3D Modelling of IIT BHU Varanasi using photogrammetric techniques on UAV Captured Data

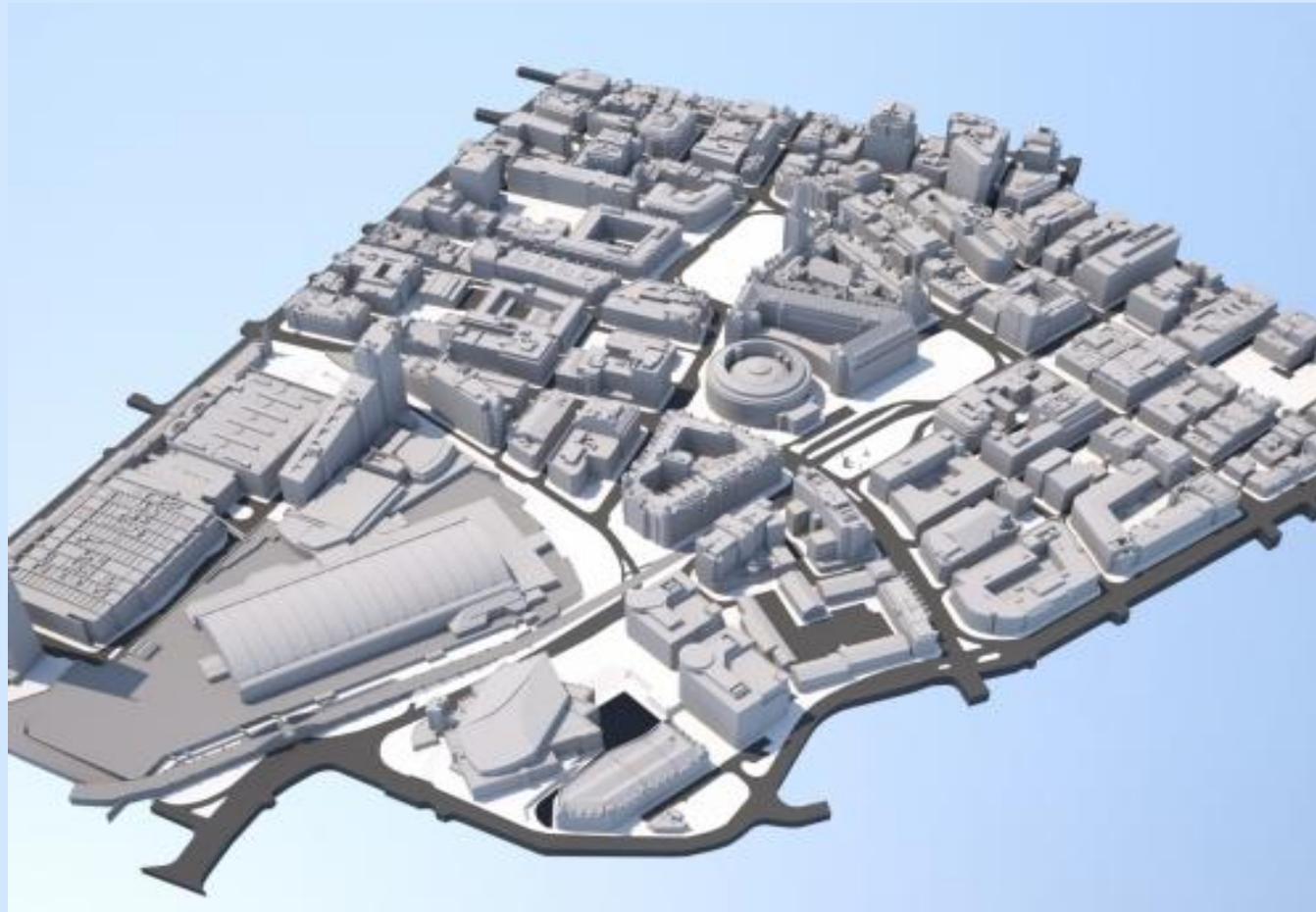- Indshine Geoinformatics

Quadcopter

- Lithium polymer Battery

- Carbon fibre body and propellers

- Maximum speed: 15 m/s

- GPS, gyroscope, barometer, accelerometer sensors
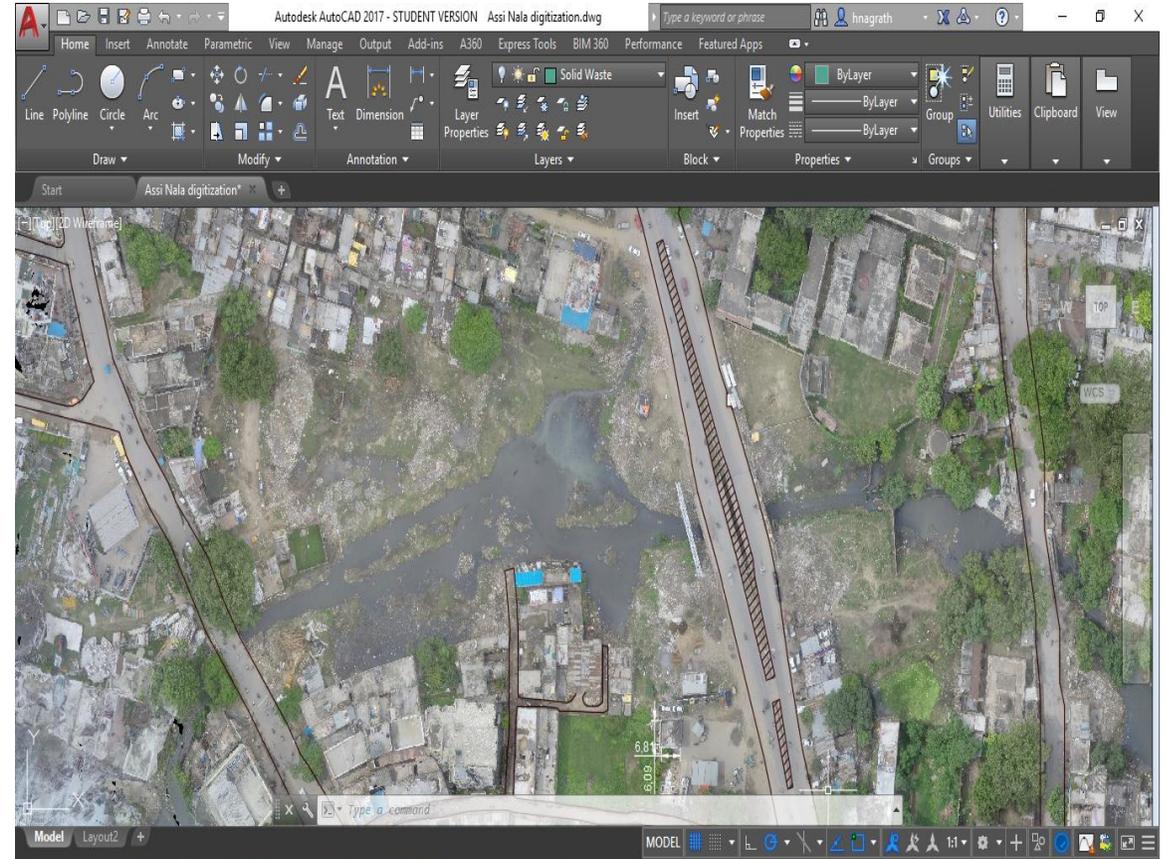
Model?
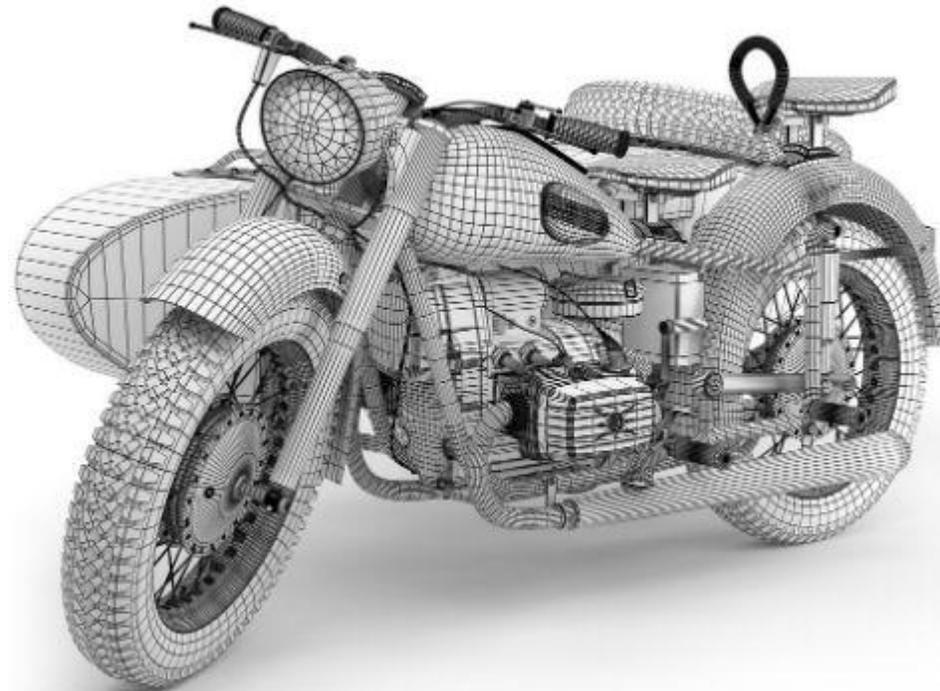
3D City Model

Solid Waste Management

Solid waste on assi river

Orthomosaic imported in AutoCAD for site digitization

Solid Waste Management

- Volumetric Analysis
- Solid waste management plan
- Cost estimation

Drainage system design

Open drainage channel in Varanasi

Orthomosaic imported in AutoCAD for digitization of water bodies

Drainage system design

- Calculation of channel dimensions
- Detection of wastewater inlets
- Study of encroachment
- Planning and development of STPs.

Study of cultural heritage

250 years old Guru Dham Temple in Varanasi

Study of cultural heritage

- Digital documentation of cultural heritage

- Precision and time-saving in measured drawing projects

- Reconstruction and restoration

Solar Potential for Roof surfaces

Varanasi Cantonment officer's mess

Building Number	Usable Area (sq. m)	Total Area (Sq. m)	% Area Usable	Avg. Solar Insolation	Estimated PV Potential (KW)	Estimated Energy Production per annum
45	224	368	60.7	5.8082	20	27740
52	307	328	93.7	5.8082	27	37449
53	105	123	85.4	5.8082	10	13870
54	173	193	89.7	5.8082	15	20805
55	137	169	81.2	5.8082	12	16644
59	165	257	64.3	5.8082	12	20805

Solar Potential for Roof surfaces

- Calculation of shaded and non-shaded area.

- Average solar insolation on rooftop.

- Solar PV system installation potential.

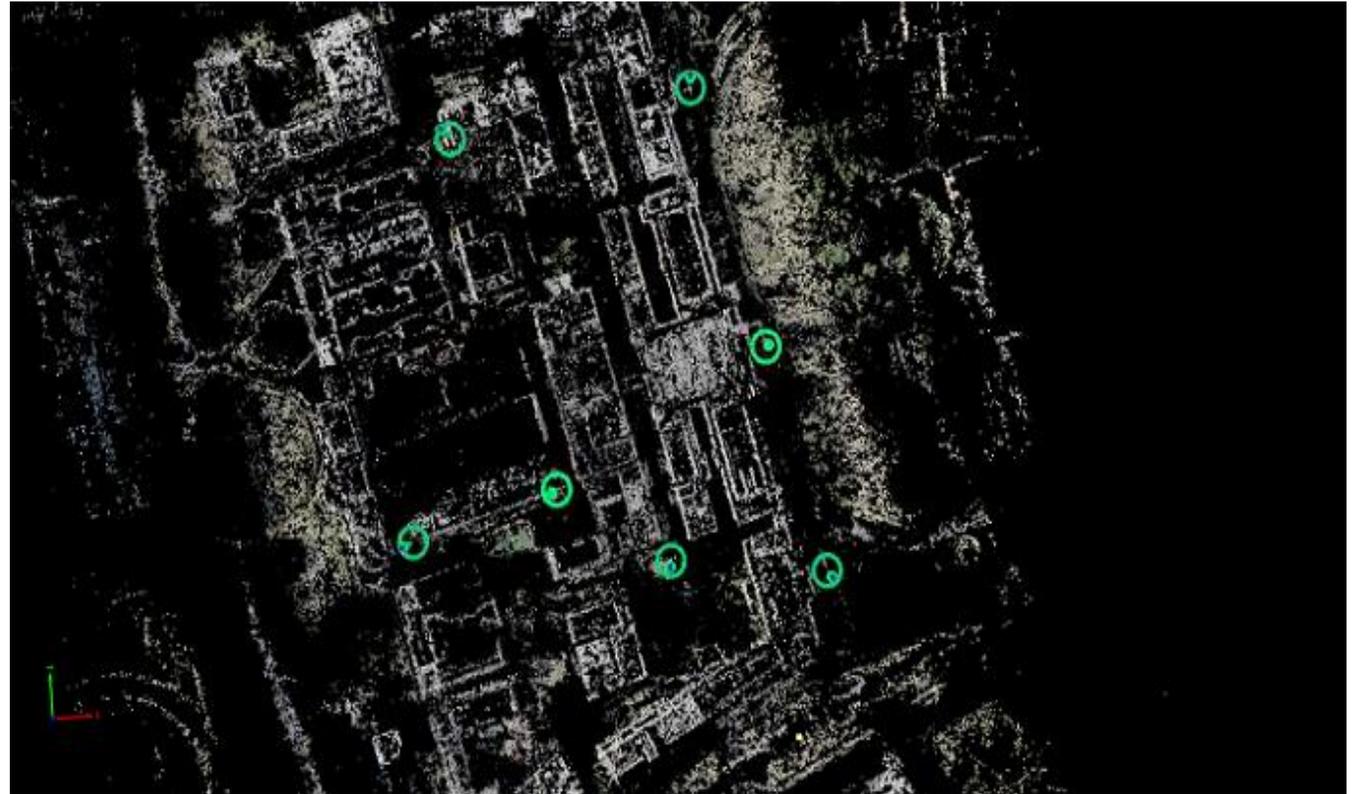- Annual estimated energy production in kWh.

3D Model

- 60 acres of area covered in single flight time

- Images captured using GoPro HERO4 Black

- 244 calibrated images processed

- Image processing using Pix4D
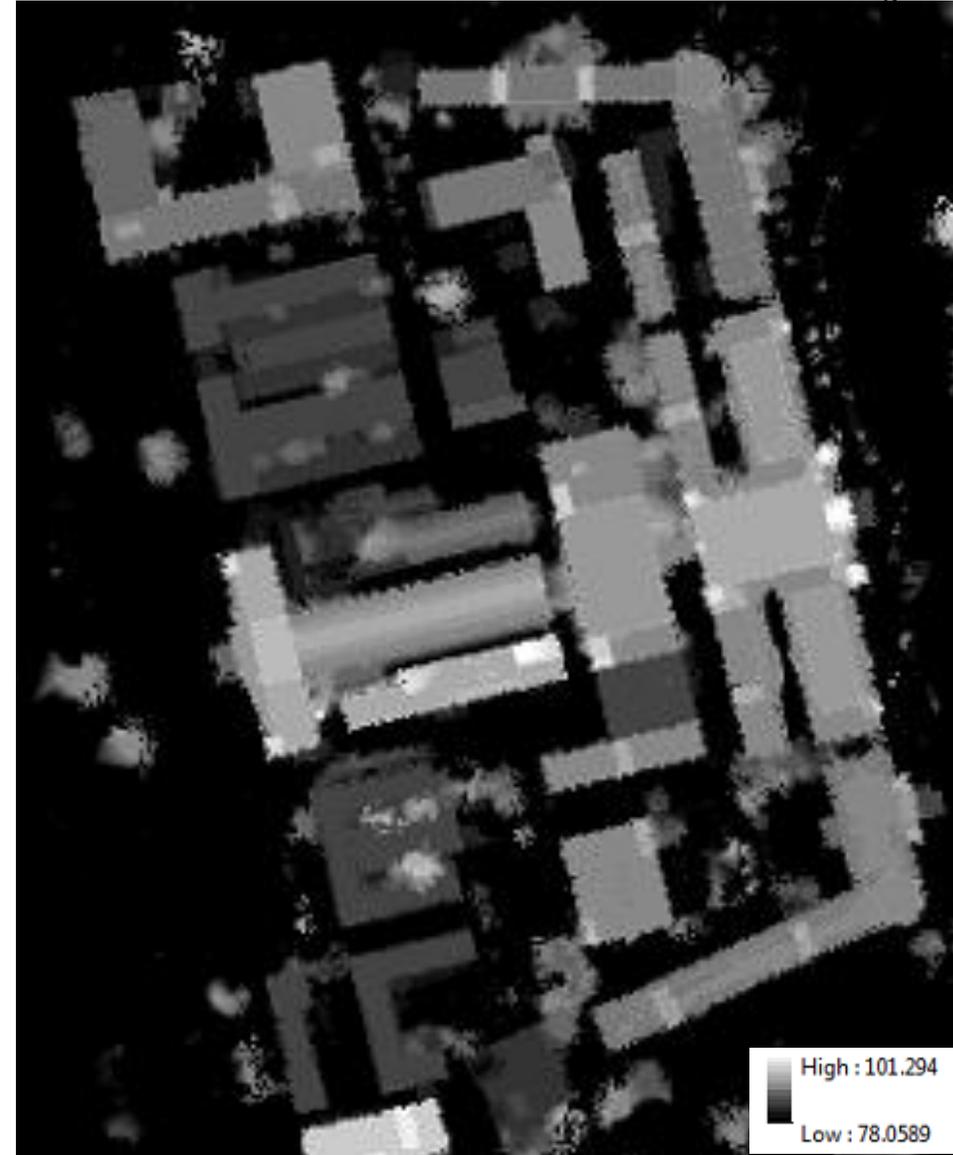
GCPs and Check Point Locations

- 5 Ground Control Points

- 2 Check Points

- Used SOKKIA GPS

- Error: X 8.4 cm, Y 7.4 cm, Z 8.2 cm

1. Digital Surface Model (DSM)

Uses:

1. Elevation data of every pixel including buildings, trees, roads.

2. Contour maps can be easily derived from DSM

3. Slope map of that area

High : 101.294
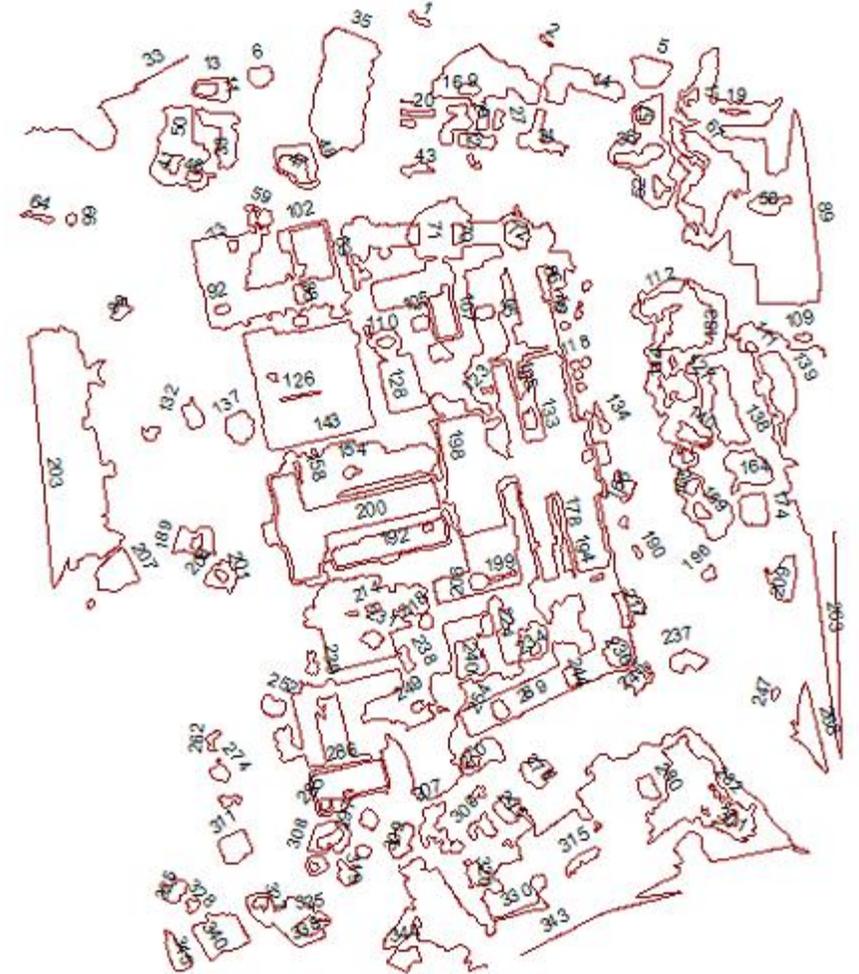
Low : 78.0589

2. Orthomosaic Image:

Uses:

1. High resolution planar projection of complete IIT BHU campus.

2. Visual inspection for pre-planning of any project.

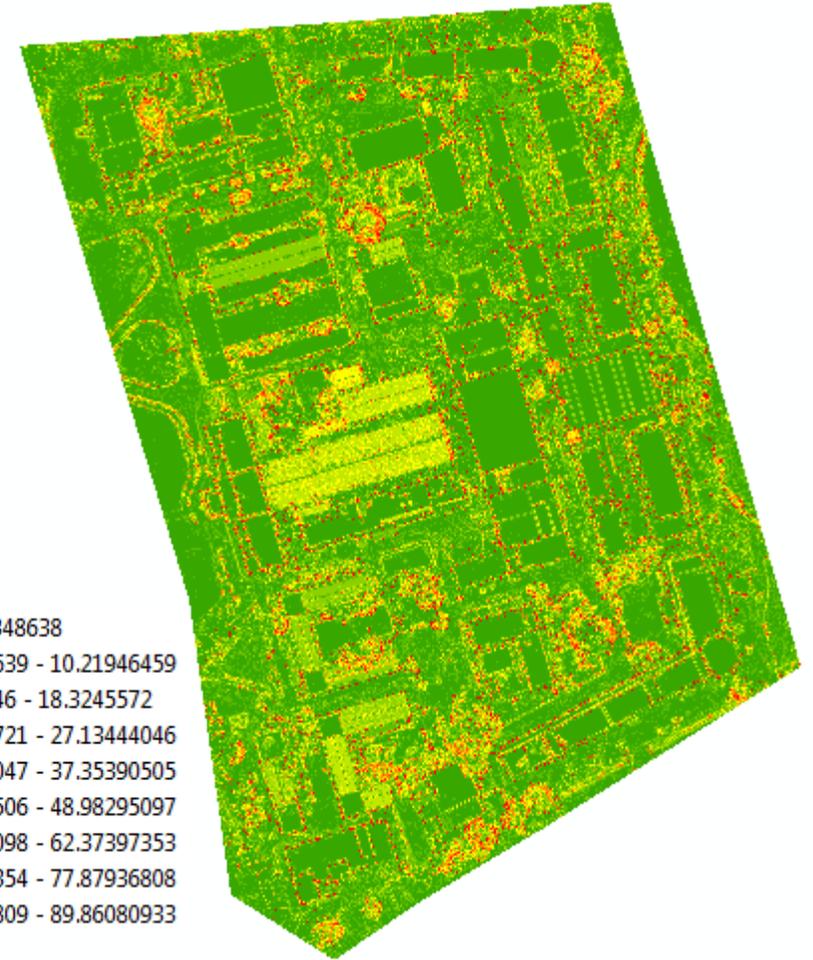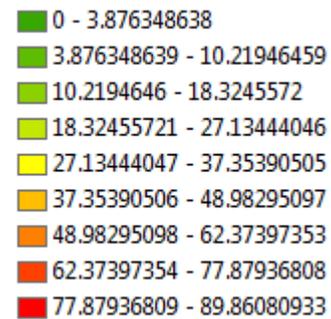3. Classification of builtups, vegetation etc..

3. Contour Map

Uses:

1. Decision mapping in road development.

2. Drainage network designing.

4. Slope Map

Uses:

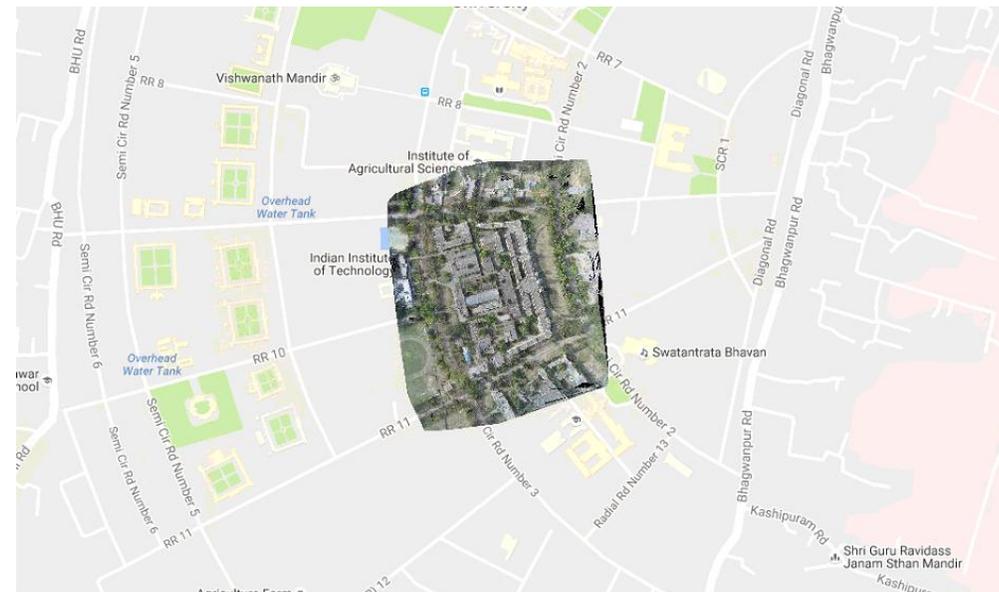1. Decision mapping in road development.

2. Drainage network designing.
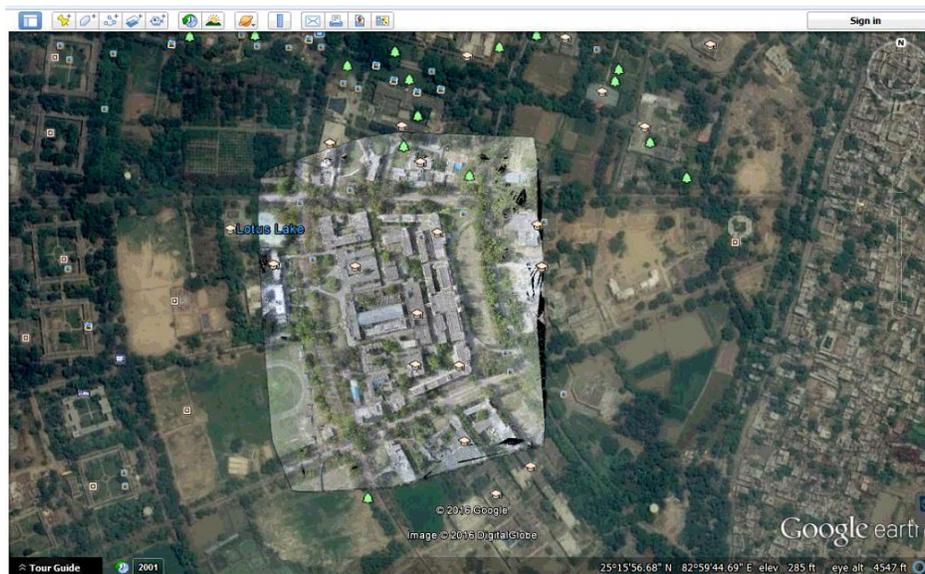

0 - 3.876348638
3.876348639 - 10.21946459
10.2194646 - 18.3245572
18.32455721 - 27.13444046
27.13444047 - 37.35390505
37.35390506 - 48.98295097
48.98295098 - 62.37397353
62.37397354 - 77.87936808
77.87936809 - 89.86080933

5. Point Cloud as in LIDAR

Uses:

1. Precision 3D Modeling for accuracy improvement.

96.075 - 108.283
93.384 - 96.075
90.693 - 93.384
88.002 - 90.693
85.311 - 88.002
82.62 - 85.311
79.929 - 82.62
77.238 - 79.929
74.547 - 77.238

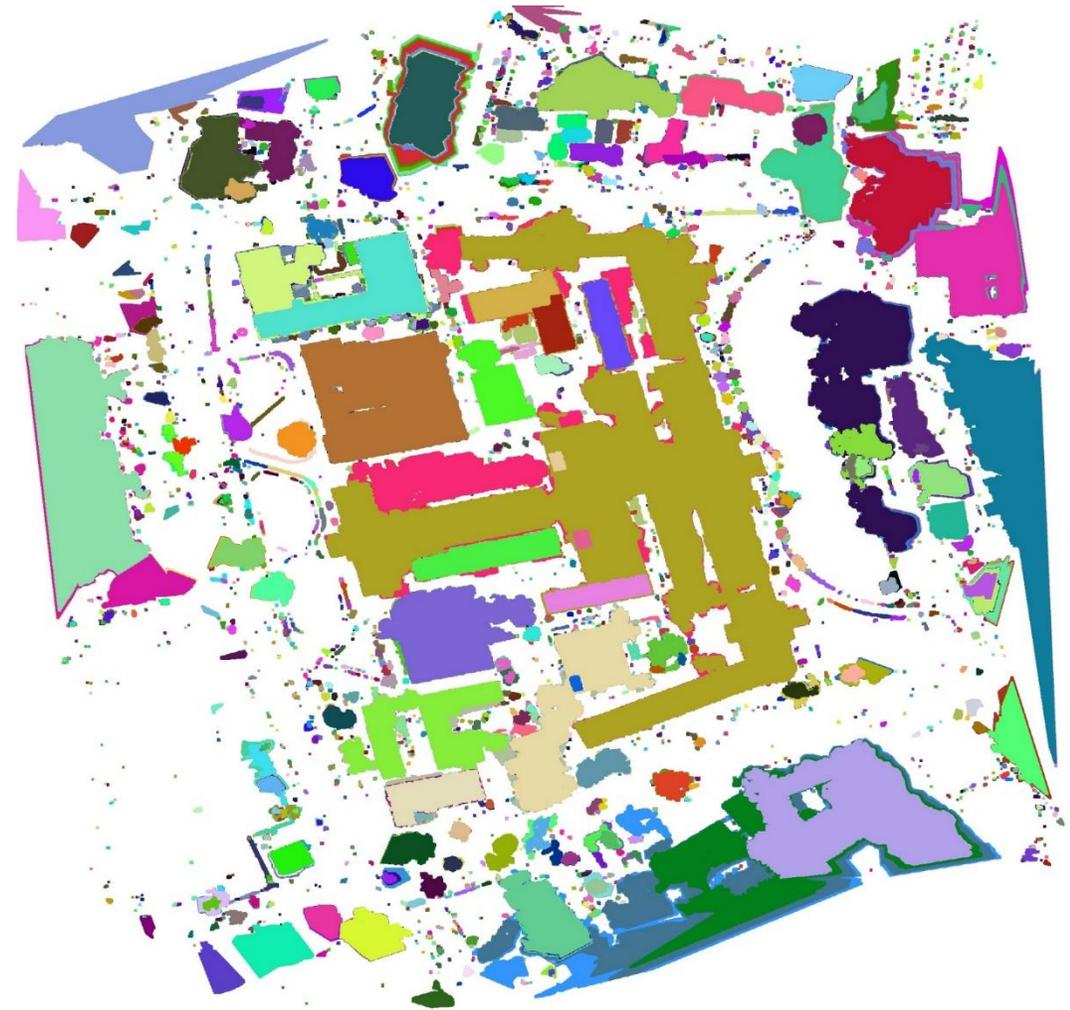# 6. KML and HTML file for google map and google earth view

7. Classification using

Unsupervised classification:

Uses:

1. Landuse Mapping.

Dimension measurement

Challenges

- Areas under the trees
- Façade of the buildings
- Multiple flights for larger area
- Large Data Processing
- Merging of data
- Maintaining accuracy of merged model

Future Plans

- Terrestrial image acquisition

- Hybrid UAV – VTOL

- Cloud computing for image processing.

THANK YOU

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