CHONGYANG REN

MSAUD 2022-2023 SELECTED WORKS

GRADUATE SCHOOL OF ARCHITECTURE, PLANNING, PRESERVATION
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Strategies for Developing Productive Waterscapes and Inclusive Communities in Bogotá

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RECOMBINANT URBANISM
Post-Olympic Structured Cities

CONFLICT URBANISM
Those Who Live and Travel in the Dark

URBAN SENSORING
Privacy Forward
KEY STATEMENT

The edge of the Juan Amarillo Wetland and other wetlands of Bogota is not a static landscape. Rather it is a dynamic and productive place between wetland and community. Our project enhances this dynamic and productive edge, allowing residents to become the guardians of the wetland, protecting it through interaction and care in ways that work better than the fence that currently separates them. At the same time this edge can be cultivated for agricultural produce to enhance the community’s economy. This reciprocity is an innovative working solution that generates benefits for both the wetland ecosystem and community.
SHRINKING WETLAND WITH URBAN SPRAWL

UNDERDEVELOPED WETLAND SURROUNDING AREA

SITE OBSERVATION NORTH SIDE

SITE OBSERVATION SOUTH SIDE
DESIGN CONCEPT

**Current Wetland**

Static landscape Features

**Weaving**

Connecting wetland and surrounding communities development

**Interaction**

wetland benefit communities stakeholder interests

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**AREA 1**

**SELF-BUILT SETTLEMENT**

I’m a resident of the neighborhood. There’s no one here to take care of it, so there’s always a lot of pumpkins. I collect them and I can eat them myself or I can sell them to the market far away.

There is no sign or activity space next to the wetland. It is just a large area of shrubs and aquatic plants. If you don’t come in and pick up these pumpkins, they will soak in water and rot.

**AREA 2**

**SUBA SETTLEMENT**

I’m a community leader of the neighborhood. There is heavy illegal garbage dumping phenomenon. People drop massive waste around the wetland. How to deal with these waste becomes a serious problem.

To beautify the environment and solve the waste issue, we have contact to build community gardens with tyres as planters. We hope to have more legalized waste stations to protect the wetland.

**AREA 3**

**WASTEWATER TREATMENT PLANT**

I’m a biologist of the neighborhood. 15 official wetlands are home to dozens of endemic species, including 202 species of birds, and take up about 727 hectares. It is our responsibility to protect these important eco zones.

There is no natural filtration along the water edge of Juan Amarillo Wetland. We need to renature water edge and educate people about the significance of the wetland and ecosystem.
AREA 2 SITE PLAN
SUBA SETTLEMENT

AREA 2
2023-2080 RETROFIT SECTION

2023

2050

2080

Urban agriculture
Crops
Food Markets
02. 2022 FALL-STUDIO II  

ATLANTA AFTER PROPERTY

ATLANTA, USA  
Vine City, Mercedes-Benz Stadium

TEAM
Chongyang Ren  
Ruxuan Zheng  
Jiani Dai  
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INSTRUCTORS  
Emanuel Admassu | Nina John Cooke | Chat Travieso | Jelisa Blumberg A L Hu | Regina Teng

DEFINITION OF PROPERTY
Property is a framework for social, economic, and political rights that are the critical drivers of intergenerational wealth. It is a form of power. Each individual’s Social identity is defined by this power hierarchy through property ownership in possession of time and spatial occupation.

AFTER PROPERTY
Property should not be a vehicle for individualism that translates itself to an investment vehicle and wealth generating commodity. Space is not a zero-sum game where one person’s loss is another’s gain, nor is it a resource that must be used by only one person at a time. Rather, proprietorship will be annexed by partnership. Against the disposition of property and land speculation caused by mass media and the commodity-economy spectacle.
CURRENT VINE CITY CONDITION

Legend:
- Vacant Lots
- Private Ownership
- Church's Ownership
- Government's Ownership
- Company's Ownership
- Existing Green Space
- Community Spaces and Churches
03. 2022 SUMMER-STUDIO I
WATER WORKS IN CARNAISE

ATLANDA, USA
Carnaise, New York City

TEAM
Verena Krappitz
Vir Jignesh Shah
Saloni Shah
Chongyang Ren

INSTRUCTORS
Nans Voron | Sagi Golan

KEY STATEMENTS

As a group, we share a strong belief that a threat to the community can be mitigated and transformed into a resource. Acknowledging our beliefs and challenges, we as a group have started this initiative to develop a plan, a new multi-dimensional perspective addressing the issues of extreme heat and storm water floods. This relationship is a vital one for the sustaining of an urban context under the umbrella of climate crisis. Through our project we intend to express these strongly held convictions towards solving problems that exist in the urban context.

Our approach was to really understand the nature of these two conditions and through our project represent how can they perform efficiently as a confluence/fertilizing system. Hence, we came up with, ‘[RE] Sourcing Storm water as a Resource’. We look at storm water not just as a resource but in reference to its context as well. This is a water hierarchy diagram that shows how the storm water can be used a resource in various ways.
IMPROVEMENT PLAN OF SCHOOL SHED AREA

Who is Benefitted?

Employees around the commercial developments
The Environmental and people working there
Adult Day Care residents and Grandparents
Children from Child Development center

Who is the Stakeholder?

NEW YORK CITY
DOE
Environmental Protection

NYC Department of Transport
NYC Department of Environmental Protection
NYC Department of Environmental Conservation

Before

Shade Area 86°F

Body Temperature 103°F

Vegetation Covered Area 91°F

Concrete Pavement 125°F

After

Planning Car 32°F

Planning Education 60°F

Planning Urban 42°F

Planning Park 36°F

Planning Green 38°F
IMPROVEMENT PLAN OF INDUSTRY SHED AREA

BEFORE

Who is Benefitted?

- Children going to the school
- Teachers who teach at the school

Who is the Stakeholder?

- NYC Department of Transport
- NYC Department of Environmental Protection
- NYC Department of Environmental Conservation
- NYC Department of Education
- NYC Department of Housing

AFTER

- Water Collection
- Shaded Space
- Permeable Surface

Outdoors temperature
36°F

Building Facade
112.3°F

Body Temperature
101.4°F

Concrete Pavement
125.4°F
**04 RECOMBINANT URBANISM**

*Post-Olympic Restructured Cities*

**TOKYO, JAPAN**

**TEAM**

Chongyang Ren
Saloni Shah
Simran Gupta
Rohin Sikka
Yuka

**INSTRUCTORS**

David Grahame Shane

**KEY STATEMENTS**

The 1964 Olympics were a rare chance for officials to implement the kind of rapid, sweeping changes that would disrupt lives and require cultural sacrifices. Visitors found not a war-scarred city but a modernizing metropolis, with state-of-the-art transportation whizzing between an upgraded airport and smart new hotels. More than that, the enormous footprint of military facilities in Tokyo’s southwest became the city’s new economic and cultural center—emblems of a peaceful, prosperous future.

Around the transformation of Tokyo’s urban transportation after the first Olympic Games, many urban renewal projects were built around Shinjuku Station and Shibuya Station. This project wants to research to the spatial conversion relationship among them used by termenology of enclave, heterotopia, and armature.
OLYMPIC STIMULUS: BOOSTING TRANSPORTATION INFRASTRUCTURE

OLYMPICS VILLAGE DEVELOPMENT AND OLYMPIC 1920-2020

SHINJUKU DEVELOPMENT AND OLYMPIC 1920-2020

SHIBUYA DEVELOPMENT AND OLYMPIC 1920-2020
this project seeks to challenge the conventional use of night light imagery by integrating other sources of datasets to provide a more comprehensive understanding of the lives and infrastructure behind nighttime activities. Specifically, the project aims to compare nighttime light satellite imagery with informal mobility network datasets, census grid counts, and building footprint datasets produced by governments and researchers worldwide. By examining the relationship between the built environment, infrastructure, and human settlement at the scale of satellite imagery, the project aims to challenge existing assumptions about the geographies of belonging and infrastructure exclusion.
DATA SOURCE

Layer 1: Night-time Light Satellite Imagery
(Dataset: NASA VIIRS Night Time Lights)

Layer 2: Gridded Population Density
(Dataset: UN M49 Adjusted Population Density)

Layer 3: Informal Bus Transit System
(Dataset: DE/UM)

Layer 4: Building Footprints
(Dataset: Microsoft Building Footprint / Google Open Buildings)
Download & prepare data. Confirm and correct (if necessary) coordinate systems.

Selected & Adjacent Cities’ Administrative Boundary (shp)

Selected & Adjacent Cities’ Administrative Boundary (shp)

V.2 VIIRS Night-time Lights 2020 (tif)

UN WFP-Adjusted Population Density 2020 (tif)

Building Footprint Data (shp/csv)

Informal Bus Routes Data (GTFS)

Extract by Mask

Extract by Mask

If it comes in shp format, direct import

If it comes in csv format. Delimited Text

Generate Shapes Features from GTFS

Night-time Light Data within selected administrative boundary (tif)

Population Data within selected administrative boundary (tif)

Building Footprint Data (shp)

Clip By

Reclassify by Table [13 DN]

Reclassify by Table [300/km²]

Threshold

Threshold

Polygonise (Raster to Vector) and filter out those below 13DN

Polygonise (Raster to Vector) and filter out those below 300/km²

Polygonised Population Data above threshold within selected administrative boundary (shp)

Polygonised Population Data above threshold within selected administrative boundary (shp)

Visualization & identify areas of interest

Machine learning model application & Further qualitative research
RESULTS

Accra, Ghana

Nairobi, Kenya

Cairo, Egypt

Harare, Zimbabwe
06 URBAN SENSORING

Privacy Forward

AVERY HALL, COLUMBIA UNIVERSITY

TEAM
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George Verghese
Alan Ren

INSTRUCTORS
Anthony Vanky

KEY STATEMENT

Our team chose to test what it would require to develop and design a sensor with privacy in mind. Setting out to solve this problem, we took up the interest in understanding what activities and flows in our public space are like. This process required understanding concepts of how much of data is needed, our end use cases and potential sensors. Through an iterative process we began to realise that privacy through software alone was not entirely perfect and it required a hardware level of intervention. Our goal was to implement a thermal sensor, built with an edge compute node that can quickly process and output binary data without ever requiring raw data storage. Using existing computer vision algorithms to create human tracks, we set out to understand and enumerate on our public spaces within Avery Hall. Through forms of experimentation and analysis we tested and learnt of the costs and benefits of using such hardware in our public domain.

Choosing a site was an important challenge as there were needs to meet the constraints of the thermal cameras capability and the ability for the computer vision algorithm to detect objects and create meaningful tracks for us to analyse. Each site was compared to an RGB baseline tracking implementation to understand sensor and model performance.
Heatbodies is a system that utilizes an infrared camera and machine learning algorithms to track human movements and behaviors in real-time. The system is designed to ensure greater privacy for individuals being scanned as it utilizes a thermal camera that does not capture identifying features.

The project utilizes a range of technologies and software tools, including Python, OpenCV, TensorFlow, YOLOv5 with DeepSort, and the NVIDIA Jetson Nano edge computing platform. Python serves as the primary programming language, while OpenCV provides tools for image processing and computer vision tasks. TensorFlow is used for training the YOLOv5 object detection model and performing inference, and DeepSort is used for real-time object tracking.

The system operates by capturing thermal images of individuals and detecting human faces using the YOLOv5 object detection model. The DeepSort algorithm is then used to track individuals in real-time and analyze their movements and behaviors. The system generates a PNG image of the tracks, which can be used for further analysis and monitoring.

Privacy is a top priority for Heatbodies, and the use of a thermal camera ensures that individuals' identities are not captured. The camera only captures thermal data, which is converted into temperature measurements, and no identifying features are visible in the images. The system also deletes the raw data after processing to further ensure the privacy of individuals being scanned.

In summary, Heatbodies is a system that utilizes advanced technologies and software tools to track human movements and behaviors while ensuring their privacy. The system utilizes a thermal camera and machine learning algorithms to detect and track individuals, and it is designed to run on the NVIDIA Jetson Nano edge computing platform for optimized performance and energy efficiency. Heatbodies is a reliable and effective solution for monitoring and analyzing human movements and behaviors in public areas, workplaces, and other environments where accurate and private tracking is needed.
Heatbodies is a system that utilizes the NVIDIA Jetson Nano platform for real-time tracking of human movements and behaviors. The system captures thermal images of individuals using an infrared camera and then uses machine learning algorithms, such as YOLOv5 with DeepSort, to detect and track individuals in real-time. This process requires a significant amount of computing power, which is provided by the NVIDIA Jetson Nano edge computing platform.

The workflow for Heatbodies involves capturing thermal images of individuals, detecting human faces and movements, and analyzing this data in real-time. The system generates a PNG image of the tracks, which can be used for further analysis and monitoring. To store and manage this data, Heatbodies can be integrated with an Amazon Web Services (AWS) bucket.

Capturing thermal images of individuals using an infrared camera.
Running the images through the machine learning algorithms, such as YOLOv5 with DeepSort, on the NVIDIA Jetson Nano platform to detect and track individuals in real-time.
Generating a PNG image of the tracks, which can be uploaded to an AWS bucket.
Storing and managing the PNG image data in the AWS bucket for further analysis and monitoring.