

Introduction to E V Future



E V Future

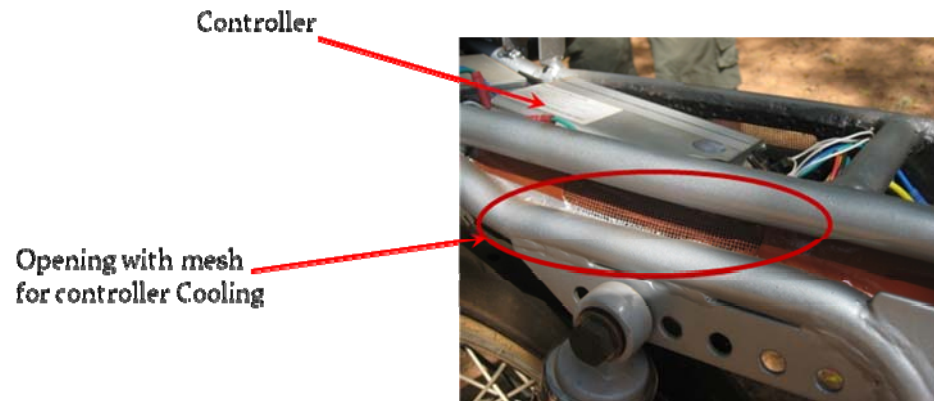
E V Future was established in 2007, in the International township of Auroville located in the South Eastern state of Tamil Nadu, India. Auroville is well known throughout India and the world for its extensive research in the fields of renewable energy and other green initiatives. E V Future's primary focus is on designing electric eco-friendly 2 wheeler solutions primarily for the Indian market and its existing road conditions. E V Future is the brain child of two young dynamic Aurovilians, Aurosukrit and Akash Heimlich who over the years have been actively involved in innovation and research into alternative energy and transportation. Over the past 2 years, E V Future has developed a prototype electric two-wheeler which is unique to all other electric two wheelers available in the Indian market – the Hum-V, a rugged multi-purpose utility “moped”.

15 prototype versions of the Hum-V have been successfully tested over the past year within Auroville. Over this period every vehicle delivered was modified and improved upon based on customer feedback.

In 2008, EV Future also launched a solar electric vehicle charging station in Auroville. The solar panel charges the batteries during the day enabling people to charge electric vehicles anytime of the day & night.

Styling of Hum-V

Understanding the present design challenges in Hum-V was the first step.



Controller cooling



Head light and side indicators



CBZ Tail light integration



Absence of center stand



Wires connecting to motor and brake



Absence of wire layout



Absence of overall wire layout



Rear brake wire running through the body



Rear wheel brake wire layout



Provision for adjustment - only once



The raw frame exposed



Position of pillion foot rest

Pillion foot rest

ERGONOMICS...?



Ergonomics – As the complete Hum-V was build to pursue a hobby the ergonomics took a back seat in the overall design.



Front cluster

Hum –V development over the years



old



new

∅" – Angle increased to reduce the distance between rider and handle

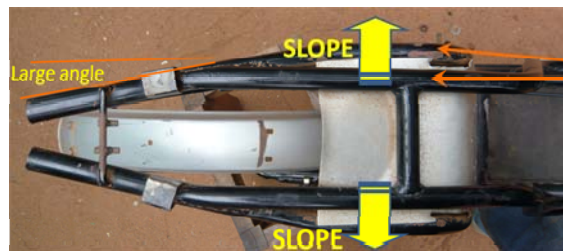
Distance between rider and handle reduced



old

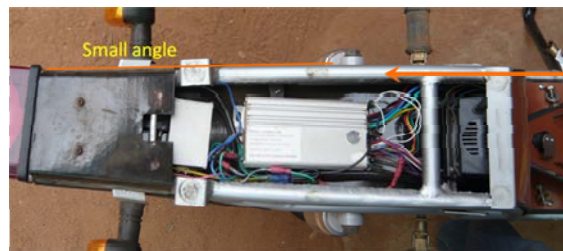


new



old

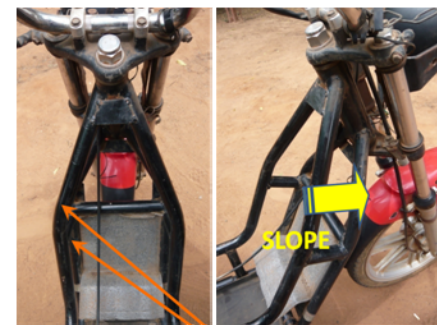
Frame tubes in different planes



new

Co-planer surface due to frame tubes in same plane NO SLOPE

Changes done mainly done for ease in sheet metal body



old

Frame tubes in different planes



new

Styling of Hum-V



old



new

Seat height reduced



old

Oversized rear wheel stay



new

Simpler construction
Made in-house
Still needs more stiffness against twisting

Rear wheel stay



old



new

Seat mounting bracket



experimented

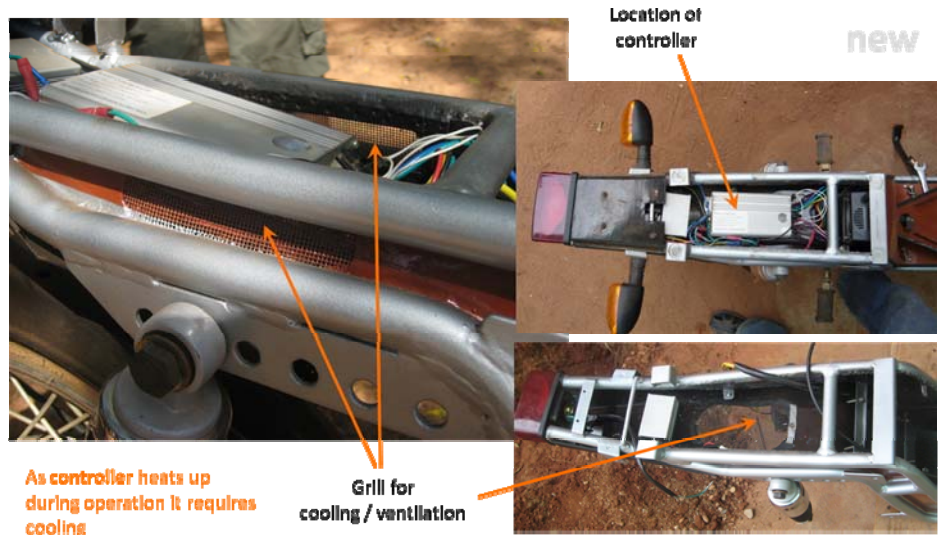
LED Head light

LED head lights were inefficient to drive in night (especially with the incoming vehicle driving on 'upper' light)

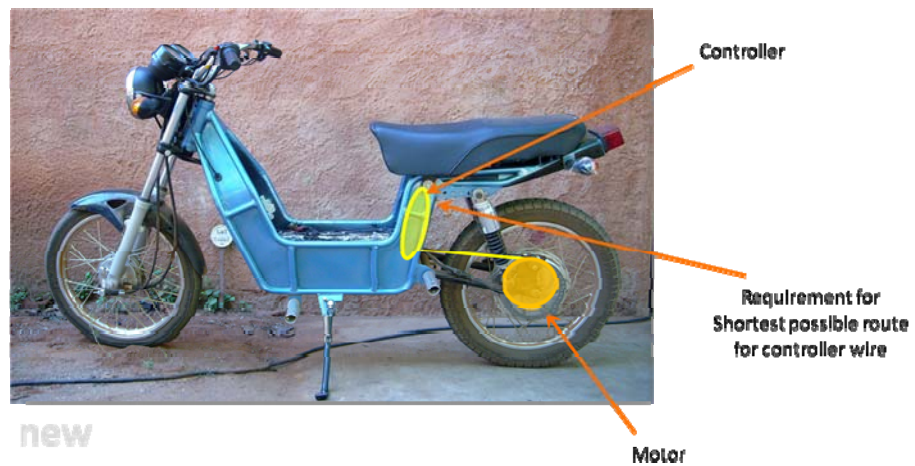


now

ED head light



Apart from these there were some other changes which transformed Hum-V to suit the Auroville driving conditions, namely addition of cruise control, rough indication of battery status, etc.



Synchronic analysis



The Vectrix

Max speed 62 mph
Range of 68 miles

3.7 kilowatt NiMH battery pack

Re-charges to 80 or 90 percent of capacity in two hours.

Three hours is usually enough for a full charge, four if you start from flat empty.



Brammo's Enertia

45 mile range

max speed of about 53 miles per hour.

lithium ion phosphate battery - Valence Technology

2009 Zero S Electric Supermoto



4kWh battery
four hours of recharge time
cruise 60 miles
aircraft grade aluminum

62.5lb of torque and 31bhp,
Shark tooth brake rotors, foot actuated and hand actuated brakes

Projector beam headlight for focused light,
the dash gives information on speed, charge and motor temperature.

priced at \$9,950



Daymak Gatto Moped Electric Bike

PT KITA MCCOY Tbk
Indonesia



The electric mopeds around the world

HUM-V competitors in Puducherry

YO – Bikes

Yo Speed – 750 watts – Yo Bikes

Shri Cauvery Green Electric Vehicles

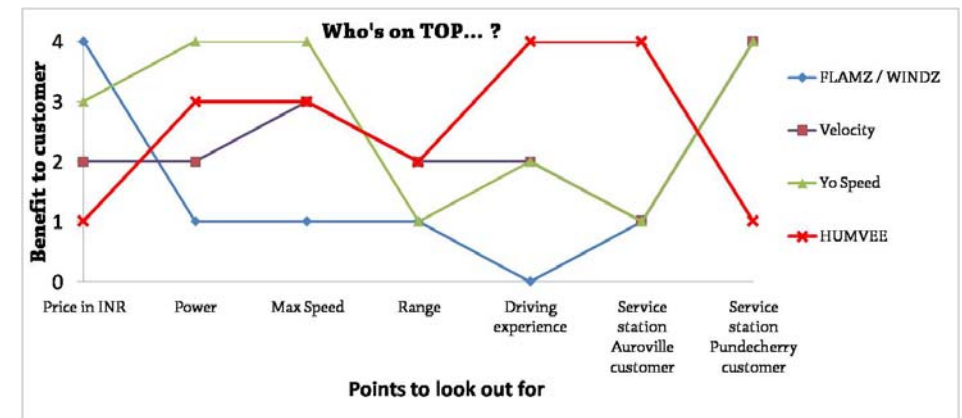
Flamz/Windz – 250 watts

Ultra Motors

Velocity – 500 watts

All the above models follow the Chinese moped design for an electric bike.

All the above models were taken for the test drive from their respective showrooms in Puducherry. The test drive results were compared for positioning Hum-V in the market as well as for finding the new market scope.



Hum-V user feedback

Styling of Hum-V

Out of 15 Hum-V users feedback of 5 users was taken for better understanding of Hum-V and to also to find out the design issues while in the use.

One of the feedback forms is as follows for reference

USER: **Alan**

Q. How long since u bought the humv?

Ans. 1 year

Q. Why did u buy the Humv?

Ans. To travel peaceful way

Q. Do you prefer the electric bike to IC bikes? Why?

Ans 100%, 15-10 mins of relaxing between activities. Time of transport to enjoy from one place to another. Enjoy the journey.

Q. Do you prefer the hum Vee to other electric bikes? Have you ridden other electric bikes?

Ans, Yes, Cycle bike.. extremely disappointing. No sensation of flying. Always bumpy. Tried cycle bikes but came back to the motorbike.. cuz no joy

Q. Where else in the world (outside auroville) could the humV be suited for?

Ans No idea

Changes

Q. If the humV were to look different, what qualities would you like it to have? Soft, strong, light, delicate, sporty, classic, cute, rugged, curvy ...

Ans. its cute.. except the handles

Q. Front tyre is too small.. bigger tyre

Ans .Is the humv comfortable for u? What would you like changed for comfort? Very comfortable- main quality. Likes the box in front.

Q. What additions on the bike would be useful to u?

Ans . Nothing, met his expectations.participated in the development.

Associations

Q. What vehicles have you owned so far?

Ans. Hero Honda splendor, Mercedes Smart – travel inside city

Q. What looks better when electric- cycle, mopeds or bikes?

Ans. Moped.. not cylcle

Q. What other two wheeler is the humv most similar to?

Ans. No idea

Q. What kind of music do you listen to?

Ans. Opera, Verdi

Q. Which movie do you think the humvee could be used in?

Ans. jour de fete .. tati

Q. Name some products that have the humv's character? (apart from the hummer)

Ans. cashewnut, love to be under the cashewnut.

He was happy with the way it looks..

Hum-V user feedback summary

Why Hum-V

Noiseless way of driving

Customizable suspension

Not bothered on looks for purchase

Feedback...

Liked the sturdy and rugged character of the HumV and would like to retain that character.

Quality issues like peeling rubber rims, charging cords etc

More charging stations

Waterproofing

Easy to clean

Required additional features

Need additions like crash bar,

hook for clothes,

Saree guard,

Clear battery indication and

Distance that can be covered with available battery charge.



The field survey

The field survey conditions

Location : Village near Reve and on the way to ECR road

Date : May 26, 2009

Time : 10:00 AM to 12:00 Noon

The vehicle used: Brown colored Humvee

Conducted by:

Roshan Valder and Kamlesh Sawant

The sample of the field survey question answers is shown in the table below.

Total seven persons were interviewed each for approximately 5 to 10 minutes.

	Would you buy this bike?	Why	Between TVS & Humvee	Why	Your opinion, views	What do u think about its cost?
Subject 1 Age: 40	--	--	Prefer Splendor and Yamaha	Choice of vehicle depends on locality, prefers Splendor at Auro and Yamaha – quick acceleration at Bangalore	It looks very uncomfortable to drive as it looks like shock-ups are not attached with frame at right points	It will work in Auro
Subject 2 Age: 25	--	Model looks like Toy	--	Like fancy and stylish vehicle	It should have leg guard, saree guard, pillion handle	--
Subject 3 Age: 30	No	Prefer petrol bikes, its paint not good, its front is not good	Humvee	--	It should be more stylish	28k
Subject 4 Age: 35	Yes	Looks good	Humvee	Ladies can also travel, No pollution, no noise, electric	Good, as luggage can be carried in same manner as TVS, handle hook required	25k

Table 1

The results of field survey

Cost :

Hum-V costs a lot more when compared to the expected Rs 20 to 30k price tag

Looks :

Need to be more “stylish”, “fancy”

It should look like company made bike

Recharging issue:

Recharging time should be reduced

Vehicle preference:

Petrol bikes are preferred because of easy refill

And need ‘more’ out of vehicle for which they will spend 20 to 30k.



Understanding Users and product
relationship

Understanding users

Three target users

- 1) Aurovillians
- 2) Rural market – age group of 40 and above
- 3) Rural market Youth – age group 20+

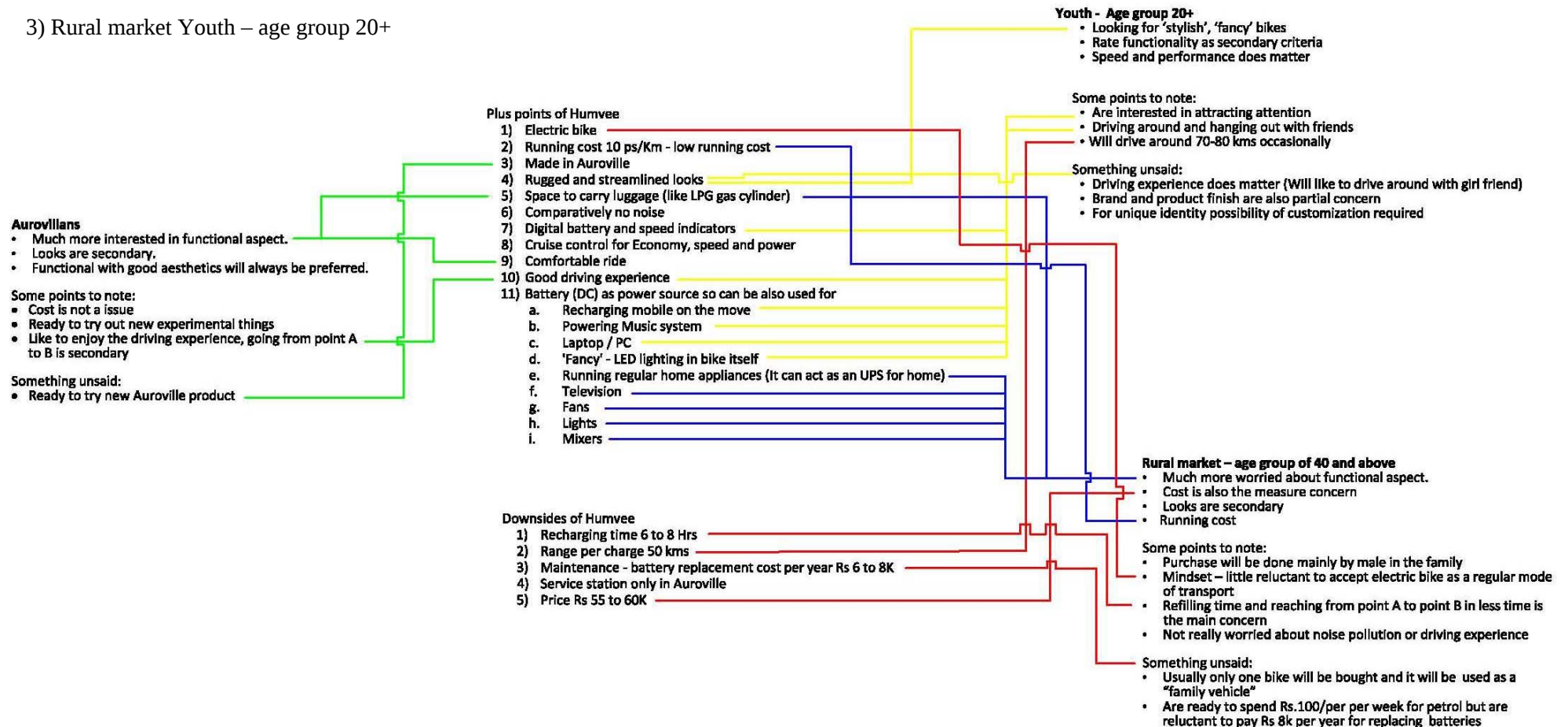


Fig. Users and product mapped to find out scope of improvement

Its clear that to attract new users Hum-V should be marketed with the new identity and it should stand out in the market of cheaply available electric mopeds. The additional multi-functionality pulls the Hum-V on the top in the comparison chart.

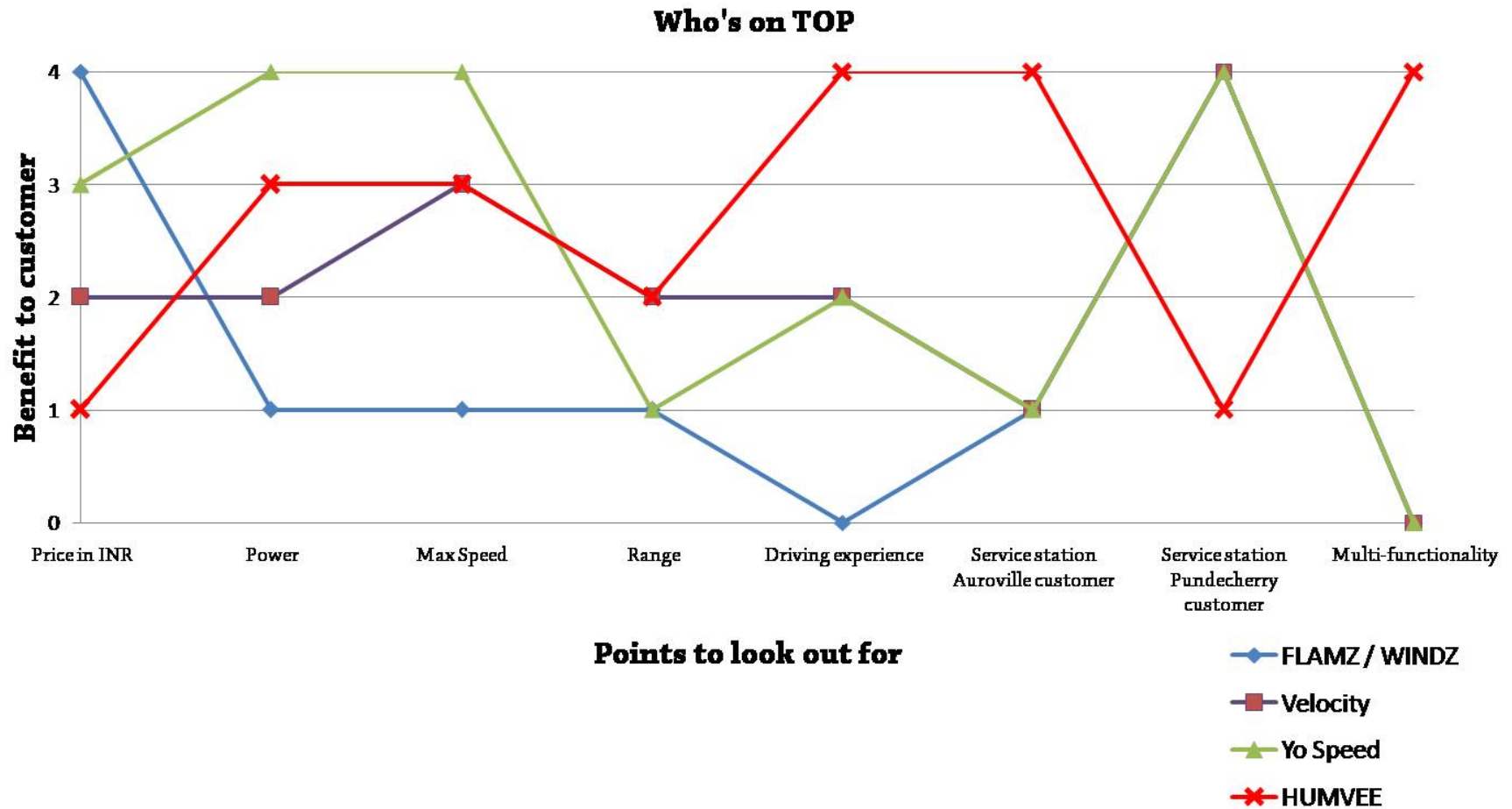


Fig. New comparison of electric bikes in Puducherry

The Design Brief

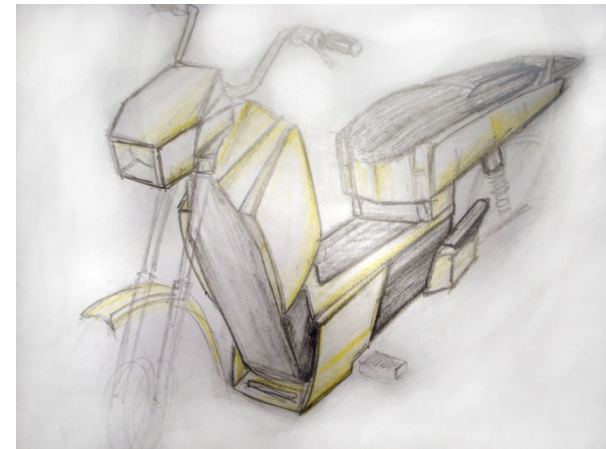
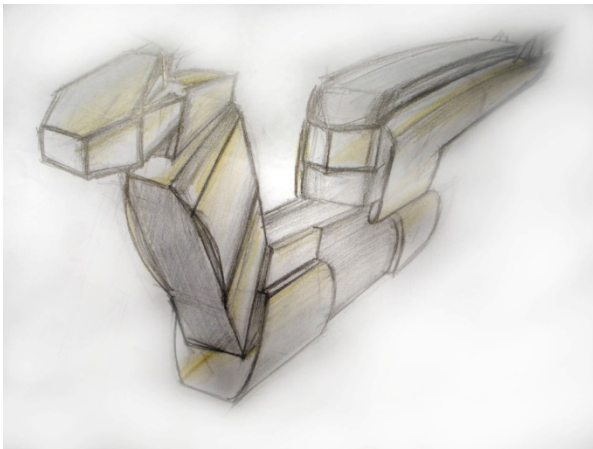
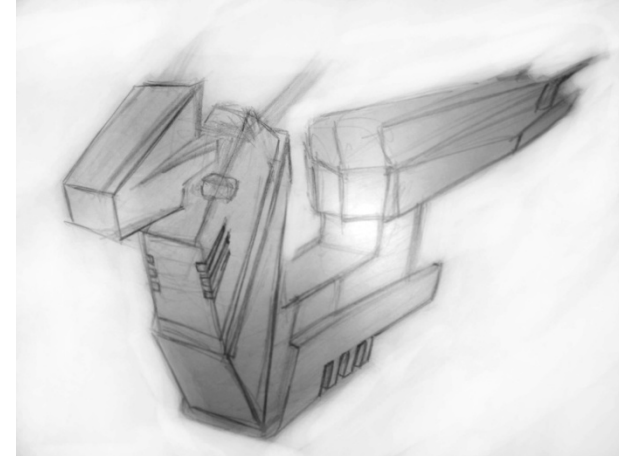
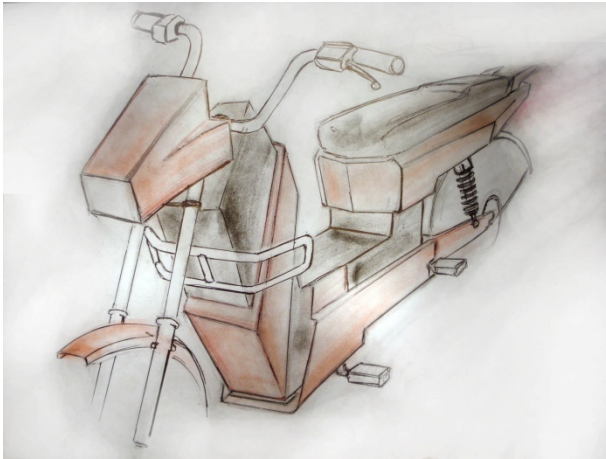
Design brief

Styling of Electric bike Hum-V, with the existing frame for

- 60 bikes as production target
- Half of them targeted for Auroville users and rest as to be sold as **Demo bikes** in different parts of India
- Targeted for environmental concerned users
- Price tag of around Rs. 50k to 55k
- The functional aspects like vents for cooling controller should also be addressed.

Other conditions

- To be designed for functionality of rural Indian market
- Body work to be designed for handmade production for this lot





First mock -up

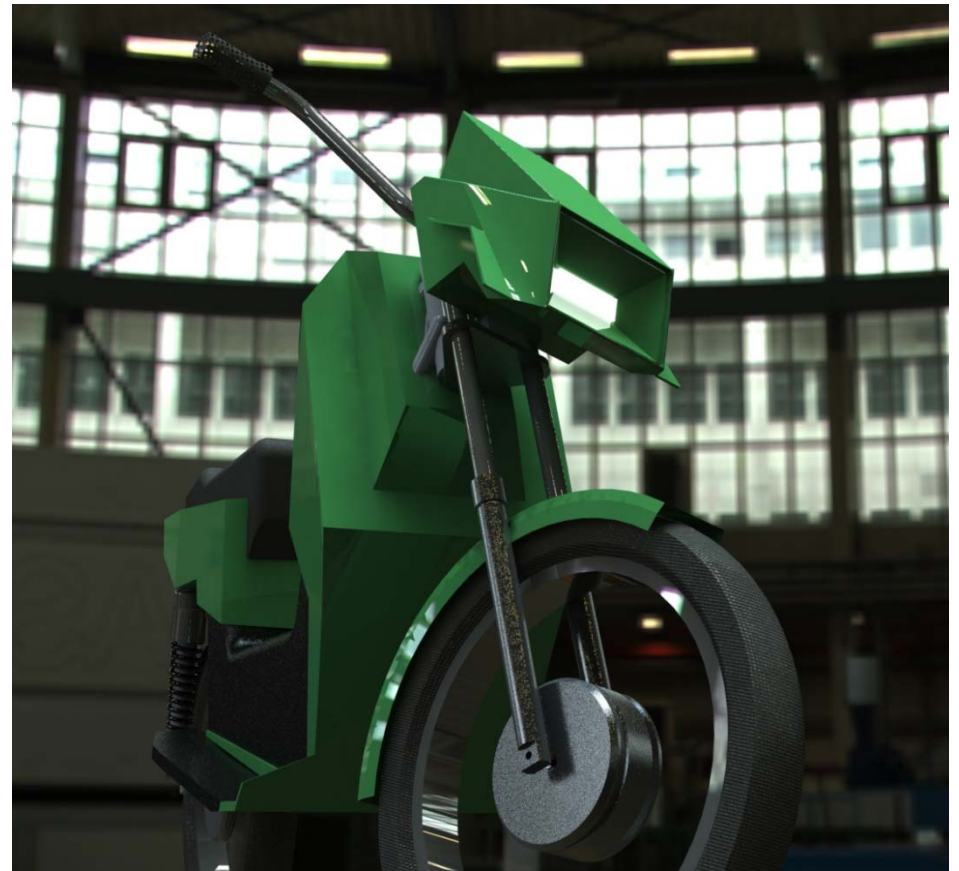


Second mock-up



Forth mock-up

Third Mock-up





Turning it into reality

Styling of Hum-V

Fabrication of the prototype took eleven intensive working days. To make the matter more challenging there were design changes on the spot – some time – either to enhance the beauty or to speed up the process to meet deadline.



The result





The pillion foot rest



The hinge

Digital speed and battery indicator



Tail light – integration of Bajaj
XCD LED light





Rendering
and
reality



Rendering and reality

