# Table 3.3: Module Implementation Technologies and Dependencies

| Module | Core Technologies | Key Components | External Dependencies | Challenges and Solutions |
| --- | --- | --- | --- | --- |
| Authentication | - React Context API- Local Storage- React Router | - AuthContext.tsx- Login.tsx- Register.tsx- ProtectedRoute.tsx | - None (local authentication only) | - **Challenge**: Secure local authentication- **Solution**: Password hashing with bcrypt-js and secure token storage |
| User Profile | - React Hooks- Material UI Forms- React Context API | - UserContext.tsx- UserProfile.tsx- ProfileEditor.tsx- SettingsPanel.tsx | - Material UI components | - **Challenge**: Complex state management- **Solution**: Custom hooks for form state and validation |
| Mood Tracking | - React Forms- Custom Components- Material UI | - MoodLogger.tsx- MoodSelector.tsx- TimeSelector.tsx- JournalEntry.tsx | - Material UI- date-fns | - **Challenge**: Balancing simplicity and detail- **Solution**: Progressive disclosure UI pattern |
| Visualization | - Recharts- Chart.js- D3.js- SVG Manipulation | - MoodCalendar.tsx- TrendCharts.tsx- DistributionCharts.tsx- CorrelationViews.tsx | - Recharts- Chart.js- D3.js | - **Challenge**: Performance with large datasets- **Solution**: Data aggregation and windowing techniques |
| Analytics | - JavaScript Statistical Libraries- Custom Algorithms- Workers API | - StatisticalProcessor.ts- PatternRecognition.ts- CorrelationAnalyzer.ts- PredictionEngine.ts | - date-fns- simple-statistics | - **Challenge**: Complex calculations freezing UI- **Solution**: Web Workers for background processing |
| Rewards | - Animation Libraries- Custom State Management- Local Storage | - StreakTracker.tsx- BadgeSystem.tsx- PointsManager.tsx- AchievementDisplay.tsx | - Canvas Confetti- Framer Motion | - **Challenge**: Engaging without overwhelming- **Solution**: User preference-based intensity levels |
| Theme | - CSS Variables- React Context- Color Manipulation | - ThemeContext.tsx- ThemeSelector.tsx- ColorCustomizer.tsx- ThemePreview.tsx | - Material UI- React Color | - **Challenge**: Ensuring accessibility- **Solution**: Built-in contrast checking and WCAG guidelines |
| Data Management | - Local Storage API- IndexedDB (planned)- File System Access | - StorageManager.ts- DataExporter.ts- BackupManager.ts- MigrationTools.ts | - jsPDF- file-saver | - **Challenge**: Storage limitations- **Solution**: Data pagination and archiving strategies |
| Notifications | - Browser Notifications API- Custom Components- State Management | - NotificationManager.tsx- ReminderSystem.tsx- NotificationCenter.tsx- AlertSystem.tsx | - date-fns- Material UI | - **Challenge**: Non-intrusive but effective alerts- **Solution**: Context-aware notification timing |
| Dashboard | - Layout Components- Dynamic Content Loading- Data Visualization | - Dashboard.tsx- QuickStats.tsx- RecentActivity.tsx- Recommendations.tsx | - Material UI- Recharts | - **Challenge**: Information architecture- **Solution**: Progressive disclosure and priority-based layout |