

# HDR DSC: Collaborative Research: Creating and Integrating Data Science Corps to Improve the Quality of Life in Urban Areas

Funded by the National Science Foundation 2019-2023

<https://datasciencecorps.umbc.edu>

**Collaborating Universities:** UMBC, Towson University, Bowie State University, University of Baltimore

## Project Personnel

- Aryya Gangopadhyay (Information Systems, University of Maryland Baltimore County)
- Jennifer Harrison (Faculty Development Center, University of Maryland Baltimore County)
- Linda Hodges (Faculty Development Center, University of Maryland Baltimore County)
- Anupam Joshi (Computer Science and Electrical Engineering, University of Maryland Baltimore County)
- Seema Iyer (Jacob France Institute , University of Baltimore)
- Michael P. McGuire (Computer and Information Sciences, Towson University)
- Tim Oates (Computer Science and Electrical Engineering, University of Maryland Baltimore County)
- Sanjay Purushotham (Information Systems, University of Maryland Baltimore County)
- Nirmalya Roy (Information Systems, University of Maryland Baltimore County)
- Sharad Sharma (Computer Science, Bowie State University)

## Collaboration Partner:

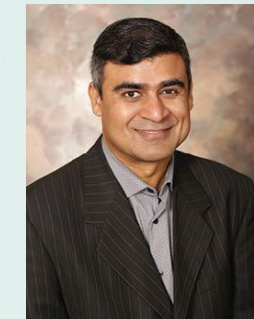
Baltimore Neighborhood Indicators Alliance (BNIA). [Click to see details](#)



Aryya Gangopadhyay  
(UMBC)



Michael McGuire  
(Towson U.)

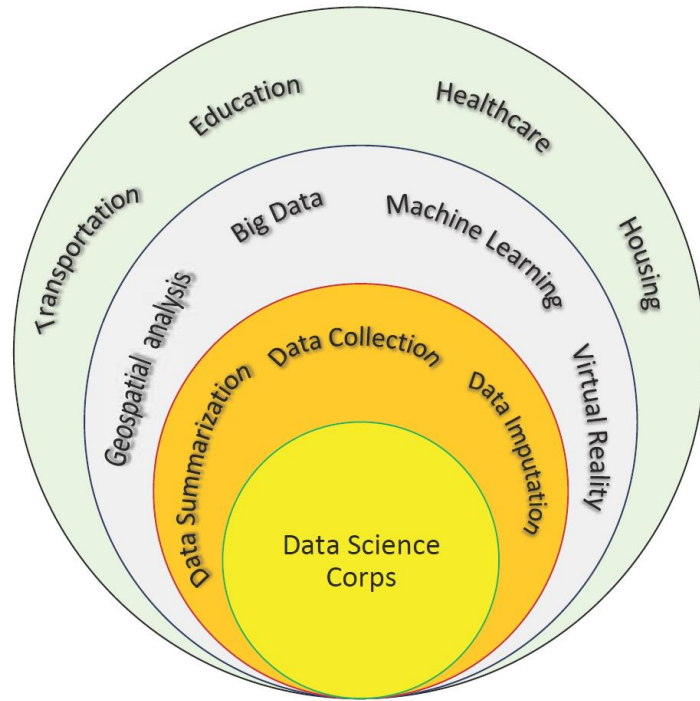


Sharad Sharma  
(Bowie State)



Seema Iyer  
(U. Baltimore)

# Curriculum map



Training

Research

Community engagement

UMBC		Core Activities and Projects					Modules in EdX					Integrated Learning			
		Pre-Case Study	Baltimore Data Day	P1 Projects	Grad. Student Projects	Data Collection and Analysis	Big Data	Machine Learning and Deep Learning	Smart Cities	Cyber-security	Geospatial Data Analysis and Visualization	Virtual Reality		Post-Case Study	
Project Outcomes	Aligned Institutional-Level SLOs														
1	Demonstrate big picture strategic-level skills by systematically analyzing how data science is applied in a range of projects.	Critical Analysis & Reasoning	0-1	1											4
2	Apply data science skills to individual projects.	Critical Analysis & Reasoning	0-1	1	2										4
3	Demonstrate oral and written communication skills.	Oral & Written Communication	0-1	1		1	2								4
4	Demonstrate technological proficiency.	Technological Competency	0-1												4
5	Work effectively in teams.	Oral & Written Communication	0-1			1		2							4
5	Explain how data science can contribute to the social good.	Critical Analysis & Reasoning	0-1	1		1					3				4
Signature Assignments		Pre-Case Study													Post Case Study

Key:	In this course, students ...
	Do not focus on this outcome
1	Gain fundamental knowledge and skills in this outcome
2	Practice and build their learning in this outcome
3	Complicate and refine their learning in this outcome
4	Demonstrate undergraduate-level proficiency in this learning outcome
	Double lines indicate formal assessments

Harrison, J. (2017). UMBC Curriculum Map Template. Baltimore, MD: UMBC Faculty Development Center. Updated 8-24-20.

## Training modules

Data Science for Social Good (Instructor: Dr. Seema Iyer) - Click here for the [presentation](#) and [video](#).

Big Data Analytics for Smart Cities (Instructor: Dr. Aryya Gangopadhyay) - Click here for the [presentation](#) and [video](#).

Machine Learning for Smart Cities (Instructor: Dr. Sanjay Purushotham) - Click here for the [presentation](#) and [video](#).

Deep Learning for Smart Cities (Instructor: Dr. Tim Oates) - Click here for the [presentation](#) and [video](#).

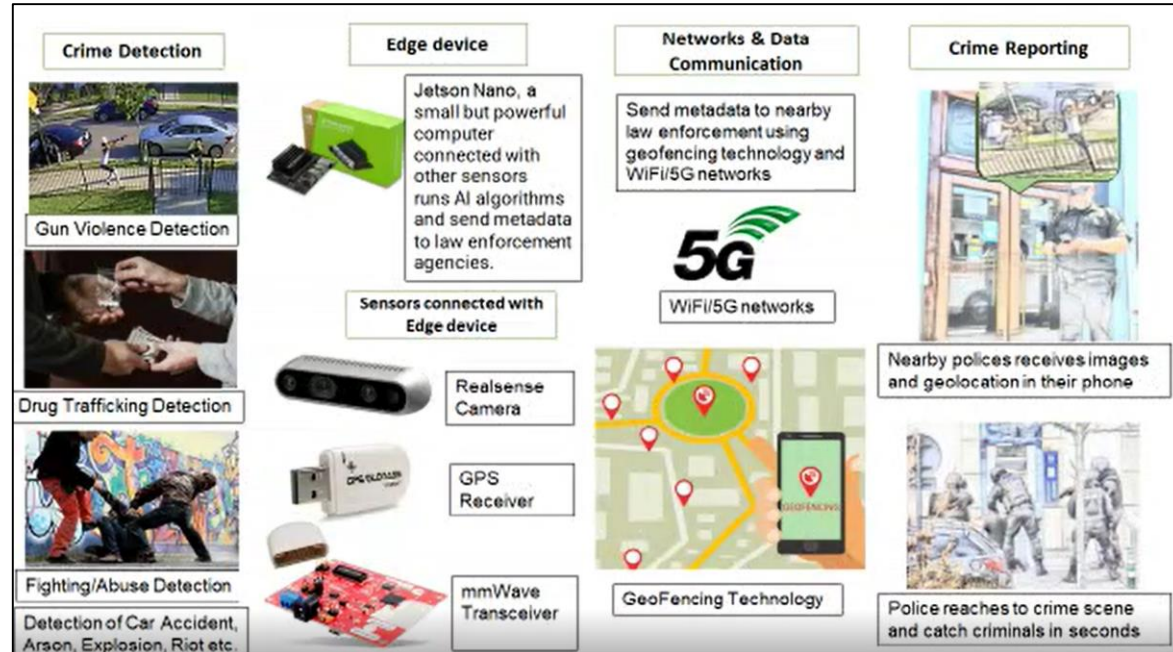
Geospatial Analytics for Smart Cities (Instructor: Dr. Michael McGuire) - Click here for the [presentation](#) and [video](#).

Virtual Reality for Smart Cities (Instructor: Dr. Sharad Sharma) - Click here for the [presentation](#) and [video](#).

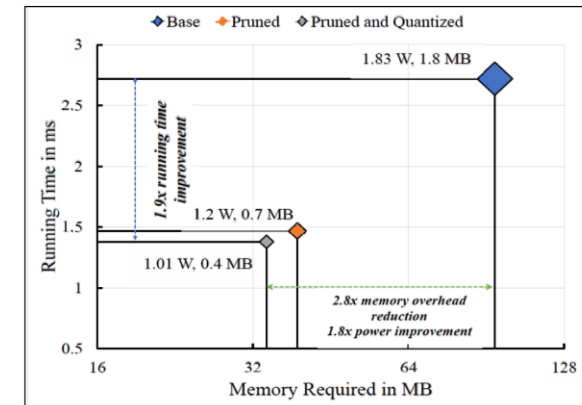
Smart City Technologies (Instructor: Dr. Nirmalya Roy) - Click here for the [presentation](#) and [video](#).

Cybersecurity for Smart Cities (Instructor: Dr. Anupam Joshi) - Click here for the [presentation](#) and [video](#).

# Data science Corps for Smart Cities



Metrics	Specifications
Processor	Intel Movidius Myriad X VPU with 16 SHAVE cores (128-bit VLIW Vector Processors)
Operating System	Raspbian Buster
Host Interface	USB 3.0 Type-A port
Memory	2 GB LPDDR4 with 512 MB LPDDR4 + 2.5 MB centralized on chip
CPU	Quad-Core Cortex A 72



City Name	LR		DT		RF		DNN		ARIS	
	Non Accident	Accident	Non Accident	Accident	Non Accident	Accident	Non Accident	Accident	Non Accident	Accident
Atlanta	0.65	0.8	0.66	0.81	0.67	0.78	0.81	0.88	<b>0.84</b>	<b>0.91</b>
Seattle	0.9	0.71	0.89	0.59	0.87	0.71	0.95	0.86	<b>0.96</b>	<b>0.9</b>
Detroit	0.69	0.76	0.72	0.78	0.69	0.87	0.85	0.86	<b>0.89</b>	<b>0.9</b>
Miami	0.69	0.76	0.72	0.78	0.69	0.77	0.86	0.88	<b>0.89</b>	<b>0.9</b>
Denver	0.76	0.74	0.74	0.72	0.77	0.8	0.87	0.86	<b>0.91</b>	<b>0.9</b>
Chicago	0.59	0.73	0.45	0.77	0.66	0.66	0.66	0.79	<b>0.76</b>	<b>0.81</b>