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# Decision on submission to Computer Standards & Interfaces

**Computer Standards & Interfaces** <em@editorialmanager.com> 15 juillet 2024 à 08:34
Répondre à : Computer Standards & Interfaces <support@elsevier.com>
À : Abdelhakim Baouya <baouya.abdelhakim@gmail.com>

Manuscript Number: **CSI-D-24-00227**

Verification and Simulation: Detection and Mitigation of Clock Deviation

Dear Associate Professor Baouya,

Thank you for submitting your manuscript to Computer Standards & Interfaces.

I have completed my evaluation of your manuscript. The reviewers recommend reconsideration of your manuscript following minor revision and modification. I invite you to resubmit your manuscript after addressing the comments below. Please resubmit your revised manuscript by **Aug 05, 2024**.

When revising your manuscript, please consider all issues mentioned in the reviewers' comments carefully: please outline every change made in response to their comments and provide suitable rebuttals for any comments not addressed. Please note that your revised submission may need to be re-reviewed.

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Computer Standards & Interfaces values your contribution and I look forward to receiving your revised manuscript.

Kind regards,

Ricardo Colomo-Palacios
Editor-in-Chief

and Corresponding Editor
Dr. Andrea Apicella
Computer Standards & Interfaces

Editor and Reviewer comments:

Reviewer #1: This paper, titled "Verification and Simulation: Detection and Mitigation of Clock Deviation," reports a simulation-based verification of a simple system in which clock deviation may be observed.
The target system is made, and events are generated by using OMNet++ simulator.
In addition, two probabilitic models: direct generation and the model based on the events generated by OMNet++, are generated by using PRISM. Four propertis related to clock deviation are shown, and proved by a probabilistic decision tree method.

A program verification package based on a formal methodin is now commonly used. The size of the targets of verification is growing to that of real-world programs. This paper is classified as a case study along this line. This is highly evaluated.

Using a probabilistic model may cause
There are some points to be clarified before publication.
I would like to evaluate this paper from two points.
(1) Size and complexity of a verification target.
If FiGO itself is complicated enough, applying it to only two entities drastically reduces the complexity. It is no longer "gossip."
As the second point, a given gateway is used for synchronization. This does not resolve the problem of synchronization. It does not seem that the communication lag is not considered.
Furthermore, the chances of clock deviation is estimated low. More general considerations are mandatory.

(2) the list of properties given in this paper in terms of appropriateness to express the clock deviation.
Actually, as the authors admit, property 1 depends on the liveness, or fairness in scheduling. Usually, fairness is expressed in a form of formula, and the property "scheduling is fair --> property 1 is satisfied."
Property 2 in a natural language is not of the form "property." That in the form of formula makes sense, however, it is not clear if "Desynchronized" is an atomic property or can be broken down.
Property 4 lacks some fundamental assumption. In general, the property that clock deviation is within a given range is never trivial. Some assumptions are necessary, but they are not explained. This property is not for clock deviation, but just used for justification of the target program.
Generally, clock deviation is dependent on its environment, which means that both positive and negative directions must be considered. It is dubious that the authors have considered these cases.

I also admit the effectiveness of probabilistic model checking for events generated by a simulator in terms of efficiency, but the authors must also note that it is not a verification in its most rigid meaning. The gap must be discussed and reflected in the paper.

Overall, the authors must reconsider the problem setting in terms of the size and complexity. Properties must be also reconsidered so that appropriate assumptions are expressed in the properties.

Reviewer #2: In this work authors proposed an approach to model, analyze and verify clock deviations due to changings in the environmental conditions. The approach exploits the OMNeT++ simulation framework to model the studied system and to derive a Probabilistic Decision Tree (PDT) which is then interpreted and verified through the PRISM language. The proposed approach has been applied to a multi-crane scenario in which a set of drones is helping to coordinate the cranes during the joint lifting of a payload.

The paper is well-written and the overall approach seems sound, however the motivational aspects and the discussion about related works must be improved. In addition, some introductive aspects are missing or provided in a later stage, making the paper somehow difficult to read.

Here some specific comments:

The introduction provided in Sec.1 must be extended. The motivational aspects of this work are not clear, why is detecting clock inaccuracies so important? What kind of errors could it generate? In this section, authors also provided a brief state-of-the-art on formal methods, but this is difficult to understand as the role of formal methods within the proposed approach has not been yet introduced.

Still in Sec.1 the proposed case study has not been introduced nor motivated. Why are you studying clock deviation in this scenario? Why is it a relevant example for your approach? I think that the paper would benefit from a brief description/motivation of the case study at this stage, also because the sentence "cranes in a drone system" is not sufficient to summarize the application.

The literature review provided in Sec.2 and Sec.7 is not sufficient. Authors mostly list background approaches and methodologies but there is no motivation nor references to similar works. Authors must provide a discussion/ comparison about/against similar works and some motivational insights related the proposed approach. I also suggest to move Sec.7 after the introduction and to merge it with Sec.2 in order to improve the paper readability.

The FiGo protocol described in Sec.4 has never been introduced previously, but this is odd as it seems to me that the proposed framework is designed specifically to validate such algorithm. Authors must introduce FiGo at an early stage and motivate why they decided to focus on this algorithm among others. In addition, I think that a discussion about if or how the proposed approach can be used to model different synchronization algorithms can improve the impact of the paper.

Description of case study is not clear. Why do cranes need drones for lifting instead of simple position sensors? Why does this operation need clock synchronization instead of a simple synchronization protocol? Also in this case some comments about motivational aspects are needed.

Here some minor comments:

In Sec.1 the sentence "our contribution can be summarized as follows threefold" seems wrong as there are 4 items listed.

Achronyms (such as PA and PDT) are defined several times in the text. Please define them just the first time, then use the abbreviation only.

In Sec.2 perhaps it would be better to explain the PRISM Language before to define the automat since some concepts such as communication and synchronization are explained here.

The text from Fig.3 and 4 is too small and difficult to read.

There are 2 references to Alg.1 in the paper.

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