



R n D NEWS



**CHITKARA
UNIVERSITY**

HIMACHAL PRADESH



Vol 4, Issue 1, Feb 2019

R & D Activities during July - December 2018

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TOP STORIES

Start-up weekend organized by CEED

Chitkara University Center for Entrepreneurship Education & Development (CEED) hosted three-day Start-up weekend powered by Google during September 21-23, 2018. The objective of such start-up weekends is to learn by doing and they also provide wonderful networking opportunity for budding entrepreneurs. The 54 hour long event started with brainstorming session where 45 raw ideas from different universities were discussed and 10 of them were shortlisted. This was followed by mentoring sessions where top 10 ideas were mentored by successful entrepreneurs who encouraged them for building a functional startup and collaborating with like minded people. Mentors also helped teams in carving out their business models. These 10 ideas were finally presented on Day 3 to jury that comprised of Mr. Ankush Khera - FoxMyBox, Mr. Jagdeep Kumar Sharma – TBIF, IIT Ropar and Mr. Hardev Singh - University of Nottingham, and top three ideas were selected. Mr. Sumeer Walia – Director, CEED, Chitkara University was the main architect for organizing this event at Chitkara University.



FUTURE EVENTS

- ❖ 2nd Annual IPR Workshop (Feb 19, 2019)
- ❖ Novate+ An exposition of innovations (Feb 19, 2019)
- ❖ Surge 0.1 (Feb 19-20, 2019)
- ❖ Techelone - Annual Tech Fest (April 2019)

Expert talk on climate change

On September 28, Department of Civil Engineering (CE) invited Shri R. R. Rashmi - Former Special Secretary, Ministry of Environment, Forests and Climate Change, Government of India and Distinguished Fellow, TERI. He delivered a talk on the topic Climate Change and Sustainable Development. There were also presentations from delegates from Department of Science and Technology (DST), Shimla, H.P. Dr. Madhu Chitkara – Pro-Chancellor and Dr. Varinder S. Kanwar – Vice Chancellor, Chitkara University, H.P. were also present during the session. Students and faculty members of CE department attended the session.

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- ❖ Dr. Varinder S. Kanwar, Vice Chancellor (Chairman)
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- ❖ Dr. Sita Ram Sharma, Applied Sciences
- ❖ Dr. Sartajvir Singh, ECE



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Coding hackathon organized by CSE

Department of Computer Science and Engineering (CSE) in collaboration with Computer Society of India (CSI) and Topcoder had organized a coding hackathon on October 17. It was a two rounds event - in Round 1, 100 participating students were given questions related to coding and they were asked to solve them using any programming language – C, C++, C#, Java or Python. Those who solved maximum number of questions qualified for Round 2. In Round 2, students were asked to develop codes that were rigorously tested by fellow participating students as well as faculty members for bugs, errors, failure cases, plagiarism etc. Participants earned scores after passing each test and also by detecting bugs in other students' codes. Finally the student with highest total score won the competition. The hackathon was coordinated by Mr. Manik Gupta – Assistant Professor (CSE).



Best paper presentation award for ECE faculty member

Mr. Shivendu Prashar – Assistant Professor, Department of Electronics and Communication Engineering (ECE) won the best

paper presentation award in a track for his paper entitled “Investigation of Grating Parameters' Impact on Spectral Characteristics of LPFG using Two-Layer Fiber Geometry”. The paper was presented in IEEE 6th International Conference on Wireless Networks and Embedded systems (WECON 2018). In the same conference Dr. Sartajvir Singh - Associate Professor (ECE) was invited to chair a technical papers presentation session. Dr. Sartajvir was also one of the reviewers in the conference.



Invitation to deliver an expert talk

Dr. Arun Lal Srivastav - Assistant Professor, Department of Applied Sciences (AS) has received an invitation from the 5th International Conference on Water Resource and Environment (WRE 2019) to deliver an expert talk on his findings published by him in a paper entitled “Synthesis of a novel adsorbent, hydrous bismuth oxide (HBO2) for the removal of fluoride from aqueous solutions”. This work was published in Journal of Desalination and Water Treatment (Taylor and Francis) in 2015 and was co-authored by Prabhat Kumar Singh and Yogesh Chandra Sharma. Dr. Arun also reviewed papers for the conference. WRE 2019 is to be held during July 16-19, 2019 at Macao Science Center, Macao, China.

EVENTS ORGANIZED

FDPs organized by department of CSE

- ❖ July 3: Dr. Bhisam Sharma – Associate Professor (CSE) conducted a faculty development program (FDP) on Research Ethics and it was attended by about 30 faculty members & M.E., Phd Scholars of Chitkara University. In addition to research ethics he also discussed about art of writing a research paper.
- ❖ July 21: A hands-on training session on Linux for faculty was organized and was delivered by Mr. Surinder Zinta – IT Department, Chitkara University. He gave insight into need of VmWare software over Ubuntu, clear understanding and working with Linux directory system was practiced. About 20 faculty members from CSE benefited from the session
- ❖ July 28 & October 6: As new platform Examyly was introduced during the semester, CSE faculty was given insight into working of the platform by Mr. Sainthal Kumar – Founder, Examyly Platform. It was a hands-on session where participants worked on different modules of the platform, they created dummy test followed by Q&A. After the basic introduction, second FDP on Examyly was conducted on October 6. It was focused on execution of online examination including how test creation is done, reuse of multiple quizzes, how multiple version of same question can be generated followed by a discussion etc. This session was also conducted by Mr. Sainthal Kumar.
- ❖ December 21: Several parallel workshops were organized on platforms/topics including Client side technologies, Database

management system, Java & C programming. The workshops were respectively delivered by Dr. Bhisam Sharma, Mr. Gaurav Mehta and Mr. Girish Rao – faculty members from department of CSE.



Expert talks organized by CSE

- ❖ July 27: Department of CSE organized an expert lecture on Amazon Web Services that was delivered by Mr. Amit Nevatia - Director, AWS Educate India. 200 undergraduate CSE students as well as faculty attended the talk. Mr. Alok Aggarwal – Assistant Professor (CSE) was the local coordinator.
- ❖ August 2: Mr. Mothy Raajan - Virtusa North Campus Hiring Lead visited our campus and delivered a three hour session that was attended by about 120 CSE students. Virtusa Corporation is an American information technology services company founded in 1996 in Sri Lanka and has its headquarters in Massachusetts, USA. Mr. Rinku Saini – Assistant Professor (CSE) was the local coordinator of the session.



- ❖ August 9 & September 6: Mr. Jitesh Goel and Mr. Mohit Madaan from AcadView visited Chitkara University and conducted a talk on Java. The talk was intended for broader academic community that seeks to explore the impact of Java in industry and academia. They also discussed effective code writing technique with boundary cases. About 180 students and faculty attended the talk. On September 6, Mr. Himanshu Batra, Founder and CEO, AcadView visited Chitkara University and delivered a session to pre final year CSE students. He discussed IT industry scenario with students, expectations of industry from students and how to make yourself job ready. Mr. Manik Gupta – Assistant Professor (CSE) was the local coordinator.



- ❖ August 24: Mr. Abhinav Johari, Senior Software Engineer, Zomato delivered a talk that was attended by 150 CSE students. He discussed about Zomato and how is it helping people discover great things around them. He discussed in detail how their team gather information and data about restaurants on regular basis and make them available to a large number of food lovers. It was a well received session and was locally coordinated by Mr. Shankar Aggarwal – Assistant Professor (CSE).



Expert talks organized by CE

- ❖ Dr. Sham Tickoo, Professor, Purdue University, USA visited Chitkara University and delivered a talk on Emerging Technologies in Engineering. The session was held on August 1 and was attended by students and faculty members of Civil Engineering (CE) department. Ms. Dipali Sharma - Assistant Professor (CE) was the local coordinator.



- ❖ Students and faculty members of CE department participated in a webinar on Aug 27-28 that was organized by Bentley Institute on STAAD.Pro software. The webinar was an awareness program where new features and codes in the software were discussed. Different universities participating in the webinar shared their views and expertise regarding the software and it led to a healthy discussion.
- ❖ Dr. Umesh Sharma, Professor at PEC, Chandigarh was invited to deliver a talk on topic Importance of transportation engineering, construction of flexible pavements, and construction of cement concrete pavements. 75 students and faculty members attended the talk that was held on October 10 and was locally coordinated by Mr. Abhishek Kanoungo - Assistant Professor (CE).
- ❖ In order to expose students of CE to the concepts of Cyber Security a session was held on November 12 and it was delivered by Dr. S.N. Panda – Director, Research, Chitkara University, Punjab.

Two-day workshop on bridge construction

Department of CE organized a two-day workshop on bridges, their types, importance and applications and it was held during 28-29, August. Topics like importance of bridge design, key structural components of bridge construction including beams, arches, trusses, and suspensions were discussed. Student participants built their own bridges during the workshop that could take upto 1000 times the weight of the bridge. The workshop was delivered by Mr. Prateek Bajpai from Civil Simplified, Bangalore and was locally coordinated by Mr. Abhishek Kanoungo - Assistant Professor (CE).



Design thinking workshop by AS & ECE

Dr. Ashok Kumar – Associate Professor (AS), Dr. Arun Lal Srivastav – Assistant Professor (AS) and Ms. Minaxi Dassi – Assistant Professor (ECE) delivered a workshop on *Design Thinking: Exchanging the Baton* on September 8 at Chitkara University, Himachal Pradesh. It was a sensitization workshop for faculty members who would be teaching *engineering problems in community services (EPICS)* in Engineering Exploration course to the first year students. The workshop was convened by Dr. Sita Ram Sharma - Associate Professor (AS), and Ms. Lipika Gupta – Associate Professor (ECE).



E – Route: A sensitization seminar by CEED

CEED conducted a late evening sensitization seminar on September 8 to encourage students to join entrepreneurship cell or E-Cell of Chitkara University. The session was conducted by



already existing student members of E-Cell who shared their experiences and learnings. The event was conducted under the guidance of Ms. Abha Sharma – Assistant Professor (CSE).

Four-day workshop on BIM

Department of CE conducted a four day hands-on workshop during September 17-20 on Building Information Modeling (BIM) using Revit software. Revit software is specifically built for BIM, empowering design and construction professionals to bring ideas from concept to construction with a coordinated and consistent model based approach. The workshop was delivered by Mr. Manas Chatterjee and Ms. Bhavana from Bentley Organization Innovative Systems, locally coordinated by Ms. Dipali Sharma - Assistant Professor (CE) and was attended by 50 students and faculty members.



Workshop on engineering mathematics

School of Computer Applications in collaboration with CSI Student Chapter organized an informative and detailed hands-on workshop on Engineering Mathematics for first year students during Sep 18 – 22. The objective of the workshop was to make students understand that mathematics is a tool that can be used to solve problems of computer applications. About 50 students participated in the workshop and it was locally coordinated by Dr. Prasenjit Das, Associate Professor, Department of Computer Applications.

Three-day workshop on C programming

Department of CSE and Computer Applications jointly organized a three day workshop on C programming language during September 25-27 in collaboration with CSI. The sessions were delivered by students only who are well versed with C programming under the guidance of Mr. Shankar Aggarwal. 70 students participated in the workshop and they were exposed to concepts like data types, access specifiers, typecasting etc.



Workshop by Ultratech cement

One day workshop on Earthquake Resistant Constructions was organized by Department of CE in collaboration Ultratech Cement under special skills & knowledge upgradation program. The workshop was held on September 29 and was attended by 20 participants from Ultratech cement. Mr. Gurmohan Singh was the local coordinator.

Two-day workshop on UI/UX design

Department of CSE organized a two-day workshop on UI/UX design during October 3-4 and it was delivered by Mr. Subhash Kapoor, Team Lead, Imagine XP, Pune. UI design is related to graphical design and UX design is more of an analytical field. Both of them are crucial for software product design. Over 100 students attended the workshop and it was locally coordinated by Mr. Rinku Saini – Assistant Professor, CSE.

Expert talk on embedded systems

Department of ECE invited Dr. Rajesh Mehra, Associate Professor, NITTTT, Chandigarh on October 3 to deliver a talk on embedded systems design. Dr. Mehra who is an expert in VLSI, embedded systems and FPGA gave a very good introduction to embedded systems and various design process using ASIC. The session was attended by around 35 students and faculty members and was locally coordinated by Ms. Shaminder Kaur – Assistant Professor (ECE).



Android app development workshop

Department of ECE in collaboration with student chapter of Institution of Electronics and Telecommunication Engineers (IETE) organized a one-day workshop on Android App Development on October 6. About 70 students from different engineering branches attended the workshop that was conducted by Mr. Ram Kumar and Mr. Rahul Malhotra from Coders Point and was locally coordinated by Mr. Neeraj Kumar – Assistant Professor (ECE).



Two-day workshop on cloud computing & AWS

Department of CSE in collaboration with CSI and Topcoder organized a two-day workshop on Cloud Computing & Amazon Web Services (AWS) during 15-16 October. The workshop was attended by over 150 students and was focused on the topics like Enterprise SDLC, Testing Servers, Elastic Cloud2, Amazon IAM, Production Servers, VPC etc. Networking topics like EC2 setup, IP & DNS and Linux operating system, community cloud for Android as well as different types of build processors were also discussed. The workshop was coordinated by Mr. Shankar Aggarwal & Mr. Manik Gupta – Assistant Professors, CSE.

Mentor-mentee series kick-started by CEED

In order to guide students on how to overcome different hurdles while executing their start-up ideas, CEED has started a mentor-mentee series where successful entrepreneurs would be invited to



interact with budding entrepreneurs of Chitkara University. First such session was organized on October 26, 2018 where Mr. P.S. Dhillon Co-founder of DataToBiz was invited to interact with the students. About 100 students attended the session and it was coordinated by Ms. Abha Sharma - Assistant Professor (CSE).



associate Mr. Maneet Kumar. They delivered an encouraging talk and spoke about Startup India and its benefits to young startup ecosystem of India. 273 students from Chitkara University and nearby universities attended the event that was anchored by CEED, Chitkara University, H.P.



Startup India yatra bootcamp organized

Chitkara University H.P. in collaboration with Government of H.P. organized a one-day bootcamp and workshop on Startup India on November 17, 2018. Mr. Sanjay Kanwar - Deputy Director, Industries, Govt. of H.P. graced the occasion. He was joined by his

EVENTS ATTENDED

Team from ECE participated in a bootcamp at IIM B

Gangesh Kumar, Arun Chaudhury (students) and Mr. Sagar Juneja (Associate Professor) department of ECE participated in a bootcamp at IIM Bangalore (July 4-5, 2018) for their start-up Equa Weight. This start-up is an outcome of team's participation in Texas Instruments (TI) India Innovation Challenge (TIICDC2017). TI has given a funding of INR 500,000 to the team for qualifying in the finals of the contest.



Paper presentation by AS faculty member

Dr. Sita Ram Sharma – Associate Professor, Department of Applied Sciences (AS) presented a research paper entitled “Inequalities and its applications” in International conference on Science: Emerging Scenario and Future Challenges (SESFC-2018) during 8-9 September held at NIT, Hamirpur.

Workshop attended by CSE faculty members

Ms. Neetu Rani and Mr. Rinku Saini – Assistant Professors (CSE) attended AWSAR Workshop on Popular Science Writing held at IISER, Mohali on September 24. They learned about art of writing research paper for the general understanding of diverse audience.

Participation in 3rd H.P. science congress

14 CSE & ECE undergraduate students, 2 PhD scholars from Civil Engineering department (R. Sarvanan and R. Aravinth) along with Ms. Ashima Malhotra - Assistant Professor (CSE) and Mr. Sagar Juneja – Associate Professor (ECE) participated in the 3rd H.P. science Congress held at IIT Mandi during Oct 22-23, 2018. Our students' teams presented various projects they have carried out through poster presentations and paper presentations during the congress. We also showcased working demos of our projects in the exhibition booth and it attracted a lot of interest from the audience. H.P. Science Congress is organized by HIMCOSTE (Himachal Pradesh Council for Science Technology and Environment) and Chitkara University, H.P. is participating in it every year.

Workshops attended by ECE faculty

- ❖ Dr. Sartajvir Singh and Mr. Shivendu Prashar attended a one-week workshop on Mobile Application Development held at Baba Banda Singh Bahadur Engineering College, Punjab during July 9-14.
- ❖ Mr. Sukhraj Singh – Assistant Professor (ECE) attended a four-day workshop during July 18-21 at IIT Ropar. The workshop was on the topic Power converter design including EMC/EMI modeling for micro grid and electric vehicle applications.
- ❖ Dr. Sartajvir Singh and Mr. Shivendu Prashar attended a three-day academic leadership program at NITTTTR, Chandigarh held during September 8-10.

- ❖ Ms. Lipika Gupta – Associate Professor (ECE) attended 8th Edition of Industrial IoT Congress held in Gurugram on December 19-20.



CSE faculty member participated in a conference

Mr. Mukesh Kumar – Assistant Professor (CSE) participated in International Conference on Engineering, Technology and Management for Sustainable Development held at Dev Bhoomi





Group of Institutions, Dehradun during October 26-27. He presented a paper entitled "Educational Data Mining and Learning Analytics: Student Performance Prediction in Academic".



CE faculty member participated in workshop

Dr. C. Prakasam, Associate Professor (CE) attended NAAC Sponsored two-day national workshop on Evolving Trends in Quality: Role of IQAC on December 14-15. The workshop organized by Vivekananda Institute of Professional Studies, New Delhi.

Participation in IEEE AGM

Dr. Rajnish Sharma – Dean (Research), Chitkara University and Mr. Sagar Juneja attended the IEEE Annual General Meeting held in Coimbatore on December 16, 2018. The meeting was organized on the sidelines of 15th IEEE conference INDICON2018 held during December 16-18, 2018 at Amrita University, Coimbatore. Dr. Rajnish and Mr. Sagar also attended the technical sessions of the conference.



Industry visit by CE students

During 16-17 October third year CE students along with Mr. Akhil Shetty, Mr. Abhishek Kanoungo, Mr. Girish Chauhan and Mr. Preetam Pundir visited Ultratech cement manufacturing unit in Solan, H.P.

Industry visits organized by CSE

- September 14 – 10 students from CSE department visited Future First Info Services Pvt. Ltd, Gurugram to get a feel of working environment of a software company. They also developed understanding about software development and software testing. Mr. Mukesh Kumar - Assistant Professor (CSE) accompanied the students to this visit.
- October 5 – Mr. Alok Kumar Agrawal – Assistant Professor (CSE) took 32 students from CSE department to CS Soft Solutions Pvt. Ltd., Mohali. The objective of the visit was to introduce students to the environment of software company.
- October 26 – 41 students from CSE department along with Mr. Alok Kumar Agrawal visited Piford Technologies located in IT Park, Mohali. During this visit students came to know about various programming languages used by software industry including Python, C#, Java etc.



PATENTS

Patents filed by Chitkara University, H.P. during July – December 2018

A Gas Detecting Device

By - Deepak Punetha and Sartajvir Singh

Application No. - 201811022863

A sensor for detection of poisonous gases is made using sensing layer that is composed of Polyaniline (PANI) and nano particles of WO₃ (Tungsten Trioxide), an electrode selected from palladium, gold etc and has an insulating layer of SiO₂ (silicon dioxide). Sensing layer and electrode is assembled in Schottky pattern for improving the detection limit.

A Weight Measuring Device

By - Gangesh Kumar, Arun Chaudhary and Sagar Juneja

Application Nos. - 201811027091 and 201811029917

Buying loose groceries like pulses, grains from grocery stores & super markets involves two steps – a) lifting the item in a scoop &

putting in a bag, b) measuring it using weighing machine at the counter. This process is simplified by incorporating weighing scale in the scoop itself and thereby reducing the number of steps from 2 to 1. The outcome is a low cost electronic scoop which is handheld & portable, runs on a battery, shows digital weight reading on LCD and also calculates total cost.

Weight Measuring Scoop

By - Gangesh Kumar, Arun Chaudhary and Sagar Juneja

Design Registration Nos. – 307983 and 308571





FACULTY ACHIEVEMENTS & CONTRIBUTIONS

Acknowledgement from a Journal for AS faculty member

Dr. Arun Lal Srivastav – Assistant Professor (AS) has received a Certificate of Outstanding Reviewer from Journal of Cleaner Production published by Elsevier with ISSN: 0959-6526.

Certification by CSE faculty members

Following faculty members from department of CSE have completed certification courses during the last semester.

- Mr. Manik Gupta, Ms. Ashima & Ms. Neha Mittal – Assistant Professors, successfully qualified foundation level Codechef Certified Data Structures and Algorithms Program.
- Mr. Alok Agrawal – Assistant Professor, successfully completed AICTE-NPTEL online faculty development program entitled Developing Soft Skills and Personality, Educational Leadership, Non-Conventional Energy Resources & Technical English for Engineers
- Mr. Rinku Saini–Assistant Professor, cleared UGC NET exam.

PUBLICATIONS

- Bhushan B., Grover U., Siby J. and Kanwar V.S. (2018). Feasibility of using paper industry sludge containing calcium carbonate in manufacturing bricks. *Traces 2018 – Trends and Recent Advances in Civil Engineering*, pp 1–12.
- Goel N. and Kumar M. (2018). Classification of diabetes patient by using data mining techniques. *International Journal for Research in Engineering Application & Management (IJREAM)*.
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- Kanwar V. S. (2018). Waste to worth - sludge containing calcium carbonate into useful building materials - an indian context. *Trends in Civil Engineering and its Architecture*, vol 2(2), pp 1–2.
- Kanwar V.S., Kanoungo A. and Shukla S.K. (2018). Effect of using sludge waste containing calcium carbonate on the properties of asphalt and hot mix asphalt mixture. D. Chen et al. (eds.), *Advancements on Sustainable Civil Infrastructures (Springer)*, pp 110–120.
- Kumar M., Salal Y.K., and Abdullaev S.M. (2018). Educational Data Mining and learning analytics: Student Performance Prediction in Academic. *International Conference on Engineering, Technology and Management for Sustainable Development*.
- Kumar M., Shambhu S. & Sharma S. (2018). Classification of heart diseases patients using data mining techniques. *International Journal of Research in Electronics and Computer Engineering*.
- Nidhi, Kumar M. & Kakkar L. (2018). Classification of diabetes patient by using data mining techniques. *International Journal for Research in Engineering Application & Management (IJREAM)*.
- Nidhi, Kumar M. and Makkar S. (2018). Classification of breast cancer tissues using decision tree algorithms. *International Journal for Research in Engineering Application & Management (IJREAM)*.
- Prakasam C. and Aravinth R. (2018). Application of numerical modelling for geomorphological evolution and river bank shifting part of Damodar River. *International conference on International conference on Hydraulics, Water Resources and Coastal Engineering*.
- Prakasam C. and Aravinth R. (2018). Delineating groundwater potential zones using remote sensing and GIS – A case study of Attur Taluk, Salem district, Tamilnadu. *International conference on Global Water Crisis: Agriculture and Food Security in the Era of Climate Change*
- Prakasam C. and Aravinth R. (2018). Impact of landslide on socio-economic and trans communication systems: A case study of Kotropi landslide, Mandi district, HP. *National seminar on Mountain Communities and Adaptive Sustainable Livelihoods Strategies*.
- Prakasam C. and Aravinth R. (2018). Impacts of coastal development on coastal ecosystem and shoreline dynamic – A case study on Ennore port, Chennai, Tamilnadu. *National conference on Sustainable Management Practices: Trends, Issues & Challenges*.
- Prakasam C. and Aravinth R. (2018). Site suitability assessment for artificial mode of groundwater recharge - A case study on Rampur Tehsil, Shimla District, HP. *1st International Conference on Sustainable Water Management*.
- Prakasam C. and Aravinth, R. (2018). Soil erosion modelling using RUSLE method - A case study on Rampur Tehsil, Himachal Pradesh. *National conference on Sustainable Development & Geospatial Technology*.
- Prakasam C. and Saravanan R. (2018). A review of ecological flow methods: Methodologies and application in the Jarji hydropower project. *3rd Himachal Pradesh Science Congress, Himachal Pradesh council for Science, Technology and Environment (HIMCOSTE)*.
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- Prakasam C. and Saravanan R. (2018). Agricultural drought assessment using GIS: A case study. *International conference on Hydraulics, Water Resources and Coastal Engineering*.
- Prakasam C. and Saravanan R. (2018). Evaluating the efficiency of the existing agricultural practices in Una district, Himachal Pradesh statistically and validate using cropwat module for sustainable agricultural practice. *National Conference on Sustainable Management Practices: Trends, Issues & Challenges*.
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- Shetty A. and Gupta G. (2018). Design methodologies for eco-friendly pharmaceutical waste management-A review. *International Conference Sustainable Waste Management through Design*, pp 586 – 595.
- Singh S., Srivastava A. and Singh S. (2018). Impact of topographic corrections on change detection using MODIS data. *3rd Himachal Science Congress on Rural Upliftment through Science and Technology Interventions*.
- Sood V. and Singh S. (2018). Analytical analysis of shadow removing algorithms over land use and land cover classification. *Himalayan Geology*, Vol. 39 (2), pp. 223-232.
- Sood V., Gupta S., Gusain H.S. and Singh S. (2018). Spatial and quantitative comparison of topographically derived different classification algorithms using AWiFS data over himalayas, India. *Journal of the Indian Society of Remote Sensing, Springer*, pp. 1311-1331.

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