



# Design Practicum (IC201P) 2023

## Group 45

### Computer vision-based non-contact flow measurement system for flood early warning

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Mentors

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#### Key Features:

- Utilizes surface videos of the stream to calculate volumetric flow
- The discharge value obtained by this method, can be incorporated into machine learning algorithms along with other relevant parameters for predicting flood locations and extents, improving adaptability.

#### Challenges Faced:

- Aligning cameras perpendicular to the stream surface.
- Implementing software to calculate depth using stereo-vision, and f/d ratio of cameras.
- Calculating image velocity vectors in software.
- Developing the algorithm for calculating discharge from surface velocities.

#### Market Survey

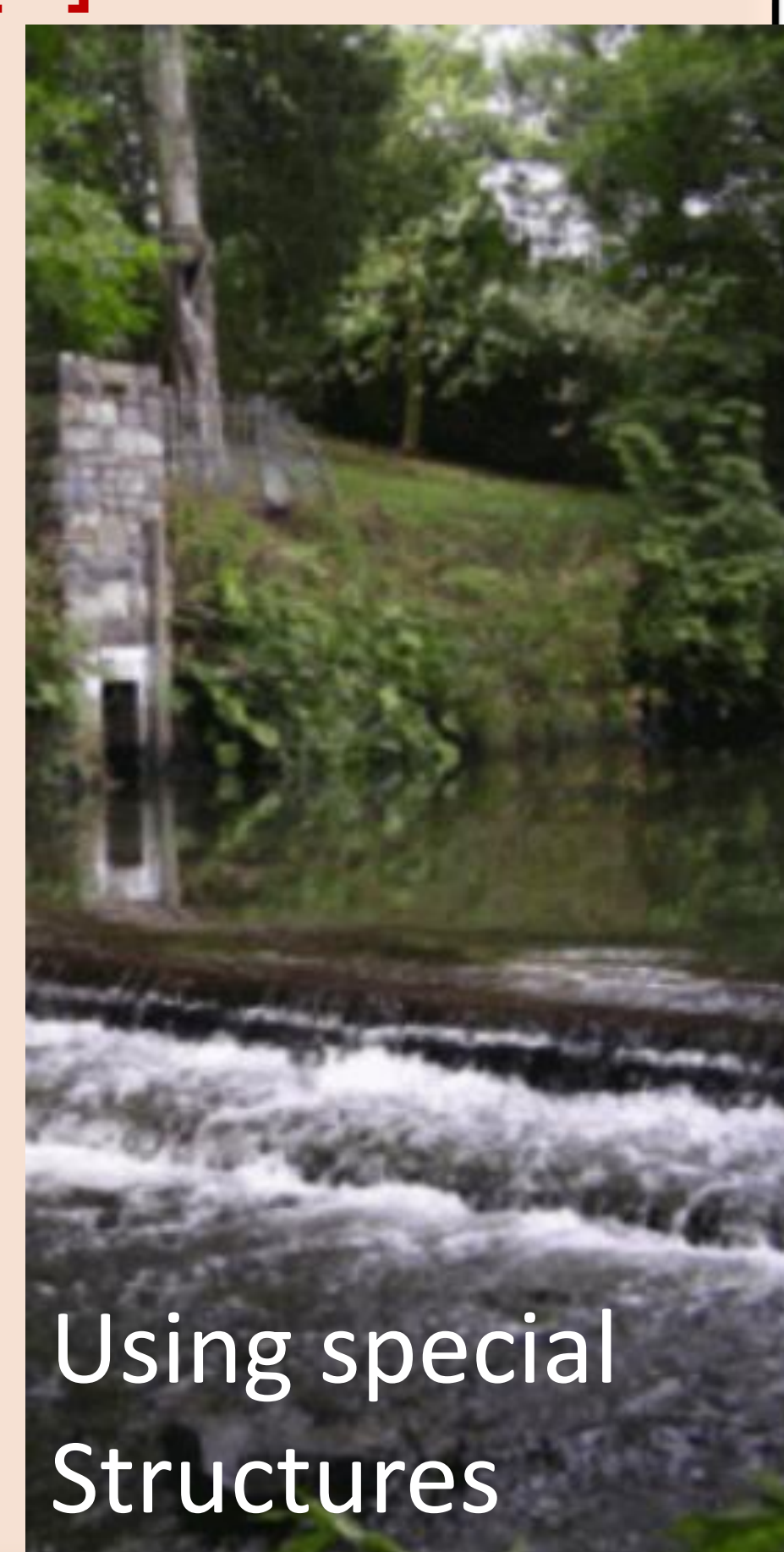
The EPA uses three methods for calculating volumetric flow. [1]



Velocity Area method



ADCP



Using special Structures



Calculation of surface image velocity vectors

#### Social Impact

More than nine million people were affected by the Uttarakhand flash floods. A total of 169 people died and over 4,021 people were reported missing.

This project aims to contribute to the disaster management of floods by making volumetric flow measurement of streams cost-effective, less labor-intensive, and more accurate.

#### Objectives Achieved:

- Developed and implemented the individual softwares for concepts involved in the project.
- Created small-scale prototypes to showcase each concept.
- Integrated software components for each concept in the project.
- Built a small-scale flume to demonstrate all the concepts in action.

#### References

- [1] E. P. Agency, "How we measure water level and flow of rivers," [www.epa.ie](https://www.epa.ie/our-services/monitoring--assessment/freshwater--marine/rivers/water-level-and-flow/how-we-measure-water-level-and-flow-of-rivers/#:~:text=The%20principal%20methods%20of%20low%20measurement%20we%20use). <https://www.epa.ie/our-services/monitoring--assessment/freshwater--marine/rivers/water-level-and-flow/how-we-measure-water-level-and-flow-of-rivers/#:~:text=The%20principal%20methods%20of%20low%20measurement%20we%20use> (accessed Apr. 22, 2023).
- [2] Satendra, K. Anandha Kumar, M. Gen, and V. Naik, "COMPILED BY," 2014. Available: <https://nidm.gov.in/PDF/pubs/India%20Disaster%20Report%202013.pdf>