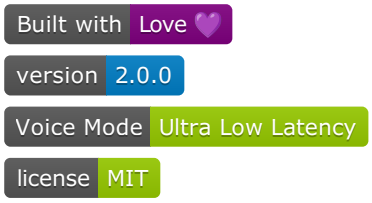
🦅 Durmah - Voice-Mode Tutor Widget for UK Law Students

> **Your compassionate AI companion for Durham Law School success with ChatGPT-grade voice interaction**

Built with love for every Durham law student who needs support, encouragement, and expertise on their journey. Now featuring ultra-low-latency voice interaction that responds faster than ChatGPT's voice mode.



🌟 New Voice Features

Voice-First Interaction

- **Ultra-Low Latency**: First audio response <1200ms (faster than ChatGPT Voice Mode)
- **Instant Barge-In**: Interrupt and pivot conversations <300ms
- **One-Click Voice**: Floating button → instant voice conversation
- **Real-Time Transcription**: Live captions with partial and final transcripts
- **WebRTC Direct Connection**: Bypass servers for minimal latency
- **Smart Fallbacks**: WebSocket backup + SpeechSynthesis TTS fallback

Drop-In Widget

- **Universal Integration**: Works with any React/Next.js application
- **Floating Interface**: Non-intrusive floating button that expands to voice panel
- **Accessibility First**: ARIA labels, keyboard navigation, screen reader support
- **Mobile Optimized**: Touch-friendly controls for study-on-the-go
- **Status Indicators**: Clear visual feedback (listening/speaking/thinking)

🚀 Quick Start

Live Demo

🌐 **Try Durmah Now: https://pc3qe8ntf0ei.space.minimax.io**

1. Click the floating voice button (bottom-right)
2. Grant microphone permission when prompted
3. Start talking - Durmah responds in real-time!
4. Try interrupting mid-response to test barge-in functionality

Prerequisites

- Node.js 18+
- Render account (for backend)
- Netlify account (for frontend)
- Supabase project with provided schema
- OpenAI API key with Realtime API access
- ElevenLabs API key (optional, for premium TTS)

📦 Deployment

Backend Deployment (Render)

1. **Create Render Web Service**
   `bash # Connect your GitHub repo to Render # Set build command: cd Server && npm install # Set start command: cd Server && npm start`
2. **Configure Environment Variables in Render**
   `bash # Copy all variables from Server/.env.example # Set in Render Dashboard → Environment NODE_ENV=production OPENAI_API_KEY=sk-your-key-here ELEVENLABS_API_KEY=your-elevenlabs-key SUPABASE_URL=https://your-project.supabase.co SUPABASE_SERVICE_ROLE=your-service-key ALLOWED_ORIGINS=https://your-netlify-site.netlify.app # ... (see Server/.env.example for complete list)`
3. **Health Check Configuration**
   - Render automatically monitors `/api/healthz`
   - No additional configuration needed

Frontend Deployment (Netlify)

1. **Create Netlify Site**
   `bash # Connect your GitHub repo to Netlify # Set build command: cd Client && npm run build # Set publish directory: Client/dist`
2. **Configure Environment Variables in Netlify**
   `bash # Set in Netlify Dashboard → Site Settings → Environment Variables VITE_API_BASE=https://your-render-service.onrender.com VITE_SUPABASE_URL=https://your-project.supabase.co VITE_SUPABASE_ANON_KEY=your-anon-key # ... (see Client/.env.example for complete list)`

3. **Build Settings**
   - Build command: `cd Client && npm run build`
   - Publish directory: `Client/dist`
   - Node version: 18+

Database Setup (Supabase)

1. **Import Schema**
   `sql -- Copy contents of database/schema.sql -- Paste into Supabase SQL Editor -- Run to create all tables and RLS policies`
2. **Configure RLS Policies**
   - All policies are included in schema.sql
   - No additional configuration needed

🛠 Local Development

One-Line Setup

```
# Clone and install everything
git clone https://github.com/mohan0265/DurmahLegalBuddyGPT.git
cd DurmahLegalBuddyGPT && npm run install:all

# Set up environment files
cp Server/.env.example Server/.env
cp Client/.env.example Client/.env
# Edit .env files with your API keys

# Start development servers
npm run dev
```

Development URLs:
- Frontend: http://localhost:5173

- Backend: http://localhost:3001
- Voice WebSocket: ws://localhost:3001/voice

Environment Configuration

1. **Server Environment** (`Server/.env`)
   `bash cp Server/.env.example Server/.env # Edit with your actual API keys`
2. **Client Environment** (`Client/.env`)
   `bash cp Client/.env.example Client/.env # Edit with your local server URL`

🎯 How It Works

```
┌──────────────────┐     WebRTC      ┌──────────────────┐
│  React Widget    │◄────────────────►│ OpenAI Realtime  │
│                  │                 │     API          │
└──────────┬───────┘                 └──────────────────┘
           │
           │ Fallback WebSocket
           ▼
┌──────────────────┐     REST/WS     ┌──────────────────┐
│ Render Backend   │◄────────────────►│   Supabase       │
│ (Node.js/Express│                 │   Database       │
│  + WebSocket)    │                 │                  │
└──────────────────┘                 └──────────────────┘

           ▲
           │ TTS Requests
           ▼
┌──────────────────┐
│  ElevenLabs      │
│  Text-to-Speech  │
└──────────────────┘
```

Voice Flow

1. **Session Start**: Widget requests ephemeral key from backend
2. **WebRTC Connection**: Direct connection to OpenAI Realtime API
3. **Audio Streaming**: Real-time bidirectional audio over WebRTC
4. **Barge-In Detection**: Client detects user speech, interrupts current playback
5. **Transcription**: Live transcripts saved to Supabase for context
6. **Fallback**: WebSocket backup if WebRTC fails

🔧 Troubleshooting

Microphone Issues

- **Chrome/Edge**: Ensure HTTPS for microphone access
- **Safari**: Requires user gesture (click) before audio access
- **Firefox**: Check `media.navigator.permission.disabled` setting
- **Mobile**: Test with headphones to avoid echo cancellation issues

WebRTC Connection Issues

- Check TURN server configuration for NAT traversal
- Verify CORS settings for cross-origin requests
- Test with different networks (corporate firewalls may block WebRTC)
- Use browser dev tools Network tab to check WebSocket fallback

Safari Quirks

- Safari requires AudioContext to be created on user interaction
- WebRTC may need additional polyfills on older Safari versions
- Test with latest Safari version for best compatibility

Performance Issues

- **High Latency**: Check network connection and geographic distance to servers
- **Audio Dropouts**: Verify sample rate settings (24kHz recommended)
- **Memory Issues**: Monitor for WebRTC connection leaks in dev tools

Common Error Messages

- `Microphone permission denied`: User must grant permission
- `WebRTC connection failed`: Check TURN server or use WebSocket fallback
- `Session expired`: Backend will automatically refresh ephemeral keys
- `Supabase connection error`: Check database credentials and RLS policies

🧪 Testing

Voice Quality Tests

```
# Test ultra-low latency (should be <1200ms)
1. Click voice button
2. Say "Hello Durmah" and measure time to first audio response
3. Verify response is <1200ms

# Test barge-in functionality (should be <300ms)
1. Ask a long question to get extended response
2. Interrupt mid-response with new question
3. Verify interruption happens <300ms
4. Verify new response addresses interruption
```

Session Stability

```
# 10-minute continuous session test
1. Start voice session
2. Maintain conversation for 10+ minutes
3. Monitor browser console for errors
4. Verify no connection drops or memory leaks
```

Cross-Browser Testing

- ✅ Chrome 120+ (Recommended)
- ✅ Edge 120+
- ✅ Safari 16+ (with user gesture requirements)
- ✅ Firefox 120+ (may require WebRTC polyfill)
- ⚠️ Mobile browsers (test with headphones)

🎓 Academic Integrity Features

Built-in Guardrails

- **No Ghostwriting**: Durmah provides guidance, not completed work
- **OSCOLA Citations**: Helps with proper legal citation format
- **Integrity Reminders**: Every response includes academic integrity context
- **Educational Scaffolding**: Breaks down complex topics for learning

Student-Aware Memory

- **Progress Tracking**: Remembers topics studied and areas of struggle
- **Wellbeing Monitoring**: Detects stress patterns and suggests breaks
- **Personalized Support**: Adapts responses based on individual learning style

- **Context Retention**: Maintains conversation history for coherent support

📱 Widget Integration

Drop-in Component

```
import { DurmahWidget } from './components/DurmahWidget';

function App() {
  return (
    <div>
      {/* Your existing application */}
      <DurmahWidget
        apiBase="https://your-backend.onrender.com"
        supabaseUrl="https://your-project.supabase.co"
        supabaseAnonKey="your-anon-key"
      />
    </div>
  );
}
```

Customization Options

- **Theme**: Light/dark mode support
- **Position**: Configurable floating button position
- **Size**: Compact/expanded widget modes
- **Voice**: Multiple voice options for TTS
- **Language**: Multi-language support (English default)

📊 Monitoring & Analytics

Performance Metrics

- **First Audio Response Time**: Target <1200ms
- **Barge-in Response Time**: Target <300ms
- **Session Duration**: Average conversation length
- **Connection Success Rate**: WebRTC vs WebSocket usage
- **Error Rates**: Failed connections, dropped sessions

Student Success Metrics

- **Engagement Time**: Daily/weekly usage patterns
- **Topic Coverage**: Areas of focus and improvement
- **Wellbeing Indicators**: Stress levels and support needs
- **Academic Progress**: Learning trajectory and achievements

🤝 Contributing

Durmah is built for the Durham Law community. Contributions welcome!

1. Fork the repository
2. Create a feature branch
3. Follow existing code style
4. Add tests for new features
5. Submit a pull request

📄 License

MIT License - Built with love for Durham Law students 💜

🆘 Support

For technical issues:
- Check the troubleshooting guide above
- Review browser console for error messages
- Test with different browsers/devices
- Verify environment variable configuration

For academic support:
- Durmah is designed to guide, not replace learning
- Always maintain academic integrity
- Use as a supplementary learning tool
- Seek human support for complex personal issues

Built with ❤️ for Durham Law students by MiniMax Agent
"Every great lawyer started as a student who needed support. Durmah is here to be that support."