

IPRO 351 Project Plan
Solar-Electric Hybrid Rickshaw for India
September 22, 2006

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Mission Statement

By working together, learning, and utilizing the myriad of skills within our team, our mission is to complete phase one of IPRO 351 by presenting results of in-depth research that will determine the feasibility of solar/plug-in power hybrid auto rickshaws in India.

1. Objectives

Research Objectives:

Perform Market and Business Analysis □

- Manufacturers of auto rickshaws; their sales and distribution figures.
- India's history and dependence upon foreign oil consumption.
- Government regulations regarding transportation, pollution and alternative energy.
- The profile of the auto rickshaw owner/operator.
- The transportation industry in India.

- Cost analysis of solar/electrical components from Indian vendors.

Conduct Technical Research

- Electrical and mechanical component research.
- The mechanics and performance characteristics of the conventional and hybrid auto rickshaws.

Design Objectives:

- Compile electrical and mechanical Specifications.
- Propose design and configuration.
- Evaluate economic viability requirements.

2. Background

Auto rickshaws are one of the most popular means of transportation in India and other countries. Although they have many benefits, including small size, light weight, and low cost; auto rickshaws are very noisy, inefficient, expel a high degree of pollutants and keep India dependent upon foreign oil consumption.

Auto rickshaws are available in diesel, compressed natural gas (CNG), and liquefied petroleum gas (LPG) models. The operating costs of these are lower than rickshaws running on gasoline; however, the higher initial costs keep the fare of these rickshaws the same as its gasoline counterpart.

The use of alternative energy in transportation is being explored as a solution to the problems experienced with the auto rickshaw.

The Research Title of IPPRO 351 is *Solar/Battery Smart Hybrid Auto Rickshaw Three-Wheeler*. IPPRO 351 is a funded research and development project and is an entirely new project. It has been divided into five phases spanning five years, from September 1, 2006 through August 31, 2011. The first phase is scheduled for completion by mid-December of 2006.

Our project proposes to tackle the auto rickshaw problems by developing a solar/battery, smart, hybrid, three-wheeler while maintaining the same performance as the traditional auto rickshaw.

3. Methodology

Research methodology

The problem at hand is trying to find a hybrid auto rickshaw that would replace the current rickshaws available in India. The replacement will have to surpass the performance of the older models, be environmentally friendly and economical.

The research will be conducted in various phases;

Phase 1:

Research Phase

This task will be lead by a “Business and Market Research Sub-Team Coordinator,” and a “Technical Research Sub-Team Coordinator” and will be composed of three team members each. Each sub-team member will be responsible for a particular aspect/s of the research phase. The research phase will commence on Tuesday, September 12th, 2006, and will end on Tuesday, October 10th, 2006 (tentative). Reports will be created by the sub-team coordinators and turned in to the project team leader on Thursday, October 12th, 2006 (tentative) for final review and editing.

This research will be in-depth and include credible secondary resources such as scholarly databases, trade publications, scholarly journals, and websites with statistics and data on rickshaws and the automotive industry in India.

The teams will also look into the problems that other organizations have faced in designing and implementing an electric/solar-electric rickshaw and look at ways to address those problems. For example, one of the issues facing electric rickshaws is the weight of the lead-acid batteries used. In addition the group will look into economical ways of addressing the problem/s. This will also serve as criteria in determining whether the group will continue with a selected design.

The primary role of the Business and Market Research sub-team is to mine for information and data on the role, background and history of auto-rickshaws, competition, governmental policies, risks and challenges, the economics of operating and owning a rickshaw, and the social, cultural, and cognitive factors on rickshaw owners and drivers.

Market research would be conducted to determine market size in the auto rickshaw industry. This will be important in determining the market potential a solar-electric rickshaw.

An investigation on rickshaw manufacturers will be done to explore their research and development strategies and to uncover potential partners and opportunities.

We will provide alternative designs for the hybrid rickshaw and determine government/consumer preferences of local rickshaw companies in India.

Phase 2:

Design Phase

This phase will have a “Visual Design Sub-Team Coordinator” who will gather and create graphical representations for reports, generate simulations, and prepare these visuals for the final presentation. The team collectively will brainstorm, establish design criteria, develop economic viability requirements, and create and simulate schematics.

I PRO Deliverables Preparation and I PRO Day Rehearsal

This portion of the project will be conducted by an “Exhibit/Final Presentation Sub-Team Coordinator” and will involve everyone within the organization. This task will entail the development of a web site (optional), poster, exhibit, Power Point presentation and a deliverables CD.

4. Expected Results

In analyzing our research on the auto rickshaw and transportation industry in India, we will determine the best design for a solar-electric hybrid rickshaw and its feasibility for introduction into the automotive market in India. The overall expectation of I PRO 351 is to create a blueprint for an environmental friendly, affordable, and practical alternative to internal combustion engine (ICE) auto rickshaws. The long-term impact of a vehicle of this nature, in terms of the, social, economic and environmental benefits will be demonstrated.

Research Phase Expectations

“We expect to have...”

- An in-depth understanding of the current and potential role of rickshaws in India and other nations with similar modes of transportation.
- Sufficient research of the rickshaw market and the transportation industry in India to provide a forecast for demand.
- Thorough information regarding governmental regulations and environmental policies of India's transportation sector to determine the most efficient market penetration strategy.
- Analysis of existing rickshaws in order to compare and contrast the various models.

- A guideline for the design of an environmentally friendly rickshaw prototype which could serve as a proof of concept.

Design Phase Expectations

“We expect to...”

- Set design criteria based upon the information gathered by the research.
- Define the electrical and mechanical components specifications.
- Create a simulated model and schematic.
- Complete a cost analysis of the proposed design and assess its commercial viability.

5. Project Budget

The budget will consist of necessary costs and expenditures related to the IPRO 351 project.

- Subscription	\$150
▪ Automotive	
▪ Alternative Energy	
▪ News Letters / e- news letters	
- Market research	\$200
▪ India's transportation industry	
▪ India's government policies regarding alternative energies	
- Miscellaneous	\$200
- Communication	\$ 50
Total Budget (estimate) =	\$600

6. Schedule of Tasks and Milestone Events

See attached Gantt chart for the schedule of tasks and milestone events.

7. Team Member Assignments & Designation of Roles

Tony Morales - Project Team Leader

Tony is a 4th year student majoring in Applied Science and Business Administration and is an Ed-Kaplan Fellow. He has extensive experience with several software applications such as Microsoft Office, Solid works and Adobe Indesign and Photoshop. Tony has a special interest in design.

Priscilla Mulhall - Business Research Sub-Team Coordinator

Priscilla has prior experience with working in an IPRO group which was also centered on alternative energy options. Priscilla is a junior in Electrical Engineering and she has a keen interest in hybrid technology.

Chukwuderaa Dike - Visual Design Sub-Team Coordinator

Deraa is excited to be in the IPRO 351 team as his first IPRO experience. He is a junior in Electrical Engineering and He has a strong research background. Deraa is an Ed Kaplan Fellow and he has useful project management experience.

Allisah Love - Technical Research Sub-Team Coordinator

Allisah is an Ed Kaplan Fellow and has research and project management experience. She is third year transfer student majoring in Business and Information Technology Management and is interested in the technical aspect of solar-electric rickshaws.

Daisy Agose - Exhibit/Final presentation sub-team Coordinator

Daisy is an Ed-Kaplan Fellow and has taken part in two previous IPRO's. She is a 4th year Chemical Engineering student and she is interested in future energy project management.

Hei Chang Lee - Meeting Coordinator

Lee is studying electrical engineering and is familiar with hybrid technology and simulation software such as ADVISOR. He has interests in music and technology.

Break-Down of Team Structure

Project Team Leader- Tony

Role: To coordinate and delegate tasks and goals.
Facilitate team meetings. Generate drafts and final write-ups and reports.

Partner:

- Allisah

Meeting coordinator- Lee

Role: Conduct the flow of the meetings, maintain harmony and order, mediate, etc.

Partner:

- Tony

Research Phase

Business Research Sub-Team coordinator- Priscilla

Role: Assign tasks/objectives and summarize findings in report

Partners:

- Daisy
- Deraa

Technical Research Sub-Team coordinator- Allisah

Role: Assign tasks/objectives and summarize findings in report

Partners:

- Lee
- Priscilla

Design Phase

Visual Design Sub-Team coordinator- Deraa

Role: To gather and create visual data for reports, final presentation and generate simulations.

Partners:

- Lee
- Allisah

Final report sub-team coordinator- Tony

Role: To combine and edit sub-team reports into the final report.

Partner:

- Allisah

Exhibit/Final presentation sub-team coordinator- Daisy

Partners:

- Everyone