

### **1) Title of the tutorial**

Stochastic Geometry for Multiple Object Tracking

### **2) Instructors name and affiliation**

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### **3) a 300 word abstract describing the proposed topic and including an outline of the contents**

Description: Stochastic geometry--the marriage between geometry and probability--is a mathematical discipline that deals with random sets. In recent years, the random finite set approach to multi-object dynamical systems has attracted considerable interest due to a host of applications in defence, computer vision, robotics, biomedical research and so on. This framework has led to the development of the well-known Probability Hypothesis Density filters and efficient algorithms that can handle millions of objects. The tutorial will walk the audience from the essence of random finite set theory to the latest developments such as filtering, smoothing, system identification and control. Insights into the theoretical and computational advantages will be given. Matlab code will be provided to all participants. It is envisaged that participants will come away with sufficient know-how to implement and apply these algorithms as well as a set of tools that will help advance their research. An outline of the tutorial content is given as follows:

- Introduction
- Bayesian Estimation
- Random Finite Set Basics
- Multi-Object Dynamical System
- Generalized Labeled Multi-Bernoulli Filter
- Generalized Labeled Multi-Bernoulli Smoother
- Applications

### **4) target audience and assumed knowledge**

We assume the attendees to have working knowledge of random variable, probability density function, estimation basics, and systems concepts such as state space models.