

Project Title

Karmata Robotics Showcase App

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Objective

To design and develop a **lightweight mobile application** where students can:

- **Register/Login** via mobile number & OTP
 - **Watch & interact** with robotics-related videos
 - **Download content** in low memory usage
 - Explore **innovative robotics work** from Karmata Robotics
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Core Features

#	Feature	Description
1	Mobile Login (OTP)	User registers via phone number, OTP verification ensures authenticity.
2	Video Showcase	Displays robotics projects, demo, and learning clips.
3	Interactive Learning	Add hotspots, pop-up notes, and mini quizzes over videos.
4	Download Option	Users can download videos in low or medium quality to save memory.
5	Lightweight Design	Total app size under 20 MB with optimized assets.
6	Offline Mode	Watch downloaded content without internet.
7	User Profile	Shows name, storage used, logout, and saved downloads.



Technology Stack

Layer	Technology	Reason
Frontend (Mobile)	React Native (Expo)	Uses JavaScript (easy for web devs), fast to develop, low MB, supports Android/iOS.
Backend	Node.js + Express.js	Lightweight, handles OTP & video APIs efficiently.
Database	Firebase Firestore / PostgreSQL	Secure, cloud-based, scalable for users & videos.
Video Storage	AWS S3 + CloudFront (CDN)	Fast delivery, adaptive streaming support.
OTP Provider	Fast2SMS / 2Factor.in	Affordable, reliable Indian OTP APIs.
Authentication	JWT (JSON Web Token)	Secure login token for sessions.



OTP Implementation Plan

1. User Flow:

- User enters phone number → API sends OTP → User verifies → JWT issued.

2. Provider Recommendation (Cost & Setup):

Provider	Pricing (per SMS)	API Integration	Notes
Fast2SMS	₹0.12–₹0.14	REST API	Budget friendly, quick setup
2Factor.in	₹0.13–₹0.25	OTP ready API	Reliable, used by startups
Twilio (Global)	₹0.70+	REST API	For international users (optional)

☒ **Best choice:** *Fast2SMS* – cost-effective for educational apps in India.



Memory Optimization Strategy

Area	Optimization
App Size	Use React Native Hermes engine, code minification, remove unused libs.
Videos	Don't bundle inside app — use CDN streaming.
Downloads	Store in <code>/cache/app_videos/</code> with auto-delete after 7 days.
Assets	Use WebP/AVIF images, compressed thumbnails, lazy loading.
Code Split	Dynamic imports for video & download modules.

Area	Optimization
App Bundle	Use Android App Bundles (.aab) for Play Store to reduce device download size.

Expected final app size: **10–15 MB only**

Video Player & Interactivity Features

Feature	Implementation
Video Player	expo-av / react-native-video
Chapters / Sections	Metadata-driven timestamps
Hotspots	JSON overlay triggers
Quiz Popup	React Native Modal + local JSON questions
Subtitles	.vtt or .srt format support
Download	expo-file-system + local SQLite tracking

UI/UX Design Guidelines

- **Clean, modern interface** with blue/white robotics theme
- Rounded cards, shadow depth, minimal clutter
- Icons: react-native-vector-icons
- **Login screen:** simple, focus on mobile input
- **Home screen:** grid of videos (thumbnail, title, duration, “Watch” button)
- **Player screen:** dark background, progress bar, captions button

App Architecture

```
KarmataApp/  
├── src/  
│   ├── screens/  
│   │   ├── LoginScreen.js  
│   │   ├── HomeScreen.js  
│   │   ├── VideoPlayerScreen.js  
│   │   └── ProfileScreen.js  
│   ├── components/  
│   │   ├── VideoCard.js  
│   │   └── OTPInput.js  
│   ├── services/  
│   │   ├── api.js  
│   │   ├── authService.js  
│   │   └── otpService.js  
│   └── utils/
```




Development Timeline (MVP - 5 Weeks)

Week	Task
Week 1	UI/UX Design, Setup React Native project
Week 2	Implement Login + OTP Verification
Week 3	Build Video Listing + Player Screen
Week 4	Add Download & Offline Mode
Week 5	Final Testing, UI polish, Deployment to Play Store

Estimated Cost (Development + Infrastructure)

Item	Description	Approx. Cost
OTP API	Fast2SMS (₹0.12 per OTP × 10,000 users)	₹1,200
Hosting	Node.js backend + DB (Render/Vercel/Firebase)	₹0 – ₹300/mo
CDN Storage	AWS S3 (100GB videos)	₹150 – ₹300/mo
Developer Tools	Free (VS Code, Expo CLI)	₹0

 **Total Monthly Cost:** ~ ₹500 – ₹800/month (very affordable)

Future Scope

- Add **AI chatbot** for student Q&A about robots
- Add **Leaderboard & achievements**
- Integrate **payment gateway** for premium robotics courses
- Use **Firebase Cloud Messaging** for push notifications

Summary (as a Software Engineer)

Category	Decision
Framework	React Native (Expo)
Backend	Node.js + Express

Category	Decision
OTP Provider	Fast2SMS
Video Host	AWS S3 + CDN
Target Size	Under 20 MB
Dev Duration	5 Weeks (MVP)
Total Cost	< ₹1000/month