Top Ten Mistakes to Avoid in Writing CAREER Proposals



Number 10: Fonts Too Small

- Small fonts promote reader fatigue
- Reviewers DISLIKE small fonts
- PAPPG mandates:
 - 11 point font minimum
 - 1 inch margins
 - 6 lines max per vertical inch

See: https://github.com/nsf-open/nsf-proposal-latex-samples

The redundant information sent by a node on its different edges also introduces a dependency between the queue. The resummant mormation sent by a most on its unsettin tages and instituted a dependency occurrent are questioned the nodes that are not even neighbors. The later complication, while true for RLC, does not inflict itself on every or one nouse that are not even neighbors. Are later complication, while true or nac, ones me, mines used on every scheme. For example, a routing scheme with feedback on a general network [58] does not suffer from this complication, Morever, unlike RLC, it is not throughput optimal. Finally, the intractability of the EMC is compounded by a nonmemoryles output process at each node. Thus, approximation is a more favorable option.

emotysess output process at each node. Anus, approximation is a more savonous option.
We propose an approximation method that updates a queue for node a considering. we propose an approximation method this opinites a queue not have a considering. It are ences of notation imposed by the next-hop neighbors $\mathcal{N}^-(u)$ (on the packets departing from u), and 2. The innovativeness of the imposed by the next-nop neighbors \mathcal{N} (u) (on the packets departing nom u), and \mathcal{L} the limitativeness of the packets arriving at u from the previous-hop neighbors $\mathcal{N}^{+}(u)$. Hence, we will only consider the dependency of the packets arriving at u from the previous-nop neighbors $N^-(u)$. Hence, we will only consider the dependency of the state transition probabilities of the queue for each node u to the state of the queues corresponding to nodes in $N^+(u)$ and $N^-(u)$. Note that this will be exact for most of the cohomology of the state transition probabilities of the queue for each hode u to the state of the queues corresponding to nodes in $A^{-}(u)$ and $A^{-}(u)$. Note that this will be exact for most of the schemes on a general network as well as when RLC is and v (u). Note that this will be exact for most of the schemes on a general network as well as when the varieties and the multi-dimensional MC when the multiple reflections into multiple companion framework is to divide the multi-dimensional MC when straductive probabilities can be calculated independently opprove on a mic servous. The main sees of the approximation trainework is to divide the muti-dimensional NC whose steady-state probabilities can be calculated independently. With multiple resections into multiple supple allow whose steady-state probabilities can be calculated independently.

Note that although each MC process is assumed independent of the other MC processes, the interdependent of the other MC processes are the other MC processes. these of their queues are captured by the approximation method via their steady-state probability distributions. In For some values are captured by the approximation meanon via their steady-state probability distributions. If the procedure, we also wish to define the minimal set of queues required to determine the performance parameters.

The some values of V and a cutter of make S C V consider the attention.

For any node $u \in V$ and a subset of nodes $S \subset V$, consider the queue For any node $u \in V$ and a subset of nodes $S \subseteq V$, consider the queue $X_{u \to S}(t)$. We denote the set of all the queues required for the analysis by X. Au $\neg S(t)$, we denote the set of an the queues required for the analysis by X. Note that, each queue $X_{u \rightarrow S}(t) \in X$ must form an irreducible ergodic Markov note that, each queue $A_{n\to N(1)}\in A$ must some an irreductive argument than whose state transition probabilities must be systematically computable

caam whose state transition pronabilities must be systematically computable given all the information regarding the communication scheme, buffer management strategy, the erasure probabilities on the links, and the network

ment strategy, the erasure probabilities on the absence ology. As a result, all the MCs will have unique steady-state the absence ology. As a result, all the MCs will have unique steady-state the absence ology. topology. As a result, an area of the stributions which are denoted by $\pi_{u\rightarrow S}(\cdot)$, i.e., $\pi_{u\rightarrow S}(k)$ $X_{u \to S}(t)$ depend on the steady-state distributions of the there is no prior information about the probability done iteratively. To determine the state transition arrival and departure of innovative packets to its we define multiple incoming and outgoing stream. the queue $X_{u\rightarrow S}(t)$. Similarly, let $\Omega_{u\rightarrow S}=\{\mu_1,\dots,\mu_{s_{i-1}}\}$ be the state of the queue $X_{u\rightarrow S}(t)$. of departing streams. Note that zin and zout are links for node u. Thus, at each epoch, the total nu mas for more u. Thus, at each epoch, one soon it each arrival occurs with probability λ_i for i = 1,

where $a_k = \tan a_k$) can be those preject as one probability of the event that the indirect of active quant departed innovative packets to (from) the queue $X_{w-S}(t)$ is equal to k, in an epoch. The superscript on the coefficients value packets to (from) the queue $\Delta_{u\to S(t)}$ is equal to s_t in an exposite the dependence of the arrival and departure polynomials seems the current state $X_{u\to S}(t)=n_u$. We included this dependency of the arrival and departure polynomials represents the cuttent state $\alpha_{H}=\alpha(1)=10$. We included this dependency of the arrival and dependency on the current state of queue to account for some cases such as the wireless networks with backpressure routing on the current state of queue to account for some cases such as the wireless networks with backpressure routing of the current state of queue to account for some cases such as the wireless networks with backpressure routing on the current state of queue to account for some cases such as the wireless networks with backpressure routing on the current state of queue to account for some cases such as the wireless networks with backpressure routing on the current state of queue to account for some cases such as the wireless networks with backpressure routing on the current state of queue to account for some cases such as the wireless networks with backpressure routing on the current state of queue to account for some cases such as the wireless networks with backpressure routing of the current state of queue to account for some cases such as the wireless networks with backpressure routing of the current state of queue to account for some cases such as the wireless networks with backpressure routing of the current state of queue to account for some cases and the properties of the current state of queue to account for the current state of queue to account the current state on the current state or queue to account for some cases such as the wireless networks with backpressure routing in Section 3.2. Let $\Delta_{u \to S} = \{A^{(n_u)}(x)\}_{m_{u=0}}^{n_u}$ and $\Gamma_{u \to S} = \{E^{(n_u)}(x)\}_{m_{u=0}}^{n_u}$ be the sets of arrival and departure polynomials for the queue $X_{u \to S}(t)$, respectively, where m_u is the buffer size of node u. Given $\Delta_{u \to S}$ and $\Gamma_{u \to S}$, the queue's state transition probabilities can be easily computed. As an example, for $0 < j < m_u$, we have the following:

pr{
$$X_{u-S}(t)$$
 = j | $X_{u-S}(t)$ = i } = $\sum_{k=0}^{z_{in}} a_{ik}^{(k)} e_{k+i-j}^{(k)}$. (i)
$$p_r\{X_{u-S}(t+1) = j | X_{u-S}(t) = i \} = \sum_{k=0}^{z_{in}} a_{ik}^{(k)} e_{k+i-j}^{(k)}$$
. (i)

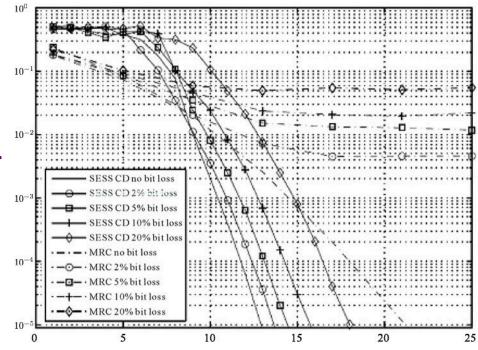
For notational consistency, we can extend $\epsilon_k = 0$ for k < 0 or $k > z_{out}$ and $a_k = 0$ for k < 0 or $k > z_{in}$. For nonanonal consistency, we can extend $e_k = 0$ and $e_k = 0$ and ethe above equation is signtly different for j=u and $j=m_0$, whose usuals are onthose use to the page and result, the proper approximate MC is formed for $X_{u=S}(t)$ with steady-state probability distribution $\pi_{u=S}(t)$. Lesus, the proper approximate and is normed for a_{w} =S(t) with steady-state probability distribution a_{w} =S(t). In summary, given all the information for the problem, for any node u, one (or multiple) queue with its incompared to the problem, and u is the problem of the problem.

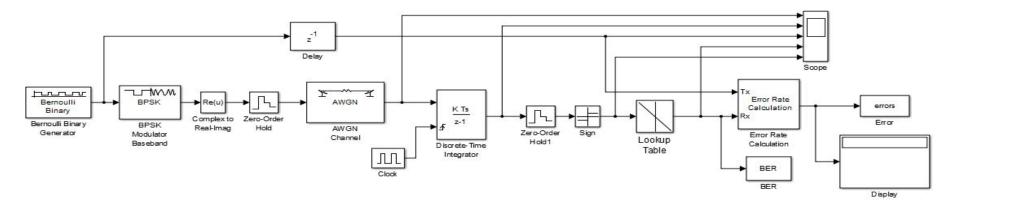
In summary, given an one mormospon for the problem, for any node u, one (or musiper) queue with its incoming advantage and outgoing streams will be identified properly. Then, the corresponding arrival and departure polynomials will be advantaged parametrically. These noterornials describe the craft transitions of the cursor from which the grandwater and outgoing screams will be identified properly. Then, the corresponding arrival and departure polynomias will be periabellity described for the MC Theorem the following already already as the computed for the MC Theorem the following already described as the outamed parametricary. These polynomias describe the state transitions of the queue from which the states of the MC. Then, we propose the following algorithm, denoted as the probability distribution can be computed for the MC. Then, we propose the following algorithm, denoted as the probability distribution for all contents. probability distribution can be computed for the MU. Then, we propose the following augorithm, denot "Irrative Estimation Algorithm" (IEA), to compute steady-state probability distributions for all queues:

roximation for RLC in general networks by considering the interdependency of more queue

Number 9: Figures Illegible

- Avoid "crowded" visuals
- Don't assume reader will print in color
- Use vector graphic formats





Number 8: Acronyms and Abbreviations

 Acronyms constitute a private language that excludes the reader.

 Abbreviations are often cryptic, and make text hard to read.

 Reader will NOT memorize your abbreviations!

ffliciently large Galois field \mathbb{F}_q) and transmits on the outgoing edge for w. For storage, suppose a packet from n

ig a packet becomes

Number 7: Dissing the Competition

- Good idea: Citing others' work
- Bad idea: Slighting others' work



("Others' work" might be sitting on the panel)

Number 6: Poor distinction between preliminary results and proposed work

- Make a clear demarcation
- Distinguish your results from others'
- Set clear objectives
- Identify obstacles you anticipate
- Highlight what you bring to the table
- Include a validation plan





Number 5: Misleading Project Summary

PROJECT SUMMARY

Overview

Cyber-physical systems (CPS) are engineered systems with built-in seamless integration of computational and physical components. Fundamental developments in sensing, control, and information technologies; promise to endow CPS with adaptability, scalability, resiliency, and sustainability. At the same time, contemporary CPS paradigms will inevitably entail human intervention, as in sustainable cloud and automobile transportation systems. Human-in-the-loop CPS will undoubtedly enhance the overall system intelligence, but modeling human behavior is truly challenging due to its complex physiological, psychological, and behavioral aspects. These considerations highlight the need for real-time management of future CPS with unpredictable system-dynamics. However, online decentralized management of networked CPS, that is robust to non-sustionary dynamics and amenable to scalable implementations, remains a largely uncharted territory, in this context, the proposed research pioneers algorithmic innovations targeting the cyber-physical opportunities emerging from cloud and transportation networks.

Intellectual Merit

This project is centered on analytical and algorithmic foundations that account for the non-stationary, unpendictable, and spatio-temporally distributed nature of forthcoming human-in-the-loop cyber-physical networks. The vision is to establish a cohesive network management framework based on state-of-the-art optimization and learning tools for real-time decentralized operations over the cloud and transportation networks. The ultimate goal is basic research on network management capitalizing on online learning to successfully perform optimal real-time resource allocation for CFS, even when the underlying system dynamics are non-stationary and unpredictable.

To this end, the research objectives are organized in three intertwined thrusts.

- (T1) Online convex optimization models and algorithms for dynamic network management;
 (T2) On-demand workload routing and service provisioning for sustainable cloud networks; and
- (T3) Real-time traffic signal control for transportation networks in smart cities.

Broader Impacts

Given the ubiquity of the research tools and methodologies, the utility of the proposed research goes well beyond the envisioned CPS areas to the broader fields of optimization, statistical learning, and operations research. Pocusing on human-in-the-loop cloud and transportation networks, this project offers the potential to bring significant social, environmental, and economic benefits. Project outcomes will have major implications for networked CPS including cloud networks and intelligent transportation networks supporting smart cars. As far as education, the proposed research will impact graduate student memoring, undergraduate training through Senior Design Projects on validation testbods, and outreach efforts to the local community and K-12 students.

CIF: Small: Exploiting Spatial Diversity and Mobility to Improve Secure Spectral Efficiency rview:

This project proposes to explore novel architecture and novel algorithms for maximizing secure spectral efficiency. Specifically, we propose to exploit the spatial distribution and mobility of collaborating mobile nodes to maximize the secure spectral efficiency of the wirelessly communicating nodes, so as to prevent attackers from eavesdropping on communications between the nodes. Given the possible locations of the eavesdropper(s) we use spatial precoding, power allocation, and artificial noise injection to ensure that transmitted information cannot be eavesdropped on. We term the proposed scheme Cooperative Spectrally-efficient Secure Communication (CSSC).

Our architecture is based on two communicating mobile nodes, each of which temporarily recruits other collaborating mobile nodes from their neighborhoods, to create a transmit cluster and a receive cluster. Each of the clusters functions as a distributed antenna system. The transmit nodes, by measuring the channel between them and the receive nodes, obtain the Channel State Information (CSI). No knowledge of CSI to the eavesdropper(s) is assumed. The CSI determines the achievable secret rate between the two collaborating clusters with physical-layer security coding. To further improve the achievable secret rate, the nodes in the transmit cluster inject artificial noise to impair the reception of the eavesdropper(s), with minimal effect on the communicating nodes.

This project is in particular interested in the performance of the CSSC scheme in mobile communication where, to best serve the communicating nodes, the clusters' memberships are constantly reconfigured, triggered by the nodes' mobility and the fluctuating channel conditions. The reconfiguration frequency depends on the required performance, exhibiting performance-vs-complexity tradeoff. The proposed scheme can be used as a stand-alone scheme, or in combination with traditional crypto security schemes by enhancing the latter and by reducing the capacity/processing requirements of crypto security. Keywords; Mobile Networks; MIMO; Cooperative MIMO; Physical-layer security; Spectral efficiency

The project proposes to study the use of spatial diversity and mobility to improve the secure spectral efficiency of wireless networks. In particular, the project will: (1) investigate practical algorithms (e.g., trading off performance for complexity) for optimal selection of the transmit and the receive cluster memberships, including the nodes assigned to inject artificial noise (e.g., given the potential locations of the attacker(s) and the channel characteristics, algorithms will be designed to select the transmit/receive cluster nodes, as to maximize the secure spectral efficiency); (2) investigate practical algorithms that take into consideration the mobility patterns of the nodes, as to maximize the secure spectral efficiency; (3) study the inter-relation and the integration of physical-layer and cryptographic security schemes; and (4) apply the CSNC scheme to communication scenarios, such as the Connected Vehicles and Mobile IoT. Broader Impacts:

In Technology: As it is envisioned that future mobile networks will rely on cooperation among network nodes, the CSSC scheme can fundamentally change future generations of wireless systems. We anticipate that the results of our study will open new research opportunities in the field of CSSC communications. Education: The PI proposes to develop a series of undergraduate- and graduate-level courses on CSSC-related technologies. The proposed research of this project will become the building blocks of such a course, allowing students to participate in the research goals of this proposal.

In Result Dissemination: The PI will engage in aggressive technology-transfer efforts to local industrial partners. In addition to the usual result dissemination route, the PI also plan on starting a series of workshops on the topic of CSSC. The innovative aspect of the proposed series of workshops is the mixed participation of academic and industrial representatives.

In Outreach: The PI will engage K-12 STEM teachers in the Research Experiences for Teachers (RET) program and other outreach activities to increase awareness and appreciation of the interdependence of science and technology in developing solutions for timely research problems and future applications.

science and technology in developing solutions for timely research problems and future applications.

In Broadening Participation: The PI will actively seek and encourage participation of underrepresented minorities and women in the research on this proposal.







Number 4: "It wasn't clear ..."

Symptoms:

- Long-winded explanations
- Too many superfluous details
- Poor organization of thoughts into words

Remedies:

- Use fewer words
- Read first two pages aloud
- "Make every word tell"



Number 3: Lackluster Education Plan

- Should be integrated with research plan
- Think beyond your present teaching duties



Number 2: Confining yourself to your PhD work

- CAREER proposal should be forward-looking
- Move above and beyond your PhD work
- "Imagine a world ..."





(no)

Number 1: Research Plan lacking Cohesion

Don't staple together unrelated ideas



Don't offer a laundry list with no prioritization



 Don't make everything look like a nail to your one hammer



Tell a story with your narrative

Questions?

