2021

CHURCH STREET FIRST

CLEAN AIR STREET - TEST BED REPORT

Photo credit: CAS team, DULT

URBAN MORPH
TRANSFORMING URBAN SPACES

DIRECTORATE OF URBAN LAND TRANSPORT
UDD, Government of Karnataka

INDIAN INSTITUTE OF SCIENCE
भारतीय विज्ञान संस्थान

CATAPULT

Honorable Chief Minister Shri Yedyurappa trying out an Electric Bicycle at the Clean Air Street

credit: Sathya Sankaran, Urban Morph

Overview

Catapult UK and Urban Morph along with Indian Institute of Science, approached the Directorate of Urban Land Transport for conducting a Clean Air test bed on Church Street on May 11, 2020.

Air Quality is a concern for cities across the world. The Innovating for Clean Air project was launched in Bengaluru in May 2019 by Catapult UK to support impactful clean air innovations and enable Electric Vehicle adoption.

Under this program, DULT, IISC, Urban Morph and Catapult came together to implement Clean Air Street testbed in Church Street Bengaluru. The objective was to transform one of the central streets in Bengaluru into a fully pedestrianized zone on weekends for a period of six months to demonstrate benefits of using sustainable modes. The initiative aimed to create a healthy, citizen-centric street environment which prioritises green and active forms of transportation while encouraging sustainable behaviours.

The Clean Air testbed was a part of the Church Street First initiative Inaugurated by the Chief Minister on 7th November of 2020 initially for a period of 4 months till 28th February 2021 over the weekends and extended by two more months till end of April 2021.

Inauguration of the testbed by the Honourable Chief Minister and other dignitaries.

Photo credit: Sathya Sankaran, Urban Morph

Test Bed

A test bed is a controlled city environment where products and solutions from innovators are deployed for a limited period of time so both the Innovators and the stakeholders involved can understand the needs of the city and its citizens.

The goals of the testbed was to demonstrate innovative air quality and electric mobility technologies developed by innovators, and provide the latter an opportunity to deploy their solutions in a real world scenario.

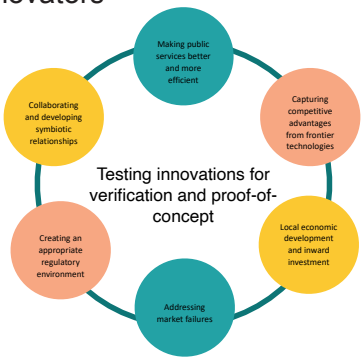
The street was closed to motor vehicle traffic every Saturday and Sunday and only pedestrians, bicyclists and the electric vehicles of the participating innovators were allowed to ply.

14 innovators were selected based on an open call put out by the organising team. For the first cohort in November 2020, the open call was put out by Catapult. For the second cohort in January 2021, DULT put out the open call.

Air quality monitors from three participating innovators were used to calibrate the air quality on Church Street. This data was used to understand the effect of pedestrianisation on the quantum of suspended particulate matter.

Test rides were provided to the visitors on the electric two wheelers and three wheelers. The innovators collected feedback on the products.

The testbed offered the benefits to both the government and the innovators



- Provide a live environment for innovators to deploy their technologies and products.
- Gather user input on the product-ease of usage, pricing etc. so as to refine the product to meet the market needs.
- Provide an opportunity to the Government agencies to experience the impact of new technologies, and understand the need for enabling policies, if any, to support the deployment of such technologies.

First Cohort

The initial participants for the test bed were 10 innovators from India and UK in response to an open call put out by Catapult.

1. Ambee
2. Prkruthi
3. Atmospheric Sensors
4. Mastiebikes
5. Elon Motors
6. GreenDzine
7. BuyMyEV
8. Altigreen
9. Trans Vahan
10. Pixuate

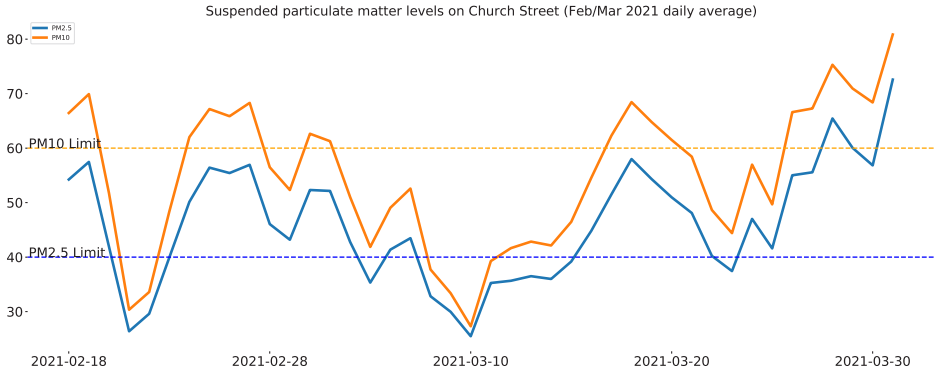
Photo credit: Sathya Sankaran, Urban Morph

ambee

Ambee provides accurate hyperlocal air-quality data in real time, improving lives, productivity, business outcomes, and even public health and governance. Ambee's data is used in countries and industries across the world. Their proprietary data-science, backed by possibly the world's largest private air quality data set, provides solutions on a previously unseen level.

Ambee provided three sensors located near Starbucks, opposite Brigade gardens and near SBI ATM on Church street.

Ambee/Prkruthi Sensors mounted on Clean Air Street



JAL manufactures indoor and outdoor devices (“Prkruti”) that use low-power IoT sensors to monitor air pollution and weather conditions. By installing low-cost air quality sensors (Prkruti) across cities, a clearer picture of air pollution and what is causing it can be built that will inspire citizens to ‘go green’.

On Church Street, Prkruthi air quality sensors were installed at two locations opposite Empire and near SBI ATM. Their devices were solar powered and provided PM2.5 and PM10 data for measurement. Prkruthi used this opportunity to recalibrate their sensors and change the firmware to connect in urban settings. This was a useful learning and service improvement opportunity for them.

Atmospheric Sensors Ltd is a young company from the UK vigorously exploiting a new, digital, approach to gas sensor management – a paradigm shift in gas sensor development – that allows the aggregation of a range of sensing technologies to achieve enhanced reliability, sensitivity and selectivity.

Their wearable monitors were provided to interns who carried the units to church street and back to their home thus measuring the difference in both the local air quality as well as from other parts of the city. The units deploy electrochemical sensors, an NDIR sensor for carbon dioxide, a particle monitor, relative humidity monitoring and temperature measurement. The data was stored locally and uploaded to the central server.

MASTIEBIKES
Add Mastie To Your Life

Mastiebikes is targeting young people with an affordable, versatile and durable electric bike. By driving adoption amongst a younger demographic, Mastiebikes aims to embed a new set of transport behaviours into this generation, helping reduce air pollution and greenhouse gas emissions. Their bike, which is manufactured entirely in India, has a battery with excellent storage capacity and which is easy to swap in and out, reducing concerns about running out of charge.

Mastiebikes deployed three electric bicycles and collected 196 feedback with an average rating of 7.75 out of 10.

Most of the respondents would use this vehicle as a last mile option with some of them considering it for short & neighbourhood trips as well. The top three feedback received for the vehicle was on reach of handlebar, height not being enough for taller folks and seat not being comfortable enough.

aurita
Electric Utility Bikes

Elon Motors Engineering works towards creating sustainable urban mobility. They believe in pedal-assisted electric bicycles as the future of urban transportation. And as AURITA BIKES, they create the most energy-efficient mode of transport. Elon motors shipped two bicycles from Ahmedabad to participate in the test bed. They were able to take feedback from the visitors on their bikes.

Greendzine Technologies

Greendzine technologies invent efficient electric mobility solutions, by developing proprietary state-of-the-art technology, through the culture of innovation, ownership and risk-taking

On Church Street, Greendzine deployed their offroad and urban electric vehicles. They were able to attract the attention of the visitor to the electric vehicles. Clean Air street provided them the opportunity to show their wares in their journey to success.

BuymyEV's IoT-enabled electric bikes on a subscription model provide mobility solutions for first/last/short-mile commute. Their mission is to make hyperlocal commute clean, green & tech-driven. BuymyEV is also looking to collect air quality data by fitting sensors on the vehicles.

The attractive bikes deployed by BuyMyEV proved to be an eye catcher with the CM choosing to sit on it during the inaugural.

Post inauguration they came back to the clean air street with the second cohort to test the personal mobility devices that people can carry into public transport.

ALTIGREEN DRIVE ELECTRIC

Altigreen's new mobility platforms – built on 100% indigenous technology – have been designed specifically keeping Indian conditions in mind, both environmental and commercial.

Its current patent portfolio spans 60 countries with 25 patents granted, including 6 in the US.

Over the years, Altigreen has been the recipient of many global awards, including from WorldWide Fund for Nature, Niti Aayog, ARAI, Economic Times, Elecrama, IoTNext, IDTechEx, and so on

On Church Street, Altigreen deployed one passenger three wheeler auto rickshaw for display and ferried passengers during the inaugural weekend. Their focus however has been on the cargo vehicle that they have since taken to market.

Photo credit: CAS Team DULT

Transvahan Technologies builds battery operated electric vehicles and automotive components, as well as offering consulting and training solutions in the automotive, clean-tech and aerospace sectors.

On Church Street Transvahan brought their passenger and cargo electric vehicles. The cargo vehicle, designed as a waste management vehicle, was demonstrated to BBMP and attracted interest by the authorities.

"We offer green transport solutions designed with societal needs in mind. Our E-Carts have now been modified for new applications such as solid waste management and use in food courts."

The Passenger vehicle was used to ferry residents and elderly visitors to and from the ends of the blocked stretch of the clean air street.

Photo credit: Sathya Sankaran, Urban Morph

From large enterprises to public spaces including bus terminuses, airports, malls or even railway stations, all have to deal with the risk of exposure to the Covid-19 virus. It is imperative to control the risk with effective crowd management.

Pixuate's automated video analytics platform provides fast, accurate and convenient screening of compliance and regulatory measures, such as temperature reading or social distancing, in real-time, backed by accurate analytics.

On Church street Pixuate deployed their video analytics platform to not just count the visitors to the street but also to screen them for being maskless during the pandemic. There was thermal screening and mask screening done by the machine learning based software.

Of the total 1,72,208 people tracked by pixuate over 8 weeks, maskless violations were only 1.4% on average.

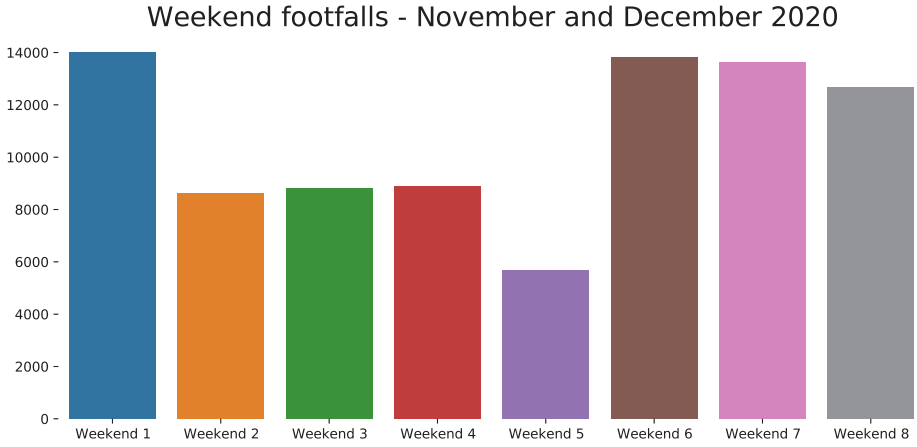
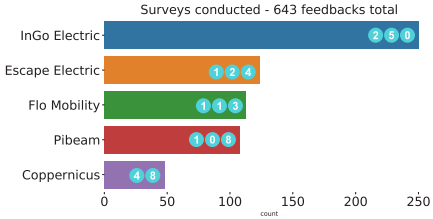


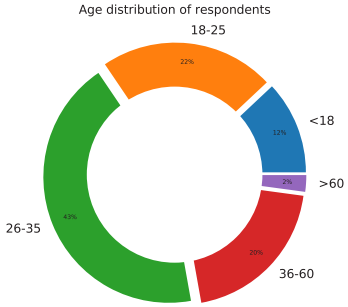
Photo credit: Sathya Sankaran, Urban Morph

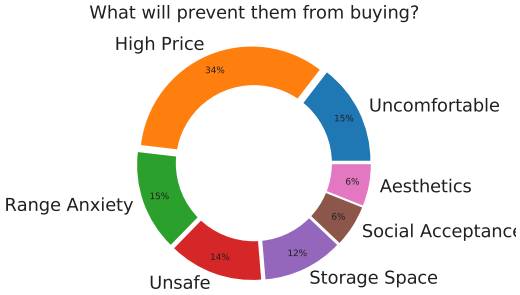
Second Cohort

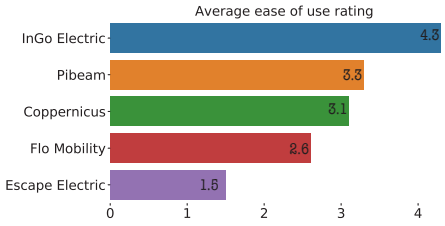
In December 2020, an open call was put out by DULT to invite more innovators to participate in the test bed. Out of the eight responses five innovators were shortlisted and signed the MoU to participate.

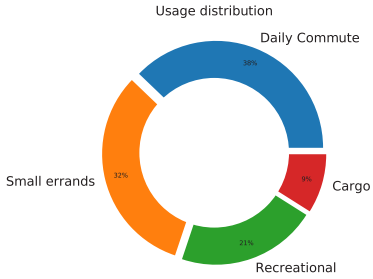
1. InGO Electric
2. Flo Mobility
3. Escape Electric
4. Coppernicus
5. Pibeam











inGO

InGO Electric makes electric personal mobility vehicles which can be used on roads as well as indoors in large spaces like airports. 14 to 30 years age group with disposable income more than 20,000/month was their target audience.

InGO e-scooter has been carefully designed to help commuting feel like a breeze while also paying close attention to the demands of factories, airports, hotels and apartment complexes as well.

InGO collected 250 feedback and had an average rating of 4.5 out of 5.

InGO Feedback - Top 3

Usage	Like	Improve
Daily commute (work, school, college)	Comfort (seat, reach, height, felt good while riding)	Price
Small errands (gym, groceries, meeting friends, park etc)	Range (distance, charge duration)	Range anxiety (distance, charging points, charging duration)
Last mile (getting to and from a bus stop, metro or train station)	Convenience (charging the battery, usability of the product)	Comfort (height, reach, seat)

Flo Mobility provides kick scooter based solutions. They brought their kick scooter to Church Street. Their stated goal was *"Our target audience is people who are looking for a quick and green alternative for last mile commute like last mile for neighbourhood, in-campus commute within large townships and IT parks, industrial hubs and warehouses, govt. spaces), luxury and recreational commute like malls, sightseeing, etc. We also want to showcase our product to govt agencies who manage tourist places of historical importance like forts, monuments, etc. Pollution is detrimental to these structures and we want to create awareness about scooter modes of commute at such tourist spots."*

On Church Street of the 113 respondents who provided feedback, their average ease of use rating was 2.6 out of 5.

Flo Feedback - Top 3

Usage	Like	Improve
Daily commute (work, school, college), Small errands (gym, groceries, meeting friends, park etc)	Aesthetics (look and feel, color)	Price
Recreational (weekend rides, visiting places)	Comfort (seat, reach, height, felt good while riding)	Comfort (height, reach, seat)
Small errands (gym, groceries, meeting friends, park etc)	Convenience (charging the battery, usability of the product)	Safety (Battery, stability, harness)

SVITCH

Svitch participated in the clean air street via Escape electric. Svitch makes folding electric bicycles with fat tyres that can be used for recreation and city rides. Foldable form factor makes for easy and compact storage as well.

Out of 124 feedback received by them on Church Street, their average ease of use rating was 1.5 out of 5.

Svitch Feedback - Top 3

Usage	Like	Improve
Daily commute (work, school, college), Small errands (gym, groceries, meeting friends, park etc), Last mile (getting to and from a bus stop, metro or train station), Recreational (weekend rides, ...	Comfort (seat, reach, height, felt good while riding), Range (distance, charge duration), Convenience (charging the battery, usability of the product), Aesthetics (look and feel, color)	Price
Daily commute (work, school, college), Small errands (gym, groceries, meeting friends, park etc), Cargo (Carrying goods and supplies, shopping bags, groceries), Last mile (getting to and from a b...	Range (distance, charge duration), Convenience (charging the battery, usability of the product), Aesthetics (look and feel, color)	Storage capacity (Carrying goods and supplies, shopping bags, groceries)
Daily commute (work, school, college), Small errands (gym, groceries, meeting friends, park etc), Recreational (weekend rides, visiting places)	Convenience (charging the battery, usability of the product), Aesthetics (look and feel, color)	Safety (Battery, stability, harness)

Coppernicus Mobility makes foldable electric bikes. Designed to be compact and convenient, the Qubit can be effortlessly folded in 3 easy steps. Built with durable components, it is the perfect choice for both work and play. It boasts a long battery life to take you the distance and smooth pedalling, to assist you with the hills.

You can carry it on public transport, in the boot of your car or tuck it under your office desk. It's super light (starting at 15.5 kgs) making it easy to carry, even on stairs. The target audience for the Qubit are those that want personal mobility and prefer to use it for last mile commute and short trips.

Of the 48 feedback collected by Coppernicus on Church Street they received an average ease of use rating of 3 out of 5.

Coppernicus Feedback - Top 3

Usage	Like	Improve
Daily commute (work, school, college)	Comfort (seat, reach, height, felt good while riding)	Price
Small errands (gym, groceries, meeting friends, park etc)	Comfort (seat, reach, height, felt good while riding), Convenience (charging the battery, usability of the product)	Prefer not to say
Recreational (weekend rides, visiting places)	Convenience (charging the battery, usability of the product)	Price, Range anxiety (distance, charging points, charging duration)

Pibeam Electric is re-imagining the Indian logistics and transportation experience with its range of green, affordable, stylish, easy-to-use EV solutions in both personal and commercial spheres.

Their objective of participating in the Church street pilot was to prove the high utilization multi vendor model using micro mobility and hence reaching new customers through this pilot. They deployed their passenger vehicle PiMo and showcased the cargo e-trike on inauguration day.

They collected a total of 208 feedback responses on Church Street with an average ease of use rating of 3.2 out of 5.

Pibeam Feedback - Top 3

Usage	Like	Improve
Daily commute (work, school, college)	Comfort (seat, reach, height, felt good while riding)	Price
Small errands (gym, groceries, meeting friends, park etc)	Comfort (seat, reach, height, felt good while riding), Range (distance, charge duration), Convenience (charging the battery, usability of the product), Aesthetics (look and feel, color)	Prefer not to say
Daily commute (work, school, college), Small errands (gym, groceries, meeting friends, park etc)	Comfort (seat, reach, height, felt good while riding), Range (distance, charge duration)	Safety (Battery, stability, harness)

Photo credit: CAS Team DULT

Outcomes

1. The Innovators were able to get feedback on their products in a live environment with a large audience over many weeks.
2. Mastiebikes has made design changes to their product based on the feedback.
3. Buymyev switched the product line and used the testbed to get feedback on their personal mobility devices.
4. Pibeam has received renewed customer interest in the city and are following up on inquiries.
5. Transvahan showcased their cargo electric vehicles for handling waste management to BBMP officials during the inauguration.
6. Citizens were able to test ride multiple EV's in a single place helping them make decisions and provide feedback.
7. The test bed facilitated movement of people and goods inside the closed stretch proving to be a use case for clean air street.
8. Workshops between Catapult and DULT helped in understanding the process of creating and managing test beds.
9. Decision of DULT to create on-going test beds to encourage innovators will create lasting impact for the mobility innovation ecosystem.
10. Karnataka is one of the first states in the country to use a pedestrianised street as a test bed for EV micromobiliy.

Urban Morph thanks V Manjula, IAS, Government of Karnataka and Commissioner, Directorate of Urban Land Transport, for the support extended by her team in making Church Street First happen without which the clean air street test bed would not have been possible.

Photo credit: CAS Team DULT

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Honourable Chief Minister and other dignitaries.at the Clean Air Street testbed

Photo credit: CAS Team DULT

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