

Indo/US Collaborative Research Grants

National Science Foundation of US and Technology Innovation Hubs of India

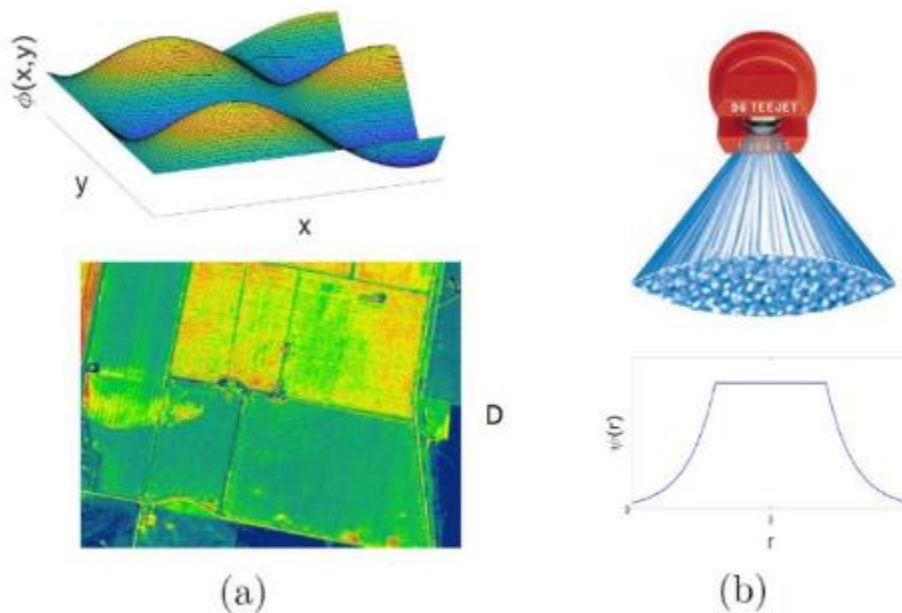


Title: Coordinated UAVs for Efficient Agricultural Spraying Operations

Indian PI: Dr. Arnab Maity, Prof. Arpita Sinha, IIT Bombay, Mumbai, India

US PIs: Dr. Animesh Chakravarthy, University of Texas, Arlington, USA

In emergency scenarios, where spraying operations need to be completed quickly and within a shorter time frame, it is more efficient to use multiple UAVs working in coordination rather than a single UAV. The amount of spraying required for big fields can be significant, and using a single UAV for spraying would make the size of the UAV rather large and thus quite expensive. Instead of using a single large UAV, splitting the quantity of the spray and distributing it among several smaller UAVs can be a cost-effective and efficient alternative. This fleet of autonomous smaller UAVs can be more economical than using a single large UAV, and certainly more time-efficient in emergency spraying scenarios. In the event of failure of a single UAV, the complete spraying operation need not stop and only the problematic UAV can be replaced by another functioning UAV. The collaborative project aims to address the problem of determining trajectories for multiple UAVs to perform a coordinated spraying operation over a field. It must be taken care that the field is sprayed appropriately as overspraying and underspraying are both detrimental to the health of the crops.



(a) Agricultural domain D and Spray requirement function $\phi(x, y)$, (b) Spray nozzle and coverage function $\psi(r)$