Editorial

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The applications of Unmanned Aerial Systems or drones are increasing day by day as technology is evolving. Researchers are finding new and innovative ways of applying UAS technology to the variety of different areas such as agriculture, construction, surveying, traffic monitoring, infrastructure mapping, natural resource mapping, and archaeology. By combining concepts of remote sensing, photogrammetry, computer vision, machine learning, pattern recognition, etc., along with the advantages of high-resolution imagery, ease of operation, cheaper costs, etc., has made UAS very preferable for earth observation.

This special issue on “Advances in UAV Remote Sensing” contains the extended version of selected papers from the First International Conference on Unmanned Aerial Systems in Geomatics a.k.a. (UASG-2019). The response to our Calls for Papers for conference was very satisfactory. From the received papers, a few were shortlisted for this special issue. During the review process, each paper was assigned to and reviewed by experts in the relevant areas, with a rigorous review process. Thanks to the great support of the Editor-in-Chief and Executive Editor of JISRS, we were able to accept excellent papers covering various aspects of UAVs and their application. In this issue, we were able to accept 27 papers.

This special issue aims to explore the theoretical and technical research outcomes on all the technical aspects of UAVs from their design to the application part. We have four papers on the design and navigation of UAVs. Paper “Unmanned Aerial Vehicle’s Vulnerability to GPS Spoofing—A Review” throws light on the UAVs vulnerability to spoofing. “LIDAR-Aided Autonomous Landing and Vision-Based Taxiing for Fixed Wing UAV” proposed a multi-sensor system for the automatic landing of fixed-wing UAV. Paper “Design Criteria of a UAV for ISTAR and Remote Sensing Applications” discusses the design of

a new integrated system combining the capability of three different technologies, viz. UAV, photogrammetry and artificial intelligence to carry out intelligence, surveillance, target acquisition and reconnaissance (ISTAR) applications. Considering the challenges brought by the traffic of UAVs, the authors discussed the need for an autonomous UAV Traffic Management System (UTMS) in the Indian context and presented a requirement analysis of the proposed system in the paper “A UAV Traffic Management System for India: Requirement and Preliminary Analysis”.

This issue also has papers on different UAV-based sensors and their application. Articles “Polarimetric Calibration of L-Band UAVSAR Data” and “Investigation on the effects of Polarization Orientation Angle shift in the UAVSAR Polarimetric Decomposition” discussed about UAVSAR.

We are happy to say that many of the papers have applied Artificial Intelligence concepts for different applications. Paper “Road Extraction from High-Resolution Orthophoto Images Using Convolutional Neural Network” utilized CNN for classifying and extracting roads from orthophotos. In paper “Automatic Extraction of Tree Crown for the Estimation of Biomass from UAV Imagery Using Neural Networks”, an attempt has been made to automatically extract tree canopy using simple deep learning convolution neural network (CNN) using training sites as input from the band spectral information. The study titled “An Integrated Object and Machine Learning Approach for Tree Canopy Extraction from UAV Datasets” mainly focuses on the problem of automation in the extraction of tree canopies. Paper “Population Coding of Generative Neuronal Cells for Collaborative Decision Making in UAV-Based SLAM Operations” presented discusses the experimental proof of the algorithmic framework and model for UAV-Based SLAM Operations. “Auto Neural Architecture Generator for UAV-Based Geospatial Surveillance for Aerial Crisis Mapping in Dark” a soft framework for crisis mapping in dark is proposed to map aerial view of geo-specific terrain in disaster-struck areas. Again paper “Object Detection and Tracking with UAV Data using Deep Learning” focuses on

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the traditional problem of object detection in UAV images from the vantage of deep learning. “Deep Learning-Based Supervised Image Classification Using UAV Images for Forest Areas Classification” applies Stacked Auto-encoder as the deep learning architecture for UAV image classification. “Automatic Extraction of Buildings from UAV-Based Imagery Using Artificial Neural Networks” employs various machine learning algorithms—random forest (RF), support vector machine (SVM), Naive Bayes (NB) and artificial neural networks (ANN)—for urban feature extraction from derivatives of UAV-captured imageries.

This special issue also throws some light on UAV Photogrammetric software. Paper “How Photogrammetric Software Works: A Perspective Based on UAV’s Exterior Orientation Parameters” tried to look into in-depth of all the black box processes that are going on in the software. This study also provides a solution to the accuracy problems with the UAV-based photogrammetric survey methods. Paper “Development of an Open-Source Tool for UAV Photogrammetric Data Processing” describes the attempt to develop an open-source tool for photogrammetric processing of UAV data using open-source libraries in Python. Few studies of this issue scratched on the traditional image processing problems in UAV image. These are “An Adaptive Technique to Detect and Remove shadow from Drone data” and “Spatial–Spectral Image Classification with Edge Preserving Method”.

Other studies focused on different applications of UAVs. Paper “Role of Unmanned Aerial Systems for Natural Resource Management” reviewed the application of UAV for natural resource management. UAV imagery was used for Cadastral mapping in paper “Cadastral Parcel Boundary Extraction from UAV Images”. Studies entitled

“Remote Sensing Analysis of Agricultural Drone” and “Calibration of Satellite Imagery with Multispectral UAV Imagery” explore the application of the drones for agriculture. The later study tried to calibrate the satellite data with UAV multispectral data. The UAV imagery used in the study “Automated Tax Mapping From UAV Multispectral Imagery” enabled a rapid mapping of buildings parcels for tax assessment as compared to conventional mapping methods. Two papers, namely “UAV in Construction Site Monitoring and Concrete Strength Estimation” and “Analysis of Survey Approach Using UAV Images and Lidar for a Chimney Study”, present the application of drones in the construction sector. “Forest Degradation Assessment using UAV Optical Photogrammetry and SAR Data” focuses on UAV application in forestry, whereas a study entitled “UAV Remote Sensing for Campus Monitoring” employed the UAV for campus monitoring.

It is our great privilege to acknowledge Dr. George Joseph, Editor-in-Chief of JISRS, thankfully for giving us the opportunity of this special issue. We would like to especially thank Dr. Prakash Chauhan, Executive Editor-JISRS, for his support and coordination. We thankfully acknowledge all the authors of this issue, without whom this issue would not have been possible. We are indebted to the dedicated reviewers who took keen interest to provide valuable comments on these lengthy articles on time to improve the quality of the papers. We hope the papers in this Special Issue would be good references to future research in UAVs. Editors would also like to thank Dr. A. Senthil Kumar, former Director of CSSTEAP and IIRS, whose brainchild is this special issue.