CAPSTONE REPORT

Part A:

Initial Definition & Research:

The decentralized car rental platform empowers vehicle owners to earn passive income from their idle cars by turning them into rentable digital assets (NFTs) on Solana. By removing traditional intermediaries, the platform offers renters a more secure, transparent, and cost-effective alternative to conventional car rental services. Smart contracts ensure trustless rentals by automating payments, deposits, and rental transitions, reducing the risk of disputes or fraud. This solution delivers strong product-market fit by addressing two key value areas: **(1)** giving car owners a seamless way to monetize their unused assets in a decentralized, verifiable manner; and **(2)** offering renters a transparent and affordable rental experience with blockchain-enforced guarantees, ideal for urban dwellers, tourists, and gig economy drivers seeking reliability and fairness.

1) Core Value Proposition & Product-Market Fit (PMF)

1. Urban Car Owners with Underutilized Vehicles

- Why: Many city dwellers own cars that are parked for most of the day. These owners can turn their idle assets into passive income without needing to engage with centralized platforms.

- Needs Met: Extra income, minimal effort, trustless rental agreements

2. Digital Nomads and Tourists

- Why: These users travel frequently and value flexible, transparent, and affordable transportation options, especially in unfamiliar cities.

- Needs Met: Easy access to verified vehicles, upfront pricing, and decentralized trust.

3. Gig Economy Drivers (e.g., Uber, DoorDash, etc.)

- Why: Some drivers can't afford to own a car full-time or need short-term access to vehicles. Your platform provides a more flexible and cheaper rental

model with less red tape.

- Needs Met: Short-term, cost-effective, on-demand car access.

4. Web3 and Crypto Enthusiasts

- Why: Early adopters who prefer decentralised apps and are comfortable with NFTs, smart contracts, and crypto payments.

- Needs Met: Transparent systems, asset ownership, DeFi-like rental economy.

3) Competitor Landscape

1. Turo (Peer-to-Peer Car Sharing)

Weaknesses: Centralized platform, high service fees, limited transparency, and region restrictions.

3. Car Subscription Services (e.g., Zoomcar, Revv, Flexcar)

Weaknesses: Expensive monthly plans, limited owner participation, and low flexibility for short-term rentals.

4. Traditional Car Rental Companies (e.g., Hertz, Avis)

Weaknesses: High costs, long paperwork, hidden fees, and no option for private car owners to earn.

Manual Research:

Token Fleet:

What it does: Enables fractional ownership of cars via tokens on the Base blockchain, with investors receiving rental income distributions

Weaknesses:

- Targets investors rather than owner-renter dynamics—less peer-to-peer utility.
- Fractional models can be complex and might deter casual users.
- Still in development, lacking active rentals or live traction.

OpenCarX

What it does: Offers a decentralized car sharing platform using blockchain, IoT, and AI for pricing/riding optimization
Weaknesses:

- No published traction or user adoption yet.
- Heavy reliance on AI and IoT adds complexity and cost.
- Likely Ethereum-based, implying slower and costlier transactions.

4) Founder-Market Fit (FMF):

As a 19-year-old undergraduate CSE student with real-world full-stack experience at a startup, I bring both technical versatility and early exposure to product-building under pressure. My hands-on work with Ethereum has given me a strong foundation in smart contracts and decentralized systems, and I'm now deepening my expertise in Solana to stay ahead of emerging blockchain trends. I'm genuinely passionate about Web3 and committed to growing with the ecosystem long-term. This project—combining my technical strengths in full-stack and blockchain with a clear real-world use case—perfectly aligns with my interests and skill set. My background uniquely positions me to execute a decentralized car rental platform, as I understand both the engineering demands and the broader vision of removing intermediaries through trustless infrastructure.

Part B: Adversarial Analysis & Refinement

1) Adversarial AI Task:

1. Value Proposition

- Strengths: Solves problems for both owners and renters using smart contracts and NFTs.
- Gaps: Legal issues with NFT-based ownership, lack of off-chain damage/insurance handling, assumes users are crypto-native.

2. Target Market

- Strengths: Clear audience—owners, tourists, gig workers.

- Misses: Overlooks fleet owners, lacks onboarding ease for non-crypto users, no insurance/legal strategy.

3. Competitors Overlooked

- Insurance-tech (e.g. Metromile), MaaS platforms (e.g. Uber), IoT rental tools, and local aggregators.

4. Blue Ocean Concerns

- Car rental is crowded. Blockchain doesn't guarantee disruption unless it truly improves cost, speed, or trust. Real-world enforcement still needed.

3) Critique & Refine FMF:

Critique:

- This market is **still relatively small and fragmented**; crypto-native renters who actually need cars in real life may not be abundant. Crypto-native *car owners* are even rarer, so you may face supply-side challenges early on.
- NFT-based ownership alone is **not enough to enable legal or physical transfer of vehicle rights** in most jurisdictions. Integrating ID and insurance is non-trivial and will depend heavily on external partnerships or region-specific solutions.
- This step is **technically difficult and UX-intensive**, and shouldn't be underestimated. Non-crypto users may need more than abstraction—they may expect full customer support, dispute resolution, and physical handoff logistics.
- The phrase **"trustless" can be misleading**—real-world rentals still require trust in physical return, condition, etc. P2P platforms often struggle with **liquidity and consistency**—without strong supply and user reputation systems, scaling is hard.

Refine FMF:

I'm a 19-year-old computer science student with hands-on startup experience as a full-stack developer and a strong foundation in Ethereum smart contracts. Now transitioning into Solana, I'm committed to building in the Web3 space long-term. My technical background allows me to rapidly prototype and ship trustless, user-centric applications. While my roots are in engineering, I've also actively studied the peer-to-peer rental economy, emerging blockchain business models, and regulatory challenges around decentralized asset sharing. This platform represents a convergence of my skills and interests—using smart contracts and NFTs to bring greater efficiency and transparency to a market I deeply understand. I'm uniquely positioned to lead this project with both technical execution and a long-term vision for decentralized ownership and mobility.

Initial focus: Crypto-native renters and owners.

Wedge: NFT-based rental ownership with real-world accountability via insurance and ID integration.

Expansion: Abstract complexity and localize for global and non-crypto markets over time.

Differentiation: Trustless, peer-owned rental model that solves cost and transparency pain points while gradually integrating off-chain accountability.