper dependency arrays
* Lazy loading of voice synthesis features
* Optimized bundle size with tree-shaking

**5.3 Error Handling**

* Network error recovery with user notifications
* Voice API fallbacks for unsupported browsers
* Session timeout handling with automatic re-authentication
* Input validation for all user inputs

**6. Use Cases & Business Applications**

**6.1 Primary Use Cases**

Medicine Bot Interactions:

* "What are the side effects of Mounjaro?"
* "Find prescribing information for Trulicity"
* "Latest clinical trial results for diabetes medications"

Compliance Bot Queries:

* "Current FDA guidelines for drug labeling"
* "Regulatory requirements for clinical trials"
* "Quality assurance protocols for manufacturing"

WebSearch & Scrape Bot:

* "Recent healthcare regulatory changes"
* "Competitor analysis in diabetes market"
* "Industry news and updates"

Traveler Bot Assistance:

* "Where I can find Indian food in Indianpolis"
* "Best coffee near me"
* "What museums are there in Indiana"

**6.2 Workflow Integration**

* Sales Team: Quick access to drug information during HCP interactions
* Regulatory Affairs: Real-time compliance guidance
* Research Teams: Literature research and regulatory updates
* Corporate Functions: Travel information

**7. Security & Compliance**

**7.1 Data Protection**

* Client-side encryption for sensitive messages (Web Crypto API)
* Session-based authentication with automatic expiration
* Domain-restricted access to Lilly employees only
* CORS protection for API security

**7.2 Privacy Features**

* Local storage management with user consent
* Session cleanup on logout
* No persistent chat storage on servers
* Avatar image handling with client-side processing

**8. Development Process & Best Practices**

**8.1 Code Quality**

* ESLint integration for code quality enforcement
* React best practices implementation
* Comprehensive commenting and documentation
* Modular component architecture

**8.2 Testing & Validation**

* Cross-browser testing for voice features
* Responsive design validation across devices
* User acceptance testing with Lilly employees
* Performance monitoring and optimization

**9. Deployment & Operations**

**9.1 Environment Setup**

Development Environment:

 Frontend npm install npm start  Runs on localhost:3000

Backendpip install flask flask-cors light\_clientpython. supervisorbot\_api.py Runs on localhost:5000

Production Considerations:

* HTTPS enforcement for production deployment
* Environment variable configuration for API endpoints
* Load balancing for high-traffic scenarios
* Monitoring and logging integration

**9.2 Browser Compatibility**

* Full Support: Chrome, Edge (recommended)
* Partial Support: Safari (limited voice features)
* Basic Support: Firefox (no voice recognition)

**10. Future Enhancements & Roadmap**

**10.1 Planned Features**

* File Upload Processing: Document analysis and attachment handling
* Advanced Analytics: Usage statistics and performance metrics
* Mobile App: Native iOS/Android applications
* Integration Expansion: Connect to additional Lilly systems

**10.2 Technical Improvements**

* Real-time Collaboration: Multi-user chat sessions
* Advanced Voice Features: Voice commands and shortcuts
* Offline Capabilities: Service worker implementation
* Enhanced Security: Multi-factor authentication

**11. Project Metrics & Success Criteria**

**11.1 Technical Achievements**

* Zero Critical Bugs: All tests passing with stable functionality
* Performance Optimized: Fast loading times and responsive interactions
* Accessibility Compliant: WCAG guidelines implementation
* Cross-Platform Compatibility: Works across major browsers and devices

**11.2 Business Impact**

* User Experience: Modern, intuitive interface comparable to consumer chatbots
* Productivity Enhancement: Unified access to multiple AI agents
* Security Compliance: Enterprise-grade authentication and data protection
* Scalability: Architecture ready for organization-wide deployment

**12. Lessons Learned & Recommendations**

**12.1 Key Insights**

* Voice Integration: Significantly improves user engagement and accessibility
* Multi-Agent Architecture: Provides more accurate and specialized responses
* React Performance: Proper hook usage and memorization crucial for smooth UX
* Enterprise Authentication: Domain validation provides effective access control

**12.2 Best Practices Established**

* Component Architecture: Modular design enables easy feature additions
* Error Handling: Comprehensive error management improves user experience
* Documentation: Thorough commenting facilitates maintenance and updates
* Testing Strategy: Regular cross-browser testing prevents deployment issues

**13. Conclusion**

***Bot Bridge*** successfully delivers a modern, enterprise-grade chatbot interface that bridges the gap between Lilly employees and specialized AI agents. The platform combines cutting-edge web technologies with practical business applications, resulting in a tool that enhances productivity while maintaining security and compliance standards.

The project demonstrates successful implementation of:

* Advanced React development with modern hooks and performance optimization
* Enterprise authentication and security measures
* Voice technology integration for enhanced accessibility
* Multi-agent AI system integration
* Responsive, user-centric design principles

**Project Status: Production ready with ongoing enhancement opportunities for expanded functionality and organizational deployment**.

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Repository:

GitHub: <https://github.com/arushigupta-lilly/BotBridge.git>

Branch: master