

# Call for Proposals

## Computer Science / Information Systems Mini-Grants 2017/2018

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### **KENET's Mini-Grants Overview**

Kenya Education Network (KENET - <https://www.kenet.or.ke/>) has as one of its mandates, the role of catalyzing collaboration in research and education among member universities and research institutions. KENET promotes collaboration through facilitation of Special Interest Groups (SIGs - <http://sig.kenet.or.ke/>) in priority academic areas, discovery of active researchers/faculty, provision of research and education mini-grants to researchers and member institutions, as well as travel grants for faculty and/or graduate students in SIG areas.

This Call for Proposals for Computer Science/Information Systems mini-grants is intended to promote early stage CS/IS research and development in current and emerging research areas, as well as strengthen the CS/IS SIG. The mini-grants target early stage research, enabling researchers to undertake proof-of-concept work to support Research and Design (R&D) ideas and concepts. It is envisioned that the mini-grants, which are ideally targeted at junior faculty, will position recipient researchers in good footing to further their research and expertise in these areas, and subsequently attract more research funding.

Through this mini-grant round of funding, KENET hopes to not only support individual research teams, but to facilitate institutional collaboration and formation of communities of practice in the research areas of focus, leading to enhanced research capacity in member institutions.

### **CS Mini-Grants: Areas of Focus**

The research areas of focus for this round of mini-grant funding are:

- i. **Distributed Ledger Technologies** (DLTs) and
- ii. **Big Data Analytics** (BDA).

These two areas are emerging as game changers in the digital era, and have the promise of substantially disrupting current practices in diverse domains of application, yielding high transformational impact. It is therefore important for researchers to develop expertise in these fields and provide knowledge and leadership in the utilization of these technologies in the local context.

## CS Mini-Grants: Structure, Technical Overview and Schedule

### Mini-Grants Structure

1. Two (2) mini-grants will be awarded per research area of focus. A total of four (4) mini-grants will be awarded for the 2017/2018 round of funding.
2. Each mini-grant will be for a maximum of 15,000 USD.
3. The grant period is 12 months.

### Areas of Focus: Technical Overview

#### 1. Distributed Ledger Technologies (DLTs)

A distributed ledger is a type of database that is shared, replicated, and synchronized among the members of a network, and where updates to the ledger records are governed and agreed upon by members on consensus. Further, every record in the distributed ledger has a timestamp and a unique cryptographic signature, enhancing the security and auditability of all transactions in the network.

Distributed Ledger Technology (DLT) refers to the protocols and supporting infrastructure that enables implementation of distributed ledgers by allowing for networked computers in different locations to propose and validate transactions and update replicated records in a synchronized way on a peer-to-peer basis. Typically, these transactions are undertaken even in the absence of a centralized, third-party intermediary.

DLTs, by design, provide decentralized, real-time, immutable and almost tamper-proof mechanisms for enabling, storing and securing nearly any type of data-based transaction or process. These ground-breaking properties of DLTs make them attractive for applications that require communication, efficiency, security, reliability and transparency.

Most blockchain and DLT applications to date have been primarily in the financial sector, with cryptocurrencies being one of the more mature application areas. However, the disruptive potential of DLTs in other domains is huge, with new application areas being tested in different sectors. This call seeks to support research and development in the application of DLTs to some of the most pressing development challenges relevant to Kenya and other developing world contexts. Application areas of interest include but are not limited to: agriculture, e-government, financial infrastructure, health care and supply chain management. We are looking to support applications of DLTs that have the potential to disrupt current practices and enhance efficiency, transparency and trust, and that have a potential to scale and achieve a transformative impact in the selected domain of application. Further, research into the best configurations of DLT for various types of applications is necessary, to ensure enhanced utility of developed applications, rather than defaulting to the standard configurations e.g. blockchain approach.

Issues/areas to consider when preparing your concept note:

1. Justify the selected application/domain area - why is this an important area for DLT application? What are the social/economic/legal implications of the proposed application?

2. Justify the use of DLT in comparison to other approaches, technologies or platforms that have been used or could be used for this application. Why DLT? What underlying transactional/infrastructural problems are being addressed by using DLT?
3. Provide an overview conceptual design of the proposed application, describing the parties involved, the ledger (type of ledger e.g. public or private, types of permissions etc., what type of data is stored on the ledger, how this data is checked and authenticated and by whom, functionalities if any that are stored on the ledger etc.), social/legal issues to be addressed for this application to be mainstreamed into the existing/current environment etc.
4. Describe a proposed business model and scaling strategy that could be explored when scaling this technology.

## 2. Big Data Analytics (BDA)

Despite numerous definitions of big data, there is general consensus that the term refers to huge volumes of highly variable data that are generated at very high velocities. This data varies not only based on data types, but also structure, yielding classifications such as structured, semi-structured and unstructured. With an increasingly digital and connected world, big data is coming from diverse sources including transactional applications, web and social media, sensors from the growing IoT networks, devices, video/audio, networks, log files etc., with most of it being generated in real time and at a very large scale. It is these three *V's* (volume, variety and velocity) that are key characteristics of big data, and which in turn pose great technical, algorithmic and infrastructural challenges when attempting to capture, store, process and analyze this data.

It is estimated that today, over 90% of available knowledge is 'hidden' in the volumes of highly variable, unstructured data. Thus, to make sense of today's world and keep up with the information load that has pervaded all aspects of life, it is imperative to have the capability to manage, process and analyze not just structured data, but also the huge volumes of unstructured data as it is being generated, with a view to uncovering the underlying facts, information and knowledge, and subsequently availing these for decision-making. Capturing, managing, processing and analyzing big data – big data analytics - therefore cannot rely simply on methods, techniques and infrastructure that have been devised to handle limited sets of structured data, like that contained in relational databases.

Locally, there has been an increase of big data from various sources such as telecommunication companies, the health sector, CCTV installations, web and social media, the retail sector etc., but there is hardly any effort to process and analyze this data. With this call, we seek to support research that unlocks the potential of big data analytics across various application domains in the local environment. Given the complexity and multi-dimensional aspects of big data analytics, we are interested in research and development work in the following two broad areas:

1. Design and development of generic platforms and tools that can be used modularly by other third-party applications, covering, though not limited to, the following aspects:
  - a. Capture/ingestion, storage and retrieval of huge volumes of structured and unstructured multimedia data, ensuring that efficiency, speed, security and scalability requirements are considered. This should also cover aspects of data deduplication, versioning and cataloguing, as well as infrastructural issues.

- b. Data-type specific pre-processing tools and appropriate (artificial intelligence) methodologies and techniques for user-led meaning/insight retrieval from data. Here, we are interested in image, video, audio or textual data, taking into account local language requirements. Further, reporting and visualization should be addressed.
2. End-to-end applications of big data analytics in a specific domain for a specific purpose. Unlike 1) above, this will focus on fully functional applications that deliver insights from data, impacting down-stream actions and decisions.

It is envisaged that the outputs from this area of focus will open up wider adoption and integration of big data analytics in the local context, by addressing the key barriers to adoption – infrastructure, big data management and big data analytics.

**Schedule:**

Following is the mini-grant’s call timeline.

**Table1: Mini Grants Call timeline**

Activity	Dates
Call for proposals open for submissions	16 <sup>th</sup> March 2018 to 27 <sup>th</sup> April 2018
Review and evaluation of received proposals	30 <sup>th</sup> April 2018 to 4 <sup>th</sup> May 2018
Face-to-face presentations of shortlisted applicants	7 <sup>th</sup> May 2018
Finalists announced and mini-grants awarded	8 <sup>th</sup> May 2018
Grantees on-boarding	9 <sup>th</sup> – 13 <sup>th</sup> May 2018
Implementation period	14 <sup>th</sup> May 2018 – 13 <sup>th</sup> May 2019
Evaluation, reporting and close-out	14 <sup>th</sup> May 2019 – 31 <sup>st</sup> May 2019

**CS Mini-Grants: Eligibility, Terms and Conditions**

**Eligibility**

This call is open to computer science or information systems faculty (who are full-time) at any of the KENET member institutions. Applicants must be PhD holders, and must demonstrate active research interest.

**Team Composition**

The lead researcher(s) must be a PhD holder meeting the eligibility criteria above. The lead researcher is at liberty to incorporate other researchers into the team as needed. If other members are incorporated into the team, then the roles and extent of involvement of these team members must be clearly spelt out. A Letter of Commitment from each Team Member with support from respective Heads of Department

or Deans, must be included as part of the team's submission documents. In this letter, each organization or individual must submit in writing, their commitment to participate in project activities, specifying their exact role in the project. Teams with multidisciplinary backgrounds are encouraged. The lead researcher will serve as the team leader and the primary point of contact for the team on all matters related to implementation of the grant.

### **Student Involvement**

One of the main objectives of this mini-grant is to develop expertise and build capacity in the areas of focus, and to grow a community of practitioners. To this end, it is important for faculty to work closely with students with a view to furthering their knowledge and capacities in the various technologies and issues of interest, in the areas of focus. Incorporating students as team members as well as designing student-level projects from the research activities to be undertaken is encouraged.

### **Collaboration and partnerships**

To enhance research uptake and utilization, it is important for researchers to identify and seek out collaborations and partnerships with strategic persons and institutions. This not only opens up pathways for moving research from the lab to the society, but also enhances visibility of researchers and their institutions, attracting even more funding and opportunities to further their research agenda. Given the identified areas of focus, it will be imperative for teams to identify strategic partnerships and collaborations with a view to modelling and planning for prototyping, testing and scaling at later stages in the research cycle.

### **Intellectual Property**

Intellectual property derived from the funded R&D activities will be appropriated and protected based on the lead researcher's institution's IP policy and procedures.

### **Post-Award Requirements**

The successful grantees will be expected to:

1. Provide quarterly progress reports to the CS research associate at KENET
2. Participate and present project work at selected meet-ups organized by KENET
3. Grow a community of researchers in the area, by reaching out to other local researchers working in the area and other related multidisciplinary domains
4. Actively seek post mini-grant funding to further their research work by writing (joint) funding proposals
5. Prepare a final project report at the end of the grant period and submit to KENET. Prepare an abridged version of the project report for profiling on KENET's and institutional websites.
6. Publish paper(s) on their work in reputable journals.

## **CS Mini-Grants: Proposal Submission**

### **Concept Note Format**

1. The concept note should not exceed 6 pages (12pt, single spacing, excluding appendices)
2. The concept note should be submitted in PDF format
3. The research area should be clearly indicated in the title page i.e. DLT or Big Data Analytics
4. No personal identification (names) or institutional affiliation should be included in the concept note.

### Concept Note structure

The concept note should have the following structure:

1. Title
2. Problem definition and justification
3. Proposed solution and justification
4. Methodology
5. Resources (human, hardware, software etc.)
6. Work plan (not exceeding 12 months in duration)
7. Detailed Budget (not exceeding 15,000 USD)
8. Appendices

### Supporting Documents

The following documents should be included as part of the concept note submission:

1. Team profile document, indicating the names, institutional affiliation and brief biographies of the lead researcher(s). Details of other team members and any collaborating institutions should also be included in the team profile.
2. CVs of the lead researcher(s), clearly profiling research activities undertaken to date as well as relevant publications.
3. Letters of Commitment from team members and any collaborating institutions.

### Concept Note submission

Concept notes with all supporting documentation should be done through the online submission portal <https://www.kenet.or.ke/eform/submit/call-for-proposals-computer-scie> by **27<sup>th</sup> April 2018, 5.00PM EAT**.

### Enquiries and applicant support

All enquiries and requests for further information related to this call should be addressed to [grantsadmin@kenet.or.ke](mailto:grantsadmin@kenet.or.ke).

### CS Mini-Grants: Proposal Evaluation

1. KENET will constitute a review panel of leading CS/IS experts. Members of the review panel will sign Non-Disclosure Agreements, as well as statements acknowledging that they will make no claim to the intellectual property developed by the grantees.
2. The reviewers will review all received applications as per the evaluation criteria provided in Table 2 below, and select the top 3 proposals for each area of focus.
3. The top three (3) finalists in each area will be invited for a final face-to-face presentation. During the oral presentations, the applicants will respond to and clarify any questions from the panel that will have arisen out of their written submissions. They will also be required to respond to any ad-hoc questions arising from the oral presentation.
4. After the oral presentations, the reviewers will make their final decisions on which two proposals will receive the mini-grant, per area of focus. Four (4) teams will be selected from four different universities.
5. Selected grantees will be notified formally and profiled on KENET's website.

**Table 2: Evaluation Criteria**

<b>Evaluation Criteria</b>	<b>Evaluation Aspects</b>	<b>Weighted Score</b>
Relevance and justification of proposed research topic	Is the proposed topic and preferred solution aligned with Kenya's Big 4 agenda, Vision 2030 or SDGs? Is it an important problem to solve in a developing world context? Is there sufficient research uptake and utilization potential for the proposed research outputs?	10%
Technical Approach and Methodology	Is the research concept innovative and effective compared to existing alternatives? Does it have the potential to disrupt current practices and approaches? Does it have transformative potential? Is it feasible? Is it viable? Is it sustainable? Is the proposed implementation methodology technically sound, adheres to best practice and appropriate for the local context? Has it been optimized for efficiency? Is the proposed work doable given the time and budgetary constraints of the mini-grant, considering the team's composition?	35%
Viability assessment and Scaling potential	Is Scale built into the solution? Can it be replicated in similar contexts? Is the solution viable given the operational context? Is there scope for furthering the research idea/prototype? Is there scope for future external research funding in order to scale-up the research?	20%
Human capacity	Does the team have the required expertise, experience and necessary contacts to deliver? Do they have a local footprint?	10%
Awareness of and strategies to address/comply with policy and regulatory requirements	Does the team demonstrate sufficient actionable knowledge on the policy and regulatory environment that could impede or catapult utilization of research outputs? Have appropriate strategies to address policy or regulatory impediments been considered and/or designed?	5%
Student engagement	Are there concrete roles and responsibilities for student team members? Are there clearly defined student-level project ideas?	10%
Stakeholder buy-in	Have critical partnerships in the main domain of application been identified? Is there likelihood for collaboration during and after the grant period? Does lack of partnerships severely impede the research work during the grant period?	5%
Potential for publication in refereed journals and/or conferences	Are the results likely to be published in IEEE or equivalent journals / conferences that are indexed in Elsevier Scopus database?	5%