

A close-up, low-angle shot of a person riding a bright red bicycle on a cobblestone street. The focus is on the front wheel, the frame, and the rider's legs and feet. The background is blurred, showing other people and buildings in the distance.

Campus bicycle for IIT Bombay

**Stage 3
Presentation**

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Mobility and Vehicle Design

Project guide: Prof. K. Ramachandran

Project description

- Design a campus bicycle for IIT Bombay.
- Mainly concerned about the male and female students of the campus.
- An effective bicycle for the students.
- More emphasis for human powered transportation inside the campus.

Reasons to select this topic

- Global warming and emission problems....
- Importance of a sustainable mobility....
- Wanted to do something simple, as the time period was small
- Cycling, is one of the cheapest and easiest mode of transport.
- India is the 2nd largest manufacturer of bicycles in the world, so more scope.

Why do we need a campus bicycle for IIT Bombay?

- It is a residential campus.
- 3000 undergraduates and 3,100 postgraduates.
- Students are not allowed to use any motor vehicle inside the campus.
- Only traveling aid is the campus Tum-Tum service.
- Recently some auto rickshaws , not legally.

IIT Bombay campus

- Hostels
- Departments and other IIT Bombay buildings
- Bus stops

The maximum distance from the extreme hostel to the academic area or the exit gates is less than 2 Kms



Image courtesy: http://www.idc.iitb.ac.in/about/IITB_map

Some daily scenes from the campus



1



2



3

Continued...



4



5



6



7



8



9

Continued...



10



11



12



13



14



15

Over dependence on the tum-tum service rickshaws



Tedious

Risky

Time
consuming



Non
economical

Students
becomes
lazy



Students who are walking or cycling are independent and more flexible to reach their destinations

Indian initiatives of campus cycling

Campus bicycles are not yet popular in Indian educational institutes

IISC Bangalore

- “ Namma cycle “ - 2012
- Bicycle sharing system
- First Indian institute
- Started with 150 cycles and 4 stations

Aligarh Muslim University

- AMU Vice Chancellor, Lt. Gen. (Retd.) Zameer Uddin Shah has launched a drive to popularize cycling within the University campus

DAVV (Devi Ahilya University)

- Their vice-chancellor DP Singh is promoting cycling inside the campus

Global bicycle industry

- Expected to witness moderate growth over the next five years and reach an estimated \$64.1 billion by 2018.
- Growing fitness consciousness among people
- rising energy prices
- growing congestion due to increasing population and number of cars on roads

Indian bicycle industry

- 2nd largest manufacturer of bicycles in the world producing about 15 million bicycles annually.
- 3 million are exported annually.
- West Asia, Africa, US and Latin America are the main export destinations.
- India has 90 bicycles for every 1,000 people, compared with 149 in China.
- Hero Cycles, TI Cycles, Avon Cycles and Atlas Cycles account for 90% of total bicycle sales.
- The premium/high-end bicycles segment is growing at 24-28% .
- Chinese cycle prices are at least 15 per cent lower than those of Indian cycles.
- 12% excise duty causes increase in the cycle prices.

Market study

- Two different kinds of dealers.
- one in a shopping mall environment, “ Sports XS “, located in R-City mall.
- And the other is in the town area, “ A one “, Powai, Mumbai.
- Two different kind of customers, one is high class the other is normal customers.
- Market survey includes questionnaire survey as well as discussion and observation.
- Questionnaire consisted of 14 questions.
- SportXS – Parves (Asst. Store manager)
A one – Faim Malik (Shop in charge)

Questionnaire survey

Question 1: What are the different types of bicycles available?

Question 2: Which factors have the most preference?

Question 3: What is the price range available with you?

Question 4: Which brands are available with you?

Question 5: Which brand has the most demand, why?

Question 6: Which type of cycle has the maximum demand?

Question 7: Which are the favourite colours of the students?

Question 8: Is there any demand for the accessories?

Question 9: Do the students are looking for storage space, tools and other facilities?

Continued...

Question 10: What do you think, have the most influence on the students while buying a bicycle?

Question 11: What are the different sizes available for college students?

Question 12: Which factors will affect the size selection?

Question 13: What are the new purchase trends in bicycle? why?

Inference from Market analysis

- More demand for MTBs.
- Weight and brand has more priority.
- No demand for additional accessories.
- They have enough demand from customers, cycles have a good market.
- Trend is going towards the foreign bicycles.

User profile

- The target users are, both the male as well as female students of IIT Bombay.
- The students includes Under graduates, post graduates and research students.
- For UG they don't have any self earnings, mainly dependent on parents.
- PG and PhD students have self earnings like stipend.

User research

- Comprised of a questionnaire survey, interview and observation.
- Sample strength was 30 students.
- Out of 30 there were 5 girls.
- Questionnaire had 14 questions.
- Two type of people one is present users and the other one is potential customers.

Questionnaire survey

Question 1: Which cycle do you have?

Question 2: Are you planning to buy a bicycle?

Question 3: Average daily travel distance in campus?

Question 4: For which purpose do you use the cycle the most? or For which purpose do you plan to use the cycle the most?

Question 5: Who financed for the cycle or Who would finance for the cycle?

Question 6: Which factor did you consider while buying the cycle? or Which factor will you consider while buying a cycle?

Continued...

Question 7: What do you like about your current cycle?

Question 8: What you don't like in your current cycle?

Question 9: What all things do you carry along with you in campus?

Question 10: Do you feel IIT Bombay campus roads are comfortable for cycling?

Question 11: Do you use cycle in the night? Or Do you need cycle in the night?

Question 12: Do IIT Bombay campus roads are well lit in the night?

Question 13: Which is your favourite cycle?

Why?

Question 12: Do you prefer to carry back bag while cycling?

Inference from questionnaire survey

- Most students have Mountain Terrain Bicycles
- Average daily travel distance in the campus is between 1 Km to 6Kms
- The main purpose of cycle is the regular commuting in side the campus
- Almost 60% of students are using their own money, either stipend or account deposited during their previous work time.
- Cost and comfort got maximum priority
 - Cost – 45%, Comfort – 27%
- Most of the students like light weight bicycle.
- They like to have gear
- They don't like minimalistic design.
- Most of the students like light weight bicycle.

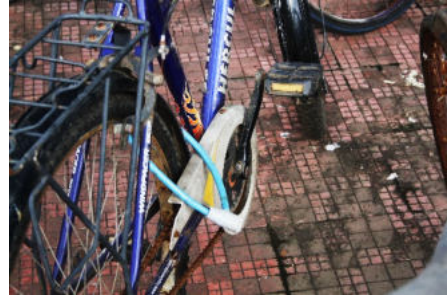
Un expressed needs through observation



- Most of them using a back bag.
- Only few students have co-passenger.
- Very little usage of carrier.
- No additional items were carried except a few of them carried umbrella and few girls used the basket of cycle to keep her bag.



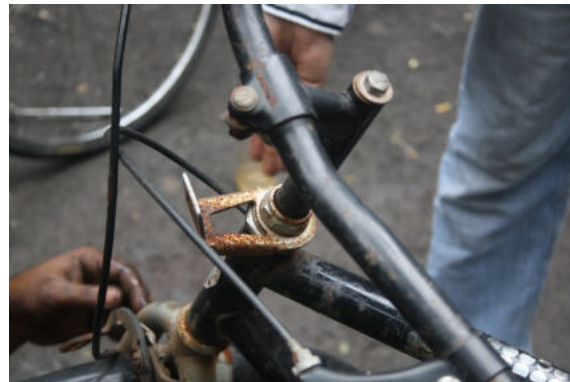
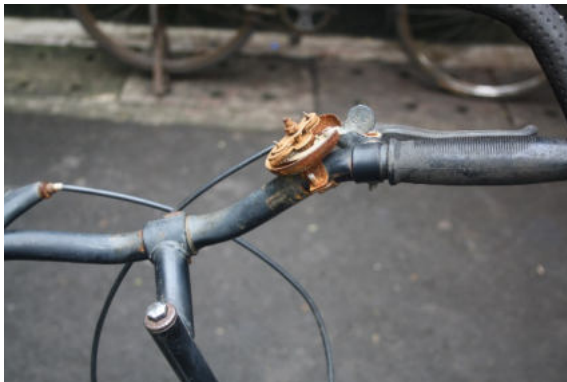
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- Big structural tubes adds more visual mass to the cycle.



Continued...



- The painted or plated parts are rusted.
- Mudguard and rim are more prone to rusting.

Continued...



Campus roads having
sloped profile

Image courtesy: http://www.idc.iitb.ac.in/about/IITB_map

Trend study

- Helps to understand the ongoing trend in this segment all around the world
- Campus bicycles in India as well as abroad have taken in to consideration.



Yellow bicycles, Western Carolina University



Rental bicycles at University of Missouri

Continued



Yale University, United States



Sunderland University, UK



National University of Ireland, Galway

Continued



Konkuk University, Seoul



Google Campus Bike ,
California, USA

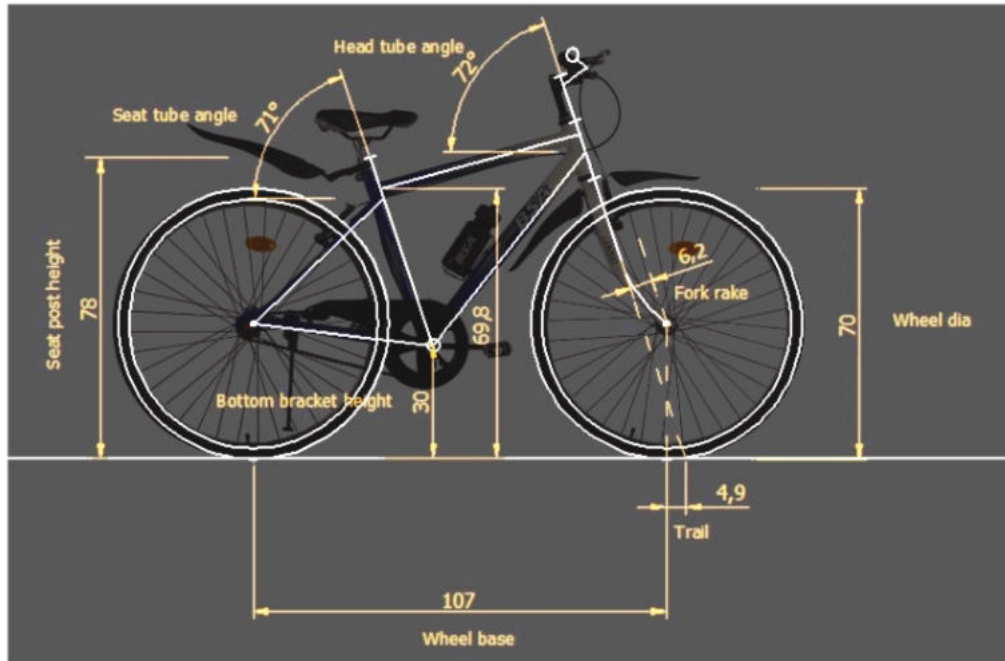


Namma cycle, IISC
Bangalore

Inference from trend study

- Mostly unisex bicycles, enables common usage of boys and girls.
- Bright coloured, ensures better visibility.
- Some kind of carriage system, helps the students to carry their goods.
- Minimalistic designs, ensures cost reduction and easy maintenance.

Reference cycles dimensions



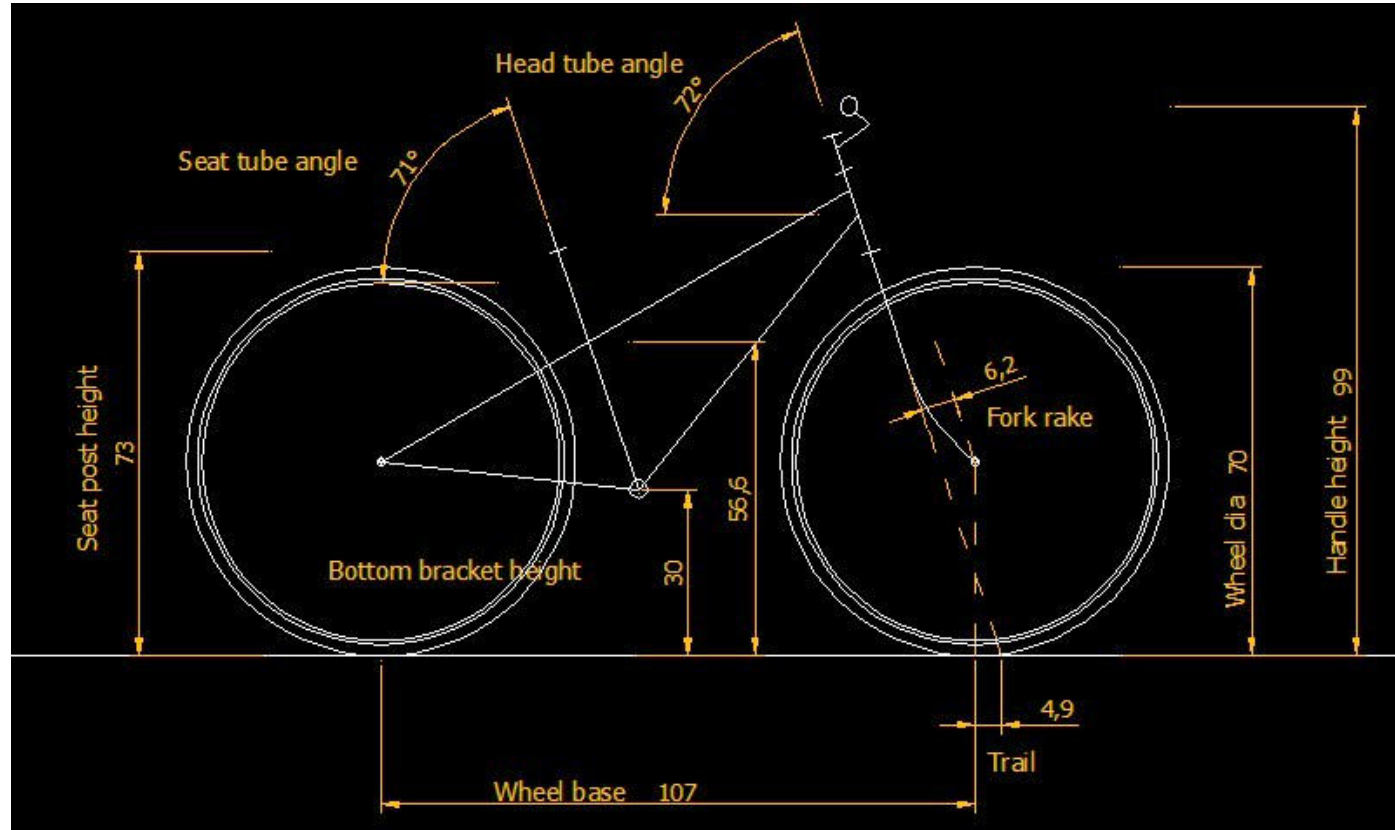
BSA Mach
city



BSA Lady
bird

All dimensions are in cm

Final concept dimensions



All dimensions are in cm

Design brief

Styling

A bicycle having a sturdy and sleek unisex frame design.

Functional requirements

Light weight bicycle having features to prevent slashing of water during monsoon.

Dimensional specification

Wheel base – 107 cm

Trail – 4.94 cm
degree

Seat post angle – 71 degree

Seat post height – 73 cm

Fork rake – 6.17 cm

Wheel dia. – 700 mm

Handle height – 99 cm

Head tube angle – 72

Finish

Finishing with paint should be matching with the campus environment and having better visibility.

Mood board for styling



Campus



Vibrant

Dynamic



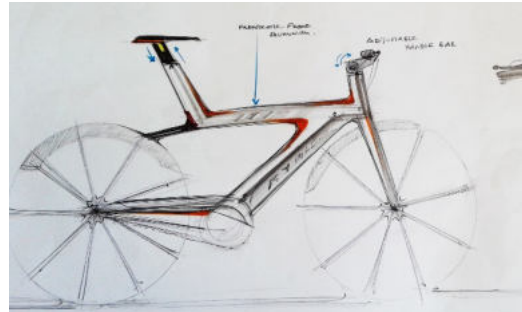
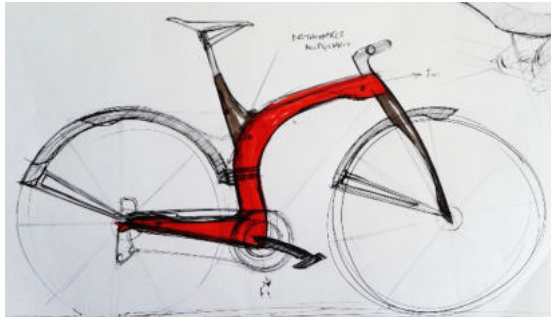
Sleek



Ideation



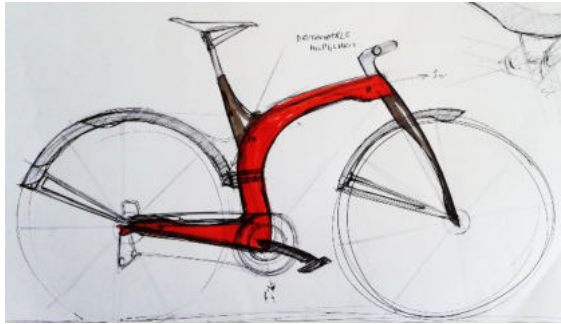
Ideation



Ideation



Shortlisted concepts



Concept -1



Concept -2



Concept -3



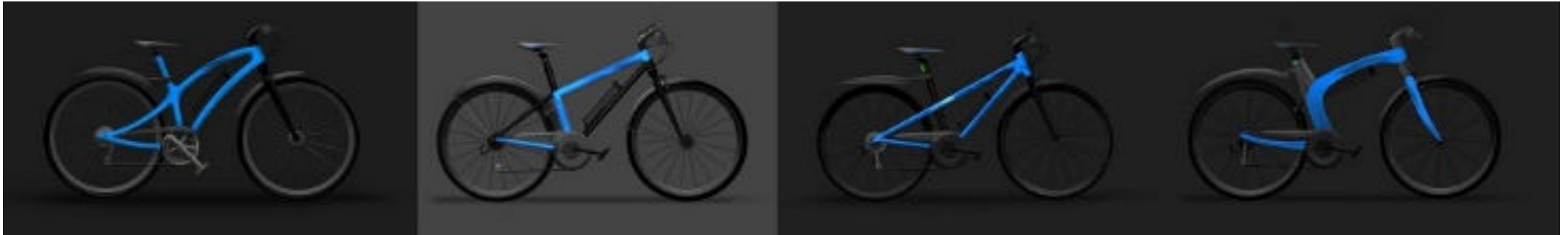
Concept -4

- Sleek
- Dynamic
- Minimalistic
- Trendy

Concepts refined



Concepts evaluation



Keywords

- Light/sleek
- Unisex-ness
- Minimalistic
- Dynamic
- Vibrant
- Fresh
- Campus-ness

Concepts 3 detailed rendering



Concepts 4 detailed rendering



Features

- Sleek design.
- Sleek and light design
- Unisex frame
- Sleek and light design
- Minimalistic
- Sleek and light design
- Dynamic
- PP mudguard
- 6 speed derailleur gear

Model making



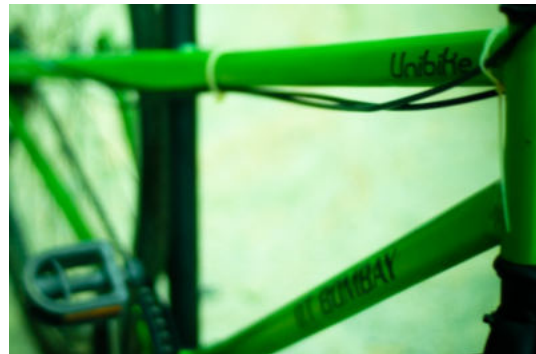
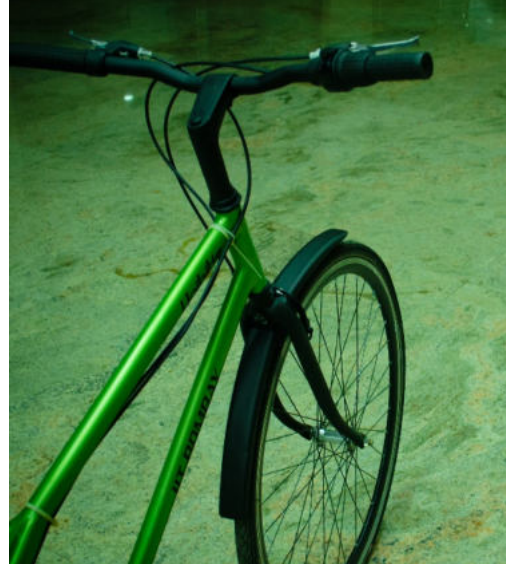
Model making



Final model (1:1)



Final model (1:1)



Thank you