NYU VIP Program

Vertically Integrated Projects

Systemic reform of higher education

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Manager: Amy Dunford, amy.dunford@nyu.edu

vip.engineering.nyu.edu
About VIP
Goal: Involve Everyone on Campus in Innovation

“The development of novel products, services, and processes for the benefit of society”
(Too Narrow!)

“Inspiration plus Execution”
(Works in all Disciplines!)
University Barriers: The 3 Forms of Fragmentation

Fragmentation of Mission

Innovation/Research: Discovery, Design, Analysis, ….
Education: Pass on Knowledge, Skills, Ways of Thinking
Service: Create Partnerships, Enable Economic Development

Fragmentation of Time

Semesters
Academic Years

Fragmentation by Discipline

Scholarship, “The Thinkings”
Budget Lines, Cultures
**United States (24)**
- Arizona State University
- Boise State University
- Colorado State University
- Drexel University
- Florida International University<sup>URM</sup>
- Georgia Tech<sup>AAU,1</sup>
- Howard University<sup>URM</sup>
- Iowa State University<sup>AAU</sup>
- Morehouse College<sup>URM,1</sup>
- New York University<sup>AAU</sup>
- Notre Dame
- Polytechnic Univ of Puerto Rico<sup>URM</sup>
- Purdue University<sup>AAU,1</sup>
- Rice University<sup>AAU</sup>
- Stony Brook University<sup>AAU</sup>
- Texas A&M University<sup>AAU,URM, 1</sup>
- UC Davis<sup>AAU,URM</sup>
- University of Delaware
- University of Georgia
- University of Hawaii<sup>URM</sup>
- University of Michigan<sup>AAU, 1</sup>
- University of Washington<sup>AAU</sup>
- VA Commonwealth University
- Virginia Tech

**International (11)**
- Inha University (Korea)
- Malmö University (Sweden)
- Natn’l Dong Hwa University (Taiwan)
- Natn’l Ilan University (Taiwan)
- Riga Technical University (Latvia)
- Universidad del Norte (Colombia)
- Universidad ICESI (Colombia)
- Universidad Mayor (Chile)
- Univ. of New South Wales (Australia)
- University of Pretoria (South Africa)
- University of Strathclyde<sup>1</sup> (Scotland)

**Pending (5)**
- Georgia State University<sup>URM</sup>
- NCA&T University<sup>URM</sup>
- Reykjavik University (Iceland)
- Tuskegee University<sup>URM</sup>
- UNICAMP (Brazil)
- Universidad de Chile (Chile)

**Legend:**
- **AAU:** Member Institution (9)
- **URM:** Underrepresented Minority Institution (7)
- 1: Program in place prior to Consortium establishment (5)
- **Bold:** State of Georgia Institutions (3)
VIP Benefits for Students

Disciplinary Insights & Professional Skills

➢ Multi-disciplinary, team experience
➢ Understanding intersections of the disciplines
➢ Long-term & large-scale project goals
➢ In-Depth experience in your field
➢ Opportunity to develop skills in different roles
➢ Preparation for work and graduate school
➢ Apply knowledge in innovative ways outside coursework
VIP Program: Essential Characteristics

- Each team is led by faculty
- Projects embedded in faculty areas of expertise
- Large-scale projects lasting years
- Multidisciplinary teams are encouraged
- New students replace those who graduate
- Program is curricular: All students are graded
- 1 to 2 credits per semester
- Participate for at least 3 semesters, up to 3 years
- Classroom and meeting space supporting teams
VIP at NYU
<table>
<thead>
<tr>
<th>Department</th>
<th>Free Elective</th>
<th>In-Major Elective</th>
<th>Capstone/ SR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Physics</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical and Biological Engineering</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Civil and Urban Engineering</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Computer Science and Engineering</td>
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<td>x</td>
<td>x</td>
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<tr>
<td>Electrical and Computer Engineering</td>
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<td>x</td>
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<tr>
<td>Mathematics</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical and Aerospace Engineering</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Technology, Culture and Society</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Technology Management and Innovation</td>
<td>x</td>
<td></td>
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</tbody>
</table>
VIP Teams

There are 28 active teams, and two new teams starting in Spring 2020.
Organizational Structure of VIP Teams

➢ Team size varies from 5 to 25+ students
NYU Survey (Qualtrics) Applications

- Name, contact, year, major, statement, resume
NYU VIP Enrollment

- **VIP 300X**
  - Letter for each team with specific course code
  - Permission code provided by faculty mentor

- **Credit policies**
  - Variable credit, approved by professor
  - 1 credit for new members
  - 2 or more for returners who become leaders
  - Repeatable for 6 credits total
  - Application to degree varies by school/department
VIP Notebook

➢ Notebook template, rubric, and peer evals provided

<table>
<thead>
<tr>
<th>Student Name</th>
<th>VIP Team</th>
<th>Semester</th>
</tr>
</thead>
</table>

**VIP Notebook Grading Rubric**

<table>
<thead>
<tr>
<th>Notebooks Maintenance (15)</th>
<th>Poor</th>
<th>Intermediate</th>
<th>Exemplary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notebooks format, name and info included, VIP team name included</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Regularly updated</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Neatness, easy to follow</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Meeting notes (15)</th>
<th>Meeting notes</th>
<th>Non-existent, disorganized</th>
<th>Present and clear, but short</th>
<th>Detailed notes, includes sub-group meetings and mid-week exchanges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting notes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resources and tasks completed (55)</th>
<th>Resources fully cited and easy to find</th>
<th>Completed tasks documented with technical detail</th>
<th>Products Included when relevant [drawings, code, charts, budgets, etc.]</th>
<th>To-do items listed and dated</th>
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<thead>
<tr>
<th>Usability (35)</th>
<th>Organisation</th>
<th>Personal work and accomplishments well recorded</th>
<th>Poorly documented: Someone familiar with the field would not be able follow the decisions made or work completed.</th>
<th>Well documented: Includes ideas, resources and results. A person familiar with the field would understand the process followed and work completed.</th>
<th>Exemplary: In addition to being well documented, includes explanations, justifications and reflections.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Personal work and accomplishments well recorded</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>4</td>
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<tr>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Exemplary: In addition to being well documented, includes explanations, justifications and reflections.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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| Useful resource | Poor resource or reference for the team. | Useful resource: Someone familiar with the project would find sufficient answers. | Excellent resource: Useful to future group members; someone familiar with the field could follow the work. |
|-----------------|------------------------------------------|--------------------------------------------------------------------------------|
| Poor resource or reference for the team. | 0 | 1 | 2 | 3 | 4 | 5 |
| Useful resource: Someone familiar with the project would find sufficient answers. | 0 | 1 | 2 | 3 | 4 | 5 |
| Excellent resource: Useful to future group members; someone familiar with the field could follow the work. | 0 | 1 | 2 | 3 | 4 | 5 |

Comments:
Based on project notebook, performance, peer evals

<table>
<thead>
<tr>
<th>Item</th>
<th>Breakdown</th>
</tr>
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<tbody>
<tr>
<td>Documentation and records (VIP Notebook)</td>
<td>30%</td>
</tr>
<tr>
<td>Personal accomplishments and contributions to your team’s goals</td>
<td>30%</td>
</tr>
<tr>
<td>Teamwork and interaction</td>
<td>30%</td>
</tr>
<tr>
<td>End of Semester Presentation or Report</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Connect Schools and Campuses

Brooklyn and Manhattan
- NYU Tandon School of Engineering
- NYU College of Arts & Science

Business and IP
- NYU Stern
- NYU Law

Data Science and ITP
- NYU Courant
- NYU Tisch

Service and Education
- NYU Wagner
- NYU Steinhardt

NYU Langone Medical Center
- NYU Nursing
- NYU Dentistry

جامعة نيويورك أبوظبي
- NYU Abu Dhabi

SHANGHAI
- NYU Shanghai

纽约大学
Joining a VIP Team

NYC Clean Fleet
About the Team
Apply to this Team

NYU Hyperloop
About this Team
Apply to this Team

NYU IGE
About this Team
Apply to this Team

NYU Robotic Design Team
About the Team
Apply to this Team

NYU Self Drive
About this Team
Apply to this Team

NYU Steel Bridge
About this Team
Apply to this Team

NYU Tandon Motorsports
About the Team
Apply to this Team

ReprintBot
About this Team
Apply to this Team

Rogue Aerospace
About this Team
Apply to this Team

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Read about the 30 teams

Consider following them on social media

Apply to any team using the online application
2018 Intelligent Ground Vehicle Competition (IGVC)
1st place in Design
3rd place Overall
International Genetically Engineered Machine
Silver Medal at 2019 Competition
Soft Robotics
2019 SpaceX Competition Results:

Top 52 out of 1000+ Universities
Cultural & Organizational Resolve

Ethical Entrepreneurship

- Entrepreneurial Institute
- Student
- Alumni
- Faculty
- Community
- Capstone

- Ethical Entrepreneurship in Education
  - Wed, May 8, 2019
  - By Andy Moss

- The search for Organization-Cultural Fit: An Ongoing Endeavor
  - Tue, Apr 16, 2019
  - By Andy Moss

- Responsible Venture Formation
  - Mon, Mar 18, 2019
  - By Andy Moss
NYU Tandon Motorsports
The Angel Cooler

* For self contained unit without need for external Oxygen Source
Urban LiDAR and Remote Sensing
Everyday Assistive Technology
Steel Bridge
New Teams for Spring 2020:

SONYC & NYC Clean Fleet
SONYC is a 5 year research project investigation a smart cities approach to monitoring noise pollution in New York City, funded by the National Science Foundation.
Sensing captures data about noise

Actuation, through on the ground collaborations with community groups and City agencies to measure and mitigate the impact of noise pollution

Analysis using big data techniques and machine learning
SENSING: NETWORK

- Sensors deployed: 55
- Mobile sensor: 1
- Years of sensing: 3
- City agencies: 7
- Business improvement districts: 3

Map showing the distribution of sensors in New York City.
SONYC research into automated sound-source identification through machine learning aims to utilize the audio data we collect to train algorithms that will run directly on the sensor and recognize the cause of noise-related disturbances. Sensors will be able to report not only a sound pressure level (SPL) value in dB, but also a probability score for the likely cause, and thereby support both deeper analysis and on the ground mitigation.
SONYC works with communities. For example, residents in the Brooklyn neighborhood of Red Hook are concerned about the impact of noise from trucks, which is likely to be exacerbated by a new UPS distribution depot that has been proposed.
SONYC works with City agencies. For example, a dashboard presenting SONYC sensor data was built for the NYC DEP, who have subsequently taken the data and built their own dashboard, which integrates the sensor data with 311 complaints and the location of DEP enforcement vehicles, and supports ongoing research activities.
- Research new mobile noise monitoring and reporting applications that use machine learning to identify particular sound-sources.
- Understand user needs.
- Design, develop, and evaluate prototypes for different contexts of use.
- Investigate requirements of three main user groups:
  1. Members of communities affected by long-term noise problems;
  2. Citizen scientists
  3. Officers and staff of City agencies, e.g. NYC Department of Environmental Protection (DEP).
NYC Clean Fleet Team

Joseph Chow, Ted Pantelidis

C2SMART
CONNECTED CITIES WITH
SMART TRANSPORTATION
Who we are

Joseph Chow
• Assistant professor at NYU Civil & Urban Engineering
• Head of BUILT lab
• Deputy director at C2SMART
• Research areas: optimization, public transit, behavioral informatics
• Research grants from NSF, FTA, C2SMART

Ted Pantelidis
• PhD Candidate at NYU
• Ex Uber Marketplace Intern
• Research in Game Theory & Assignment Games

NYC DCAS Fleet Services
• 30,000 owned and leased vehicles the largest municipal fleet in the United States.
• NYC maintains fleet units at 37 main repair locations and has over 400 in-house fueling and 400 separate electric charging locations.
• More than 2,000 staff work full time in fleet repair and garage operations across over 50 fleet operating agencies and offices.
• In total, nearly $1 billion is spent annually on fleet repair, fueling and procurement.
Scope of the project

- NYC DCAS Fleet Services plan to expand their fleet (2000 EV vehicles expected until year 2021).

- 100 new fast-chargers (DC charging ports) will be placed in public spots in NYC within 2020.

- **Student project for Spring 2020:**
  - Data analysis on daily usage and occupancy of electric facilities in NYC.
  - Route design optimization modelling for heavy duty electric vehicles (electric school buses, sanitation trucks, etc.).
  - Location planning for fast-charging facilities.

Background

- Previous research work on behalf of BMW ReachNow in Brooklyn NYC on rebalancing electric vehicle car-share.

- The optimization model along with custom-built heuristics were presented in Washington D.C., Vienna Austria and Seattle WA.

- The study included simulation development in Matlab, data analysis and development of rebalancing optimization models.
What are we looking for

• Motivated students with proven excellent academic background.

• Minimum three students needed for this project:
  1. We need one student with GIS and data processing skills to process the EV location data
  2. A second student with some background in statistics and data analytics will help analyze the time use patterns of the charging stations
  3. Lastly, a student with skills in numerical analysis with Matlab/Python will synthesize different fleet type agents that follow certain schedules

The selection process will be conducted in two rounds in the next few weeks:

1. Submit your resume to: joseph.chow@nyu.edu
2. Receive an invitation for an interview on-site.
Networking at NYU

Connecting Students to Careers and Campus Innovation

➢ Prototyping Fund
➢ Green Grants
➢ InnoVention
➢ Stern $300K Challenge
➢ Innovation Corps (I-Corps)
Ask us about VIP and any of the teams!

- 3D Printed Biomedical Devices
- Applied Global Public Health Initiative
- College Students Studying College
- Concrete Canoe
- Designing for Creative Physical Computing
- Humanities Research Lab: Studying Immigrant Cities
- Materials Engineering and Design
- NYU Robotics Design Team
- Reprint Bot
- Rogue Aerospace
- U-START
- Urban Food Lab
- Wearable Technology
Systemic reform of higher education

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VIP Info Session

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