



TIRARE

MOBILITY TECHNOLOGIES LIMITED

<https://tirare-webpage.github.io/>

ELECTRIFYING EXISTING UTILITY VEHICLES THROUGH PROPRIETARY RETROFIT TECHNOLOGY

Institutional:

- validated by and incubated under
- IIIT Delhi + 1 lakh grant in collaboration with STMicroelectronics
 - iHub Anubhuti

Engineering:

- ☐ Working Mechanical Architecture Completed
- ☐ Proprietary Retrofit Platform
- ☐ Patent Specification Completed

Legal/IP:

Patent Filing
through IIIT Delhi
Legal Support

Mentorship:

- Mentored by
- STMicroelectronics staff
 - Rajeev Tiwari (STEMROBO)

Patent Pending • Functional Engineering Prototype • Retrofit Platform



Where Tirare Began

One afternoon, I noticed a cargo tricycle with a broken pedal still transporting goods.
The rider wasn't working because the vehicle was reliable.
He was working because stopping wasn't an option.
That moment revealed something larger than a mechanical failure.
**For millions of operators, the vehicle is not the barrier.
Replacement is.**

how can
electrification
succeed if it
begins by
asking people
to replace it?



**The question was never how to
build a better vehicle.
The question was how to make
electrification accessible without
replacing the one already earning a
livelihood.**



The People Electrification Leaves Behind.

Electrification can reduce operating costs, increase productivity, and improve working conditions.

Yet the operators who would benefit the most are often the least able to access it.

Conventional EV Assumptions

- Buy a new vehicle
- Pay a large upfront cost
- Accept days of downtime
- Qualify for financing
- Adapt to a completely new platform



Reality of Our Customer

- Already owns a working vehicle
- Cannot stop earning even for a day
 - Repairs locally
- Operates on daily cash flow
- Needs continuity, not replacement

Millions of utility vehicles already in service have no economically viable pathway to electrification.

The Market Failure

The challenge is not whether electric mobility works. The challenge is whether the people who move our cities can realistically access it.

If replacement is the barrier, perhaps replacement is the wrong starting point.



THE CONDITIONS FOR RETROFIT ELECTRIFICATION HAVE FINALLY CONVERGED.

Why Now?

Four forces are converging

GOVERNMENT POLICY

Government Capital is Accelerating Electrification

- PM E-DRIVE allocated ₹10,900 crore through FY2025–26.
- Focus includes electric two-wheelers, three-wheelers, e-buses, charging infrastructure, and public transport electrification.
- Successor to FAME programs, signaling continued policy support.
- **Source:** Government of India, PM E-DRIVE notification (2024)

Government policy is accelerating EV adoption

but remains focused primarily on new vehicles.

LOGISTICS GROWTH

Demand for last-mile mobility continues to grow.

- India's logistics market estimated at approximately US\$317 billion in 2024.
- Projected to exceed US\$480 billion by 2029.
- Growth driven by e-commerce, hyperlocal delivery, quick commerce, and urbanization.
- **Source:** Mordor Intelligence / industry logistics reports

More goods are moving than ever before,

increasing demand for affordable utility mobility

BATTERY ECONOMICS

Battery Economics Have Improved

- Global lithium-ion battery pack prices fell from roughly US\$780/kWh (2013) to approximately US\$139/kWh (2023). This is one of the most important enablers of affordable electrification.
- **Source:** BloombergNEF Battery Price Survey

Batteries are no longer the primary barrier to electrification.

EXISTING FLEET

The Existing Vehicle Base is Massive

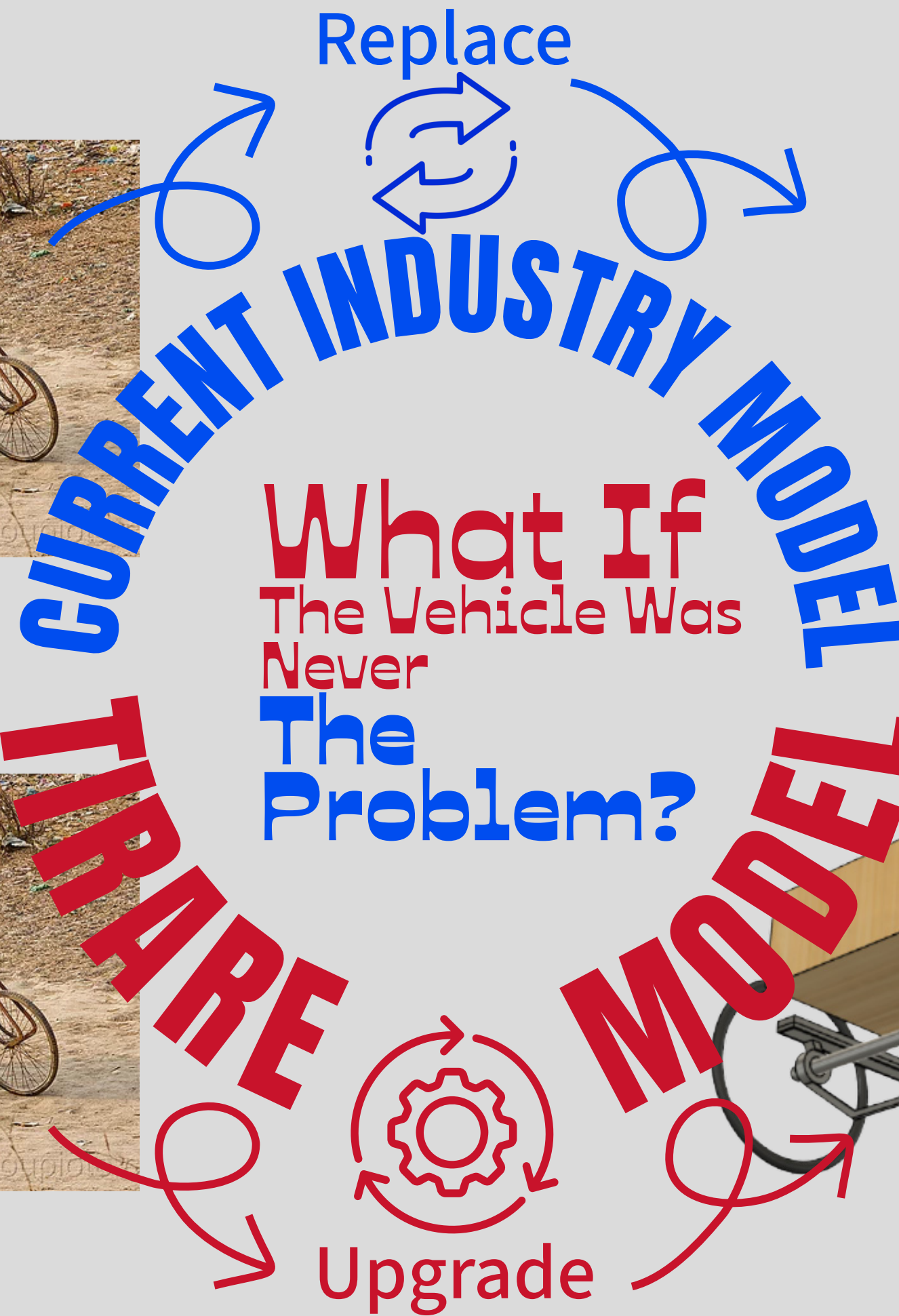
- India already operates millions of three-wheelers.
- The majority of utility and cargo vehicles currently in service remain non-electric.
- Most operators earn their livelihood from vehicles they already own. Replacement is not the only pathway to electrification.
- **Source:** Vahan registrations, SIAM, government transport data

The infrastructure that matters already exists. It simply lacks an affordable upgrade path.

Bottom-Line Insight

For the first time, policy, economics, technology, and infrastructure are aligned to make retrofit electrification commercially viable at scale.

The opportunity is no longer building another electric vehicle.
The opportunity is electrifying the millions already on the road.



For decades...

Utility vehicles were designed to work.
When performance became insufficient,
the industry replaced the vehicle.

Electrification followed the same assumption.

New vehicle. New financing. New maintenance. New costs.

Tirare asks a different question.

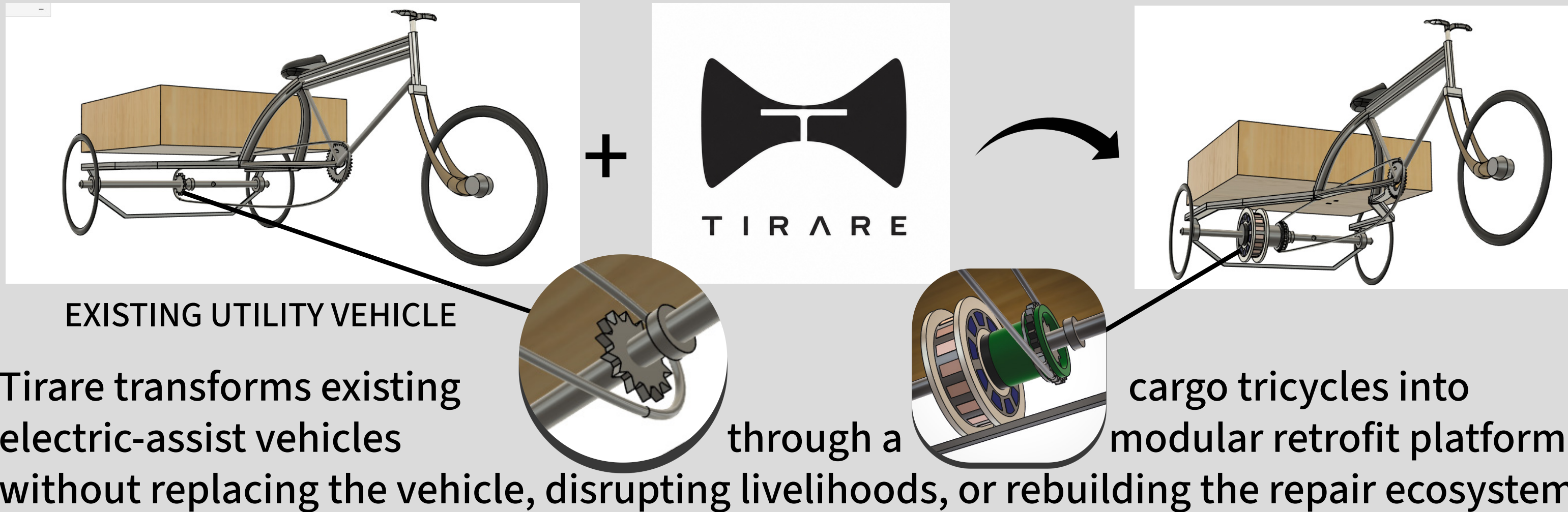
What if the existing vehicle was already the solution?

Electrification should upgrade livelihoods; not replace vehicles.

*Replacing it introduces
friction.*

*Preserving it creates
opportunity.*

ELECTRIFICATION WITHOUT REPLACEMENT



NON-INVASIVE RETROFIT

- Existing vehicle retained
- No replacement

WORKSHOP-COMPATIBLE

- Designed for local installation
- Compatible with existing repair networks

RIDER-INTENT ELECTRIC ASSIST

- Manual operation preserved
- Assistance responds naturally to rider input

MODULAR ARCHITECTURE

- Upgradeable
- Serviceable
- Scalable

Patent Pending Modular Drivetrain Architecture

The result is a practical pathway to electrification that preserves existing vehicles while reducing rider effort, improving productivity, and lowering the barrier to adoption.

Engineering Around Existing Vehicles

The best engineering doesn't start by asking what can be added. It starts by identifying what cannot be changed.

Existing cargo tricycles were never designed for electrification.

They were designed for:

- Continuous daily operation
- Heavy payloads
- Low-cost maintenance
- Simple local repair

Most electrification approaches begin by redesigning or replacing major vehicle systems.

We chose a different starting point.

What if the vehicle's existing architecture became the design constraint instead of the limitation?



Our Engineering Priorities

- Preserve the existing vehicle
- Enable modular installation
- Design for local servicing
- Minimize additional components
- Maintain manual operability
- Reduce manufacturing complexity

Every subsystem of Tirare was engineered to work around these constraints; not by redesigning the vehicle, but by integrating with it.



AFFORDABILITY IS ENGINEERED

Our proprietary rider-intent architecture enables the entire drivetrain to be smaller, lighter, and more affordable.

Conventional electric retrofit

Large Battery
+
Large Motor
+
High Cost

Large battery because the system must provide all propulsion.

Tirare Architecture

Rider Contribution
+
Proprietary Rider Intent Interface
+
Proportional Electric Assistance
↓
Smaller Motor
Smaller Battery
Lower Cost

ENGINEERING PRINCIPLE

Instead of designing for full vehicle propulsion, Tirare is engineered to amplify human effort.

A proprietary rider-intent measurement architecture enables proportional electric assistance, allowing the system to deliver meaningful performance using substantially smaller electrical components.

This reduces:

Motor size Battery capacity Vehicle mass System cost Energy consumption
while preserving the operator's existing vehicle and familiar riding experience.

Performance is achieved through intelligent torque distribution; not larger electrical components. Rather than increasing electrical power, Tirare increases the effectiveness of every watt delivered.

FROM CONCEPT TO ENGINEERING PLATFORM

Tirare is being engineered as an integrated mobility platform; not an assembly of off-the-shelf components.

1. Proprietary Drivetrain Architecture

- Patent-pending Mechanical Rider Intent Interface (MRII)
- Rider-intent-based proportional electric assistance
- Retrofit-first mechanical integration

2. Modular System Design

- Non-invasive retrofit architecture
- Existing vehicle preserved
- Serviceable modular assemblies

3. Cost-Optimized Powertrain

- Reduced motor requirement through proportional assist
- Reduced battery capacity requirement
- Engineering-led cost optimization

4. Manufacturing Readiness

- Simplified component architecture
- Designed for scalable manufacturing
- Workshop-compatible installation

Concept

Architecture

Mechanical Design

CAD Assembly

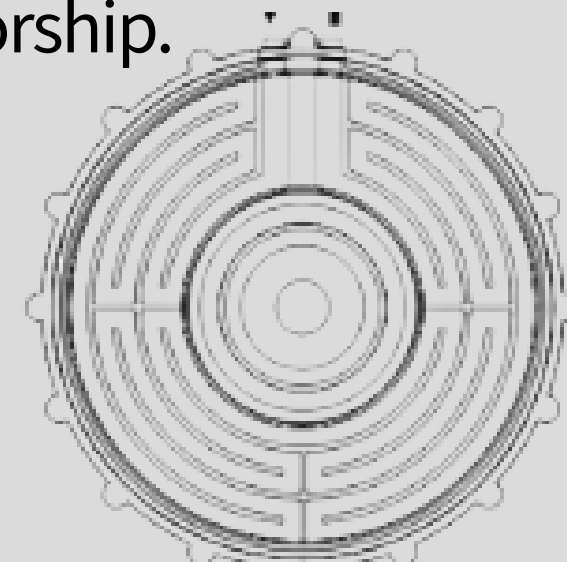
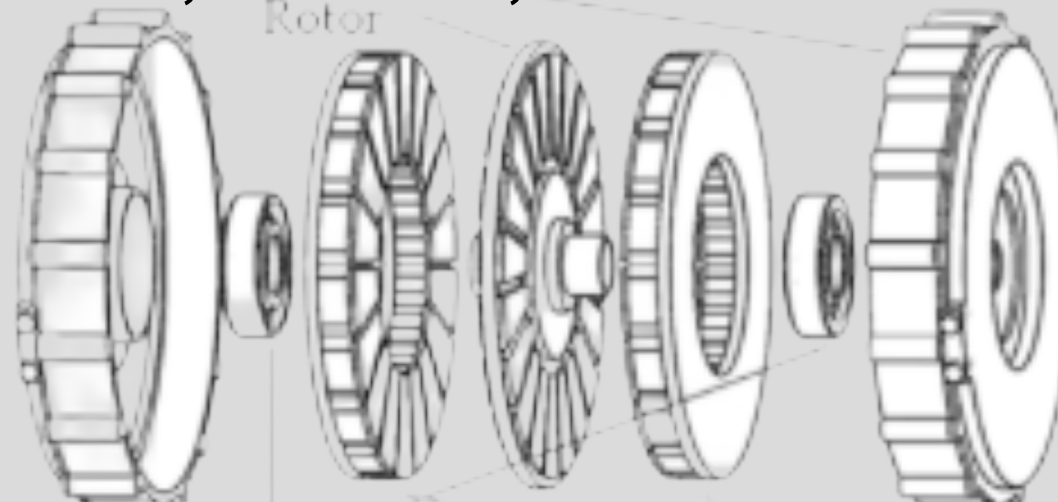
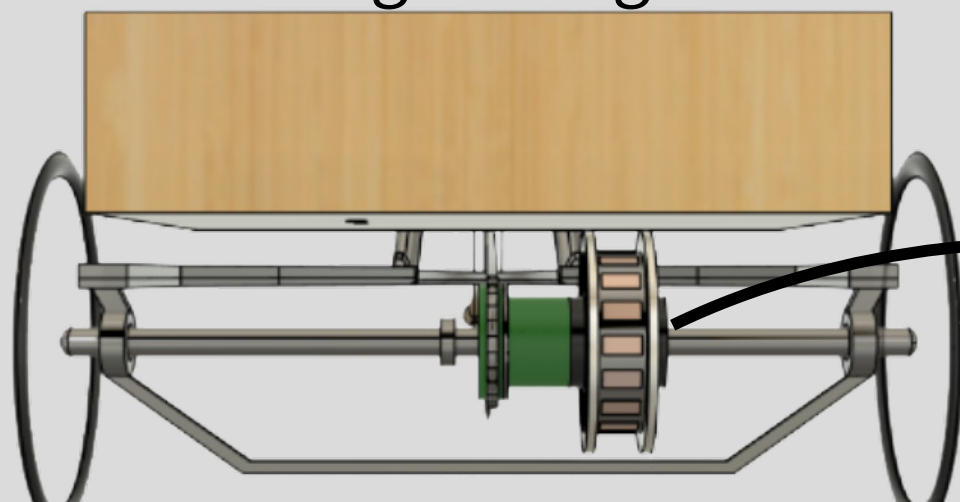
Engineering Validation

Patent Filing
In Progress

Prototype
Manufacturing
[Next]



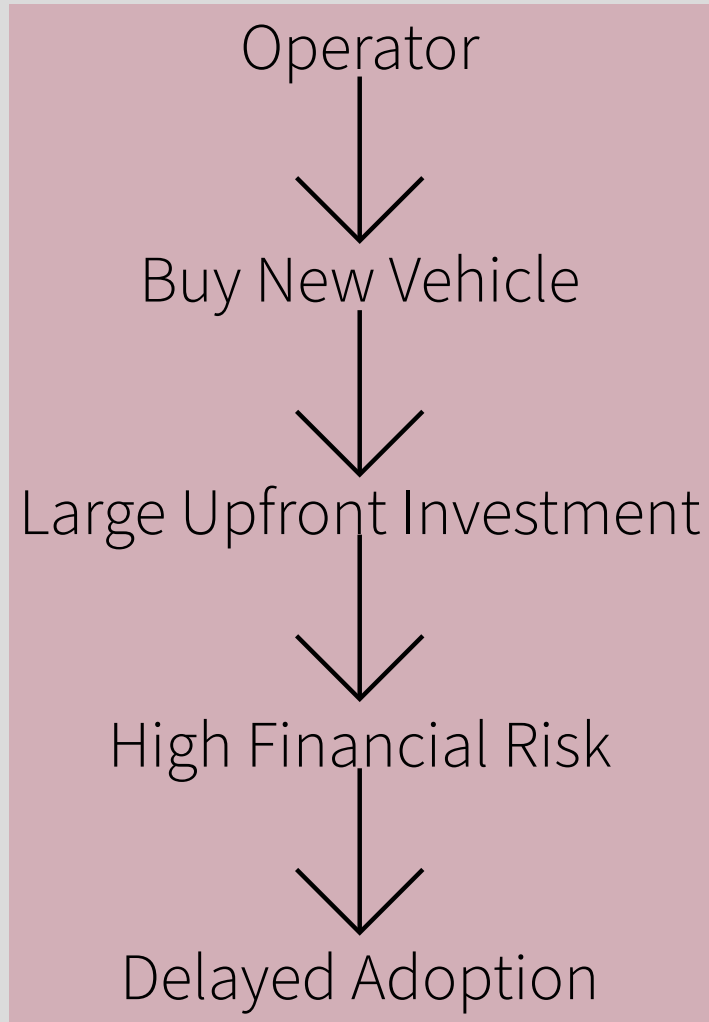
Engineering validated through IIT Delhi, CIPD Labs, and institutional mentorship.



ACCESS BEFORE OWNERSHIP

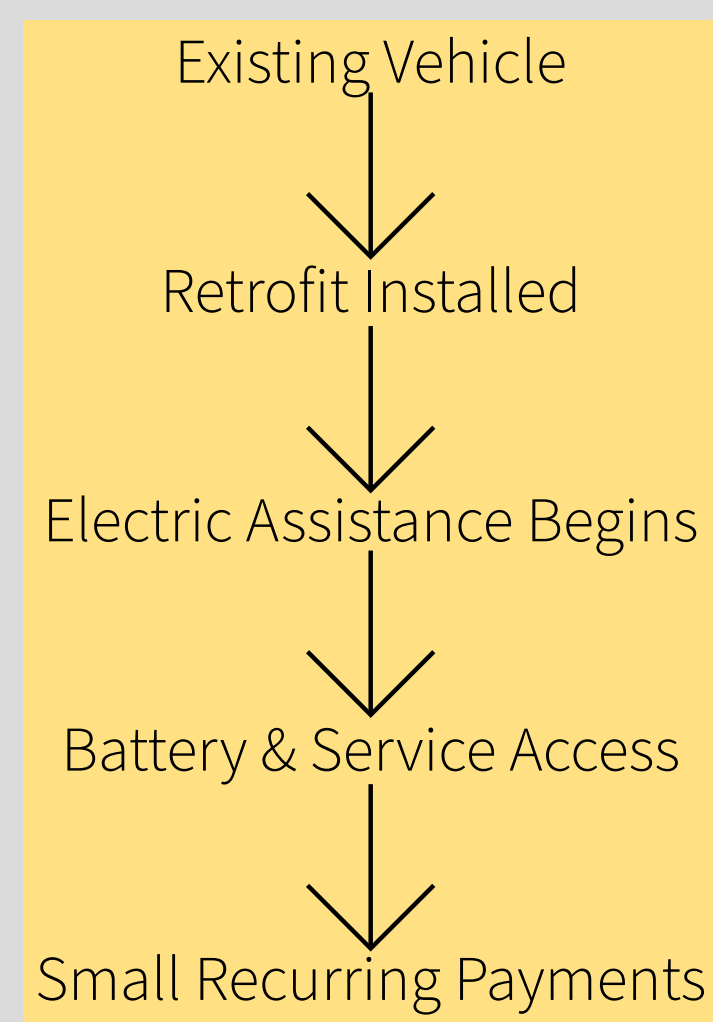
The biggest barrier to electrification is not technology; it is upfront affordability.

Traditional Model



Adoption depends on access to capital.

Tirare Model



Adoption follows earning patterns instead of savings.

Instead of asking operators to replace the vehicles they already depend on, Tirare enables a phased transition through a retrofit-first deployment model.

Operators continue using their existing vehicle while gaining access to electric assistance through an integrated service and battery network.

This approach reduces upfront financial barriers while creating recurring ecosystem revenue.

Lower Entry Cost

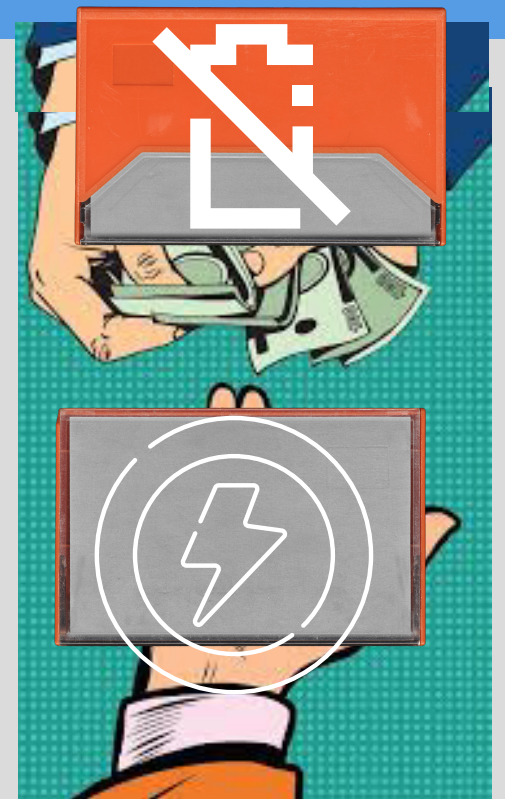
- No need to replace the existing vehicle.

Earn While Transitioning

- Operators continue working during adoption.

Scalable Service Network

- Recurring service relationships support long-term deployment.



THE TIRARE PLATFORM

Electrification scales when products, service, energy, and operators grow together.

Retrofit Platform

The modular electric-assist system that upgrades existing cargo vehicles.

Workshop Network

Installation, servicing, diagnostics, upgrades, and long-term customer support.

Energy Network

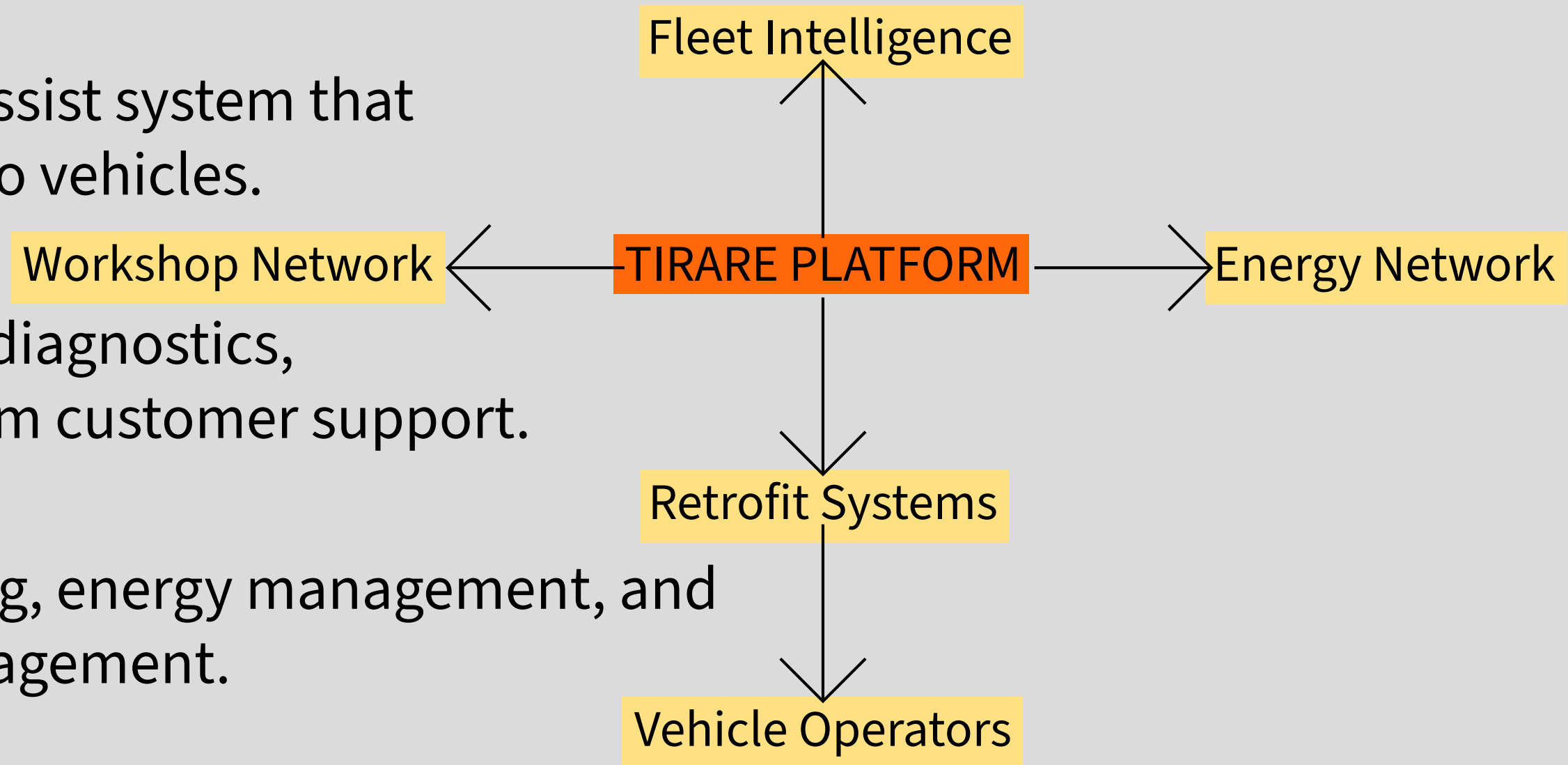
Battery access, charging, energy management, and recurring operator engagement.

Vehicle Operators

Existing vehicle owners who continue earning while transitioning to electric mobility.

Fleet Intelligence (Future Platform Layer)

Operational data, predictive maintenance, fleet optimization, and future digital services.



Every retrofit strengthens the service network. Every service node expands energy access. Together, they create a scalable electrification platform rather than a standalone product.

VISION STRIP

Today

Retrofit

Workshop

Energy

Tomorrow

Fleet Management

Predictive Maintenance

Mobility Services

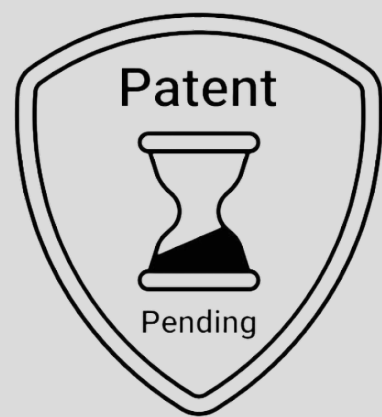
Intellectual Property & Technical Moat

Tirare's competitive advantage is rooted in proprietary system architecture; not merely component selection.

Intellectual Property

Patent-Pending Core Innovation
Mechanical Rider Intent Interface
(MRII)

- Patent drafting initiated through IIIT Delhi legal support.
- Novel compliant rider-intent measurement architecture.
- Enables proportional electric assistance while isolating rider-generated torque from motor-generated torque.
- Designed specifically for retrofit applications.



IIIT Delhi



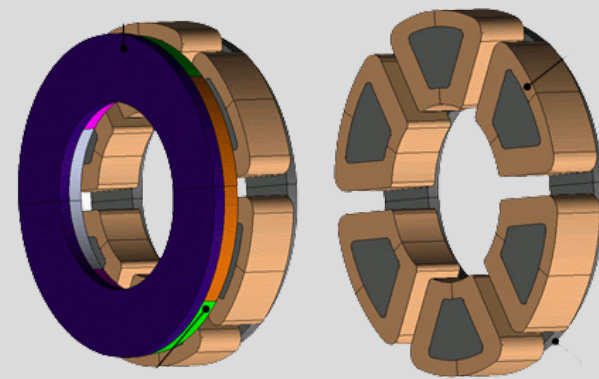
CIPD Labs



Engineering Progress

Engineering Platform
Established

- Complete mechanical architecture finalized.
- Full CAD assembly completed.
- Modular retrofit platform engineered.
- Engineering Proof of Concept completed.
- Prototype manufacturing preparation underway.



validated by

STMicroelectronics



Competitive Moat

Difficult to Replicate

The platform combines multiple engineering decisions into a unified system:

- Proprietary rider-intent architecture
- Retrofit-first system integration
- Modular serviceable design
- Cost-driven engineering methodology
- Existing vehicle preservation

Competitive advantage arises from the complete architecture rather than any individual component.



iHub Anubhuti



Rather than protecting a single component, Tirare protects an integrated retrofit architecture that enables affordable proportional electric assistance.

Roadmap to Scalable Electrification

Our roadmap focuses on validating the technology, scaling deployment, and building the supporting ecosystem.

TODAY (Current Stage)

Engineering & Validation

- Patent filing in progress through IIT Delhi
- Core engineering architecture finalized
- Complete CAD assembly developed
- Prototype manufacturing
- Initial pilot deployment planning

NEXT (12–24 Months)

Deployment & Network Expansion

- Field validation with real operators
- Workshop installation network
- Energy & service access network
- Fleet partnerships
- Manufacturing

scale-up

LONG TERM (Platform Vision)

Connected Mobility Infrastructure

- Connected fleet ecosystem
- Fleet intelligence & diagnostics
- Predictive maintenance
- Data-driven operations
- National retrofit deployment platform

Every milestone strengthens both the technology and the ecosystem required for large-scale electrification of existing utility vehicles.

Founder

Built Through Relentless Execution

Tirare did not begin in a laboratory. It began with an observation on the street and evolved through persistence, engineering, and the refusal to compromise on the quality of the solution.

The Journey

An Observation

While watching cargo tricycle operators, I realized that the greatest barrier to electrification was not technology; it was replacement. The people who needed electric mobility the most could not afford to abandon the vehicles that sustained their livelihoods.

Building from First Principles

Without prior experience in mechanical engineering, drivetrain design, or patent drafting, I began developing Tirare from the ground up. Every discipline; from CAD modelling to system architecture, startup strategy, and intellectual property; had to be learned while building.

Starting Again

The first complete engineering proof of concept grew into a 96-page technical document. After months of work, I discovered a fundamental architectural flaw. Rather than defending a weak solution, I discarded the entire design and rebuilt the platform from first principles.

Validation Through Execution

Shortly after completing my Grade 10 board examinations, I entered IIIT Delhi's E-Pitch Café in the Proof-of-Concept category meant for college students; competing primarily against university founders and research teams. Tirare was selected as the winner, securing institutional validation, prototype funding, incubation support, patent filing assistance, and access to an engineering ecosystem that continues to strengthen the company.

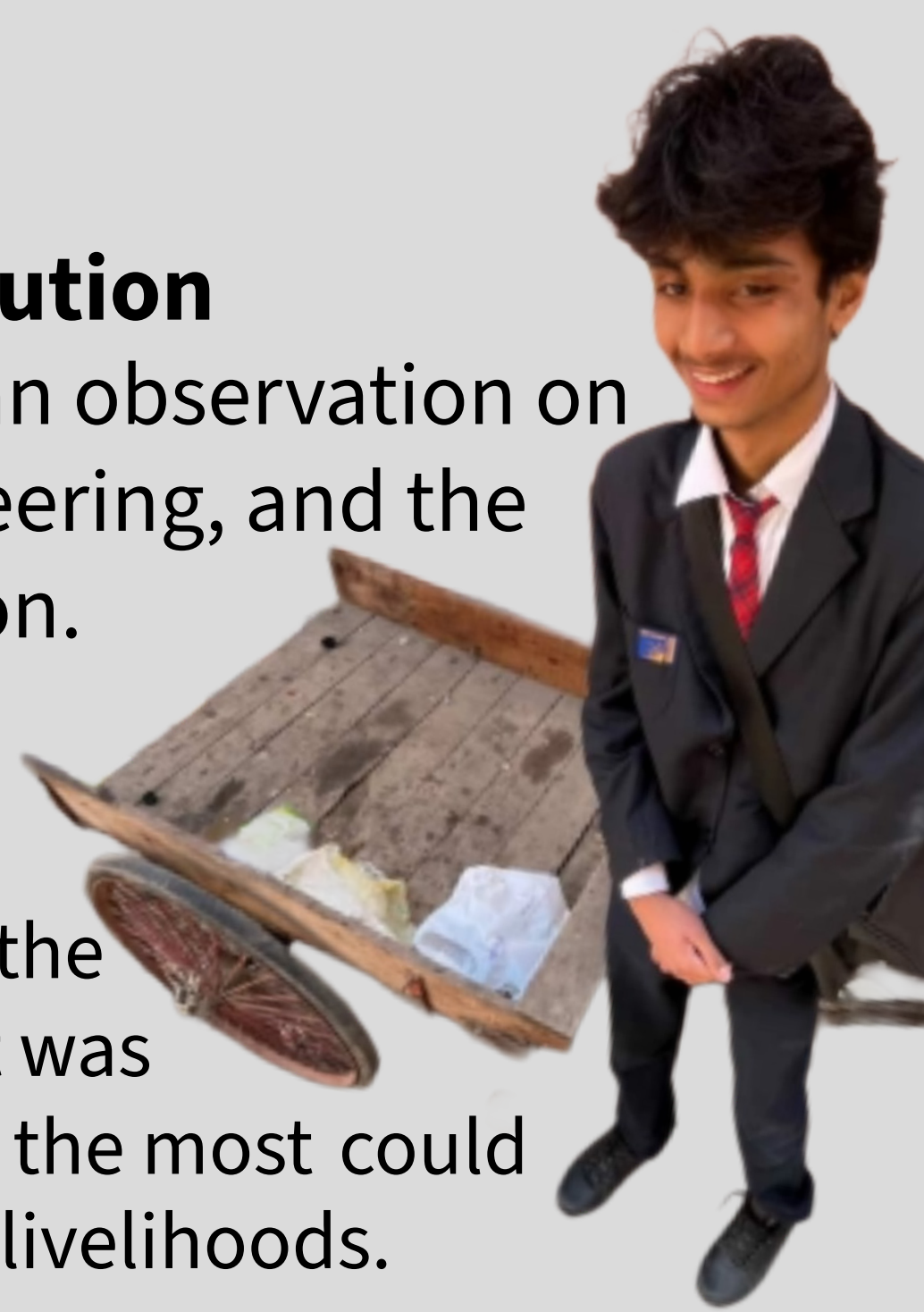
Building a Company

Today, Tirare has evolved from an observation into a patent-pending deep-tech startup with a finalized engineering architecture, institutional support, prototype development underway, and a clear pathway toward commercialization.

Selected Highlights

- Winner - IIIT Delhi E-Pitch Café (Proof-of-Concept Track)
- ₹100,000 Prototype Grant
- Incubated under CIPD, IIIT Delhi
- Patent Filing Initiated through IIIT Delhi Legal Support
- ☉ National Finalist - WRO Future Engineers
- Team Lead - F1 in Schools Nationals
- Queen's Commonwealth Essay Competition Bronze Medal

Every major milestone in Tirare has been earned by solving the next problem rather than waiting for the next opportunity. That philosophy continues to define how the company is engineered, protected, and built



BUILDING THE FUTURE OF UTILITY ELECTRIFICATION

What We Are Looking For:

Tirare is entering the transition from engineering validation to real-world deployment.

To accelerate this journey, we are seeking partners who can help transform a validated architecture into a scalable mobility platform.

Current Priorities

Prototype Development

- Manufacture and assemble the first functional MRH prototype
- Complete integrated drivetrain testing
- Validate rider-intent sensing and assist performance

Pilot Deployments

- Deploy retrofit systems with real cargo tricycle operators
- Collect engineering and operational data
- Refine the platform through field validation

Manufacturing & Ecosystem

- Develop manufacturing-ready assemblies
- Expand workshop integration
- Build installation and service capabilities
- Prepare for scalable production

We Welcome Collaboration From

- Incubators & Accelerators
- Prototype Manufacturing Partners
- Mobility & Logistics Companies
- Strategic Investors
- Government Innovation Programs
- Academic & Research Institutions

Tirare is building an affordable pathway to electrification by upgrading the vehicles that already power millions of livelihoods.

Contact

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The future of mobility begins with the vehicles already on the road.