| Name | Title | Abstract | Poster / Videos |
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| Divya Saxena | Design and Verification of an NDN-Based Safety-Critical Application: A Case Study With Smart Healthcare | NDN allowed users to fetch data by names irrespective of the actual hosting entity connected through a host-specific IP address. NDN well suits the content- centric pattern of machine-to-machine (M2M) communications predominantly used in IoT. In this paper, we leverage the basic feats of NDN architecture for designing and verification of an NDN-based smart health IoT (NHealthIoT) system. NHealthIoT uses pure-NDN-based M2M communication for capturing and transmission of raw sensor data to the home server which can detect emergency healthcare events using Hidden Markov Model. Emergency events are notified to the cloud server using a novel context-aware adaptive forwarding (Cdf) strategy. Post emergency notifications, and user health information is periodically pulled by the cloud server and by other interested parties using NDN-based publish/subscribe paradigm. The cloud server carries out long-term decision making using probabilistic modeling for detecting the possibility of chronic diseases at the early stage. We extend the workflows intuitive formal approach model for verifying the correctness of NHealthIoT during the emergency. We evaluate the cdf strategy using ndnSIM. Moreover, to validate and to show the usability of NHealthIoT, we develop a proof-of-concept prototype testbed and evaluate it extensively. We also identify some research challenges of the NDN-IoT for researchers.  Please cite it as “*D. Saxena, V. Raychoudhury, Design and Verification of an NDN-Based Safety-Critical Application: A Case Study With Smart Healthcare, IEEE Transactions on Systems, Man, and Cybernetics: Systems, vol. pp, no. 98, July 2017, pp. 1-15*” | [[PDF](https://drive.google.com/open?id=0B4o1vUC2XCvRSVF2SUctazJPakE)][[Code](https://drive.google.com/open?id=1McoIhAr0Rr6NDarsnx6zx19f9eofWoSB)][[Report](https://drive.google.com/open?id=1jlTFbF7W_iSZw-F6GwJp_Vn9UmIENE5B)][[Video1](https://drive.google.com/open?id=0B4o1vUC2XCvRVTBrOXBTbHVWVDg)][[Video2](https://drive.google.com/open?id=0B4o1vUC2XCvRTzA3dEk5M1RHMXc)] |
| Divya Saxena | Named Data Networking A Survey | Internet was developed as a packet data network where users and data sources (server) with specific IP addresses interacted over a pre-established communication channel. This model of client–server data communication has evolved into a peer-to-peer mode of data sharing in recent times. Applications like, YouTube, Bit Torrent, social networks have revolutionized the idea of user generated contents. Modern users care only for specific data items irrespective of their sources. So, the idea of using IP addresses to identify servers hosting a particular content is losing its importance. Moreover, want of IP addresses is a challenging issue haunting the Internet community since long. The need of the time is a content-centric networking platform where data hosts are of less importance, and Named Data Networking (NDN) has been proposed to that end. NDN allows users to float a data request without any knowledge about the hosting entity. NDN can handle user mobility, security issues more efficiently than the current Internet. Although NDN has been proposed in 2010, so far, there is no survey paper studying its architecture and various schemes proposed for its different characteristic features, like, naming, adaptive forwarding and routing, caching, security, mobility, etc. In this paper, we introduce a novel taxonomy to study NDN features in depth. We have also covered several NDN applications. We conclude our survey by identifying a set of open challenges which should be addressed by researchers in due course.  Please cite it as “*D Saxena, V Raychoudhury, N Suri, C Becker, J Cao, Named Data Networking A Survey, ELSEVIER COMPUTER SCIENCE REVIEW, pp. 15-55, January 2016*” | [[PDF](https://drive.google.com/open?id=0B4o1vUC2XCvRSDZtZElHQXNIbnM)] |
| Divya Saxena | N-FIB: Scalable, Memory Efficient Name-based forwarding | Though NDN has several benefits over traditional IP-based Internet, storing names instead of IP addresses has two major bottlenecks. While it consumes significantly large memory, it incurs higher search and update time. Another issue is the fast growth of routing table size through which FIB will not fit in existing routers’ line-card memory. Moreover, frequent updates to the FIB can degrade the packet delivery performance. In this paper, we propose a scalable and memory efficient Patricia trie based name forwarding scheme (called, N-FIB) for FIB. N-FIB supports FIB aggregation to significantly minimize the impact of large FIB size and high FIB update cost. Moreover, N-FIB is reducing routers’ computation and memory overhead, while supporting strong forwarding correctness.  Please cite it as “*D. Saxena, V. Raychoudhury, N-FIB: Scalable, Memory Efficient Name-based forwarding, ELSEVIER JOURNAL OF NETWORK AND COMPUTER APPLICATIONS (JNCA), September 2016*” | [[PDF](https://drive.google.com/open?id=0B4o1vUC2XCvRb21wZUpqSEE2OU0)] |
| Divya Saxena | Radient: Scalable, Memory Efficient Name Lookup Algorithm for Named Data Networking | NDN router stores all incoming content requests ('/'-delimited string components) in the Pending Interest Table (PIT) until they are satisfied. Multiple requests for the same content are merged in a single PIT entry and when the requested content is available, it is forwarded simultaneously to all the requesters. Although NDN has several benefits over the existing IP-based network, replacing IP addresses with names increases memory consumption and lookup cost. One possible way to restrict memory usage is to use name encoding, i.e., to encode identical components of a name with a unique integer. In this paper, we propose a novel memory efficient name encoding scheme (called, Radient) for PIT and evaluated it extensively.  Please cite it as “*D. Saxena, V. Raychoudhury, Radient: Scalable, Memory Efficient Name Lookup Algorithm for Named Data Networking, ELSEVIER JOURNAL OF NETWORK AND COMPUTER APPLICATIONS (JNCA), 2016*” | [[PDF](https://drive.google.com/open?id=0B4o1vUC2XCvRSG83Z0Q5VFVXMzQ)] |
| Divya Saxena | Implementation and Performance Evaluation of Name based Forwarding Schemes in V-NDN | Recently, researchers proposed the use of a content-centric approach, Named Data Networking (NDN), for enhancing the efficiency of vehicular ad-hoc networks. In this paper, we implement IP-based data forwarding schemes, such as Epidemic, Spray & Wait, and Adaptive Forwarding using NDN on the sparsely-connected real vehicular testbed. We also evaluate these NDN-based forwarding schemes to study the performance of name based forwarding for retrieving and disseminating data. Our experimental results obtained through real vehicular testbed validate the performance and usability of NDN over VANET.  Please cite it as “*D. Saxena, V. Raychoudhury, C. Becker, Implementation and Performance Evaluation of Name based Forwarding Schemes in V-NDN, In Proceedings of International Conference on Distributed Computing and Networking (ICDCN 2017), January 4-7, 2017, Hyderabad, India*.” | VANET Testbed  [[PDF](https://drive.google.com/open?id=0B4o1vUC2XCvRTXNSRDJVeW1nTUk)][[Code1](https://drive.google.com/open?id=0B4o1vUC2XCvRTzJCdGdPUjRYVWM)][[Code2](https://drive.google.com/open?id=0B4o1vUC2XCvROHJNZXRsUW01UEk)][Report][[Video](https://drive.google.com/open?id=0B4o1vUC2XCvRYldZRnZ2RzNQcjQ)] |
| Divya Saxena | An NDNoT based Efficient Object Searching Scheme for Smart Home using RFIDs | The use of content names for communication support name-based routing, in-network caching, and security which make the NDN more suitable for IoT. In this paper, we propose a NDN-based searching mechanism (named, Search-NDNoT), which can be used to find any smart item augmented with the RFID in real-world in real-time. An energy-efficient data aggregation algorithm is also proposed to maintain up-to-date data on the server. Our proof-of-concept prototype shows the usability of our proposed system.  Please cite it as “*D. Saxena, V. Raychoudhury, C. Becker, An NDNoT based Efficient Object Searching Scheme for Smart Home using RFIDs, In Proceedings of International Conference on Distributed Computing and Networking (ICDCN 2017), January 4-7, 2017, Hyderabad, India*” | [[PDF](https://drive.google.com/open?id=0B4o1vUC2XCvRSTlIaUZhNWZJU0E)] |
| Alark Sharma | Socio-Physical Interaction Network | Recent years have witnessed the rapid advances in embedded devices, wireless sensing technologies (e.g., RFID and wireless sensor networks (WSNs)), and wireless communications and mobile computing. The widespread deployment of integrated sensing, computing, and communication systems are resulting in smart motion detectors, door locks, light bulbs, alarms, vehicles, wallets, and key rings. Moreover, we are also experiencing stupendous growth in smart phone usage in recent years which are interconnecting people everywhere and all the time. People are becoming inseparable from the smart phone they carry and can be as well identified by their smart phones. So, in practice, physical objects including human being are all transformed into smart objects, and it is foreseeable that, in the near future, they will be interconnected to form an Internet-of-things (IOT). Relationships between smart objects in such an Internet-of-things environment can be manifold, object-to-object, object-to-human, and human-to-human. Object-to-object relations can be like, ‘near’, ‘far’, ‘above’, ‘below’, ‘beside’, etc. Object-to-human relations can be like, ‘owned by’, ‘belong to’, ‘carried by’, etc. Finally, human-to-human relations can be normal social relations, such as, ‘friends’, ‘family members’, etc. In order to simplify the smart object modeling, together we call all such relations as social relations between smart objects (including human). So, the aim of the proposed project is to capture different types of social interactions among smart objects in the physical world and to develop a combined socio-physical interconnection network (SPIN) platform to enable searching, browsing, and tracking of all such objects. Using such a system, various useful applications can be developed. Examples of such applications are smart home, office, city; healthcare for elderly and disabled; security system for large public areas, like airports and shopping malls; intelligent transportation system, etc. | Get the  Paper (Full Version) and the PPT |
| Sandeep Sandha  &  Deepak Uniyal | Event-detection and Resolution through Decentralized Co-ordination of Intelligent Entities in Smartphone-based Remote Elderly Health Monitoring System | In order to provide round-the clock monitoring of elderly patients, we propose a remote Health Monitoring System for Elderly patients (EHMS). The EHMS system uses embedded sensor nodes, such as, pulse rate, blood pressure, glucose level, and pollen count sensors, etc., to monitor the vital signs and the surrounding environments of a particular patient. The sensed data is initially sent to the user’s smartphone, which, based on the past health history of the patients, looks for abnormal sensor data readings (called as, events). Events are detected in a cascading manner, stage by stage, so that, abnormal pulse rate value may trigger checking of blood pressure level, and so on, such that, the energy cost of the sensor nodes can be minimized. Events are detected in real-time and by the smartphone carried by patients. The smartphone then takes proper decision regarding future actions and asks for feedback from the user through multi-modal and convenient user interfaces. User responses are recorded for self-learning purposes and for future use. The collected sensor readings are later sent to a backend server for further processing. All data exchanges are done in a secured manner. The contribution of this project is highly relevant and has special significance to both the industrial community and the society. The results and findings of this project will have impact on a broad range of research areas including mobile and pervasive computing, distributed systems, smart healthcare, and big data management. Goals The goals of the proposed research are to decide critical health situations of elderly patients through collaborative interaction of multiple embedded and wearable micro-sensors to inform patients about potential threats (pollen count, pollution, etc) in indoor and outdoor environments based on their past health history to adopt smartphone based decision making approaches for emergency actions and to use simple multi-modal interfaces to facilitate interaction between patients and caregivers |  |
| [Demo Video](https://www.youtube.com/watch?v=nTaWCidTJr0) |
| Arpit Neema | Development and implementation of IOT framework | Technical advances in sensor networking as well as mobile computing and communications are aiming to transform our physical environment into a smart space. Our real-life objects augmented with sensor nodes and RFID tags can be interconnected with each other to form an Internet-of-Things (IoT). Such an IoT can be used for many intelligent application developments. Soon in the near future, in addition to finding information in the cyber space of the Internet, it will be desirable for people to identify, search, and browse information about objects in the physical world. We can foresee increasing demand of this technology in our everyday life. This project is set as a significant step towards realizing such a dream. In this project, we will build an IoT and will study the research issues and developmental challenges associated with it. We will also develop one or more prototype proof-of-concept applications to prove the usability of the IoT framework. Associated with the demo applications, we will develop mechanisms and algorithms to support those smart applications built on the IoT framework. More specifically, we will study the related work, propose an IoT framework, design the key mechanisms and algorithms, and develop a prototype with example applications for demonstration. |  |
| [Demo Video](https://drive.google.com/file/d/0B-FCUubtQZUENjdmbkViWUlVNUU/edit?usp=sharing) |
| Preetika Rani | Infectious Disease-Outbreak-Period Detection Using Discrepancy Scores | One of the most challenging problems for people working in health departments is to detect the disease outbreak in environment. An outbreak is when there are more cases of disease or infection as compared to normal over an area or particular group of people, over a period of time. It is assumed that cases are related to each other such as having same cause or source of infection. People working in public health departments investigate outbreaks for finding the source, cause, prevention, avoidance of a particular or unknown disease as early as possible. During an outbreak the numbers of cases of illness are more as compare to normal illness. Detecting these patterns at later stage is trivial, but detecting these patterns in its early stage can mitigate the effects. Health Departments may learn about any outbreak by different sources like doctors complaining large cases, chemist reporting increased demand of particular medicines, a person observing illness symptoms frequently in the society etc. Other than these, machine learning techniques can be used for analysis of public health surveillance data. | [Paper (IEEE Healthcom 2014)](https://drive.google.com/file/d/0BxPutnTuhDu9WjRkZHBLMk9DNnM/edit?usp=sharing) |
| Sandeep Sandha | Crowdsourcing based Context-aware Panoramic Map Generation for Smartphone Users | Recent advances in smartphones and location-aware services necessitate identifying logical locations of users, in terms of their surroundings, instead of raw location coordinates. In this paper, we have proposed CROWD-PAN-360 (CP360), a novel smartphone-based system to generate 360-degree panoramic map of a querying user for his unfamiliar surrounding using crowd-sourced images. The objects (logical locations) appearing in the images are identified using manually or automatically generated tags. The system is context-aware and it intelligently associates user location coordinates with several smartphone contexts, like acceleration and orientation. CP360 can significantly reduce GPS positional errors for even cheap low-end smartphones and can identify the user surroundings very efficiently. We extensively tested the system in both indoor and outdoor environments of IIT Roorkee campus using Android smartphones over a dataset of more than 6000 crowd-sourced images of nearly 70 objects (departments, hostels, cafeteria, etc.) and CP360 generates the panoramic map with an average accuracy of 92.2%. | [Media Report](https://drive.google.com/file/d/0BxPutnTuhDu9SlNMRV9JTEhOZkk/edit?usp=sharing)  [Paper (TPDS)](https://drive.google.com/file/d/0BxPutnTuhDu9U2ZSN01oUDlXMHM/edit?usp=sharing) |
| Sandeep Sandha | Automatic Event Scheduling in Mobile Social Network Communities | In this project, we have implemented an autonomic system for activity scheduling in Mobile Social Network communities. We have implemented this, using Model II as described in the Research Paper. We have used Samsung Chord API for making network connections among the users who form a community. This API connects devices in a private channel and forms a group of people in a local area. Devices running Chord-based applications discover each other using a UDP(User Datagram Protocol) broadcast based discovery, and then use a TCP-based protocol stack to create a reliable, peer-to-peer local communication network. This network can be used to share data, including text, binary messages and files, with selected members of the network. Without using the cloud or server, it instantly supports sharing 1-to-1, 1-to-many or many-to-many.  According to Model II, when any user in the community proposes an event, a dynamic binary tree is created with the root node as the person proposing the event. The other members in the group act as nodes of the tree and data flows from parent to child nodes following the overlay. For this, an array is created and it contains the information about the position of all the nodes in the tree. This array is passed on to each node in the overlay along with the information about the event proposed. When this information reaches a node in the network, the user can respond accordingly, whether he/she wants to join the event or not. This response given by the user follows the same overlay structure and the responses finally reach the root node through the parent nodes. According to the responses generated, all the members are notified of the event. | [Paper (Socialcom'13)](http://ieeexplore.ieee.org/stamp/stamp.jsp?tp&arnumber=6693360)  [Paper (TPDS)](http://www.computer.org/csdl/trans/td/preprint/06714503-abs.html) |
| Sandeep Sandha | Crowd-sourcing Portal | We set up a unique complaint portal, the online system of the collecting the complaints, issues for all the members of IIT Roorkee. The more organized and systematic way of dealing with the issues speedily.  In today’s world of technology and information, we can speed up the stages through which the complaint has to pass for it to be addressed. The proper channel of communication can be computerized so as to facilitate the both the victim and the problem addresser. Complaint portal utilize all the benefits offered by the today’s fast communicating technology.     Technology development has enabled powerful, less chaotic and speedy transactions which have penetrated in almost all fields. For eg. Shares used to be sold by hard copy transactions in about 45 days but now through demat system it is a matter of seconds. similarly E-commerce field has undergone a revolution with ever increasing number of people using online stores for buying things of daily use and they don’t need to go to market and search for them. Upcoming but not so popular fields like e-gold, e-metal are also starting to take roots in the system. Non financial transactions like applying for jobs, applying for nationality, certificates of income domicile, many examinations etc. are all now starting in government and private institutions. | [Playstore Link](https://play.google.com/store/apps/details?id=com.sdslabs.dataCollection) |

http://hitwebcounter.com/counter/counter.php?page=5754334&style=0025&nbdigits=5&type=page&initCount=0