Review Form
Please rate the following (5 = excellent, 1 = poor)

Relevance to the REoCAS track:
5

Scientific contribution of the paper:
4

Structure of the paper:
4

Standard of English:
4

Appropriateness of the abstract as description of the paper:
5

Discussion and conclusions:
3

Reference list, adequate and correct citations:
3

Overall evaluation:
4

Specific reviewer comments and recommendations for Improvements (to be passed to the author/s anonymously. Please expand on any weak areas in the above list and offer specific advice as to how the author(s) may improve the paper):

The paper considers the problem of consensus in populations which include a subset of "disruptive" individuals.
In particular the considered disruptive individuals are either: "zealots" that never change their decision when interacting with other individuals; or "contrarians", that always take the opposite choice when they interact with another individual.
The authors give (parametric) formal definitions of "stable consensus" and "switching consensus" as BLTL (Bounded LTL) formulas, and exploit model-checking tools (PlasmaLab, PRIM) to study such properties on various kinds of populations.
The checked populations include populations with varying numbers of zealots, contrarians, and mixes thereof.
Finally, the authors also study other two properties: the expected time t to reach consensus and the expected time h consensus is held, again on various kinds of populations.

The paper addresses an interesting topic for the REoCAS community, and is (mostly) well written and organized.
The main points I would like to be expanded/clarified are the following:

- although interesting, the studied models are quite simplistic; could you provide more insight in how they could be used (or expanded?) to improve the design and performance of a swarm of robots or another practical CAS?

We have listed at the end of the paper how we want to extend our analysis for more complex scenarios, e.g. with more problem parameters, decision difficulties, etc.

- how does your work compare with techniques developed in distributed systems to mitigate Byzantine attacks?

Thanks for pointing this out! We have included a paragraph about Byzantine attacks in the related work sections. We explain that there are similarities between both scenarios (reach a consensus, agents showing a different behaviour than specified), but also significant differences (more stochastic or deterministic way of dealing with disruptive agents, more internal processes in Byzantine agents).

Moreover, I have the following additional points I would like to be addressed:
- p.3 top: can you explain in 1-2 lines what the info provided by mean-field analysis would be?

We have added 3 sentences to explain mean-field analysis and its limitations in the related work section. We say that mean-field analysis approximated the influence of all components on any given component of a large system, possibly leading to inaccuracies.
- sec 2.1, 2nd par: "can choose between to" --> "can choose between two"

Corrected, thanks.
- sec 3.1, 1st par: since there are "an equal amount of zealots for each opinion, ZX = ZY", doesn't this explain why, with large numbers of zealots, consensus can't be reached?

True, this explains why consensus cannot be reached for more than 90 zealots in a system of 100 individuals and distance parameter d=10. However, as you can see in Fig. 4(a), consensus cannot be reached for just Z=50 zealots (Z=Zx+Zy, Zx=Zy=25). We added a short statement about this in section 3.1.
- p.8 top: "More concretely, the system robust" --> "More concretely, the system is robust"

Thanks!
- p.8 above Fig.4: you say "the consensus curve is most sensitive to varying the majority threshold and reaching time", but no reaching time is shown in 4(b)

We have added a sentence to clarify that this sensitivity can be seen in Figure 4(a) and was the reason for the chosen parameters in Figure 4(b).
- Fig.5 caption: "varying number of zealots" --> "varying number of contrarians"

Corrected, thanks.
- p.10 above Fig.6: "40 zealots zealots" --> "40 zealots"

Thanks.
- p.11 top: why use another tool (PRISM) for this analysis? please explain moreover, pls explain "adding reward 1 to a state of majority (for holding time) and its complement (for reaching time)"

We have included a statement explaining that we got more precise results with Prism and explained what we did in more detail.
- p.11 top: "in which we queries" --> "in which we query"

Thanks.
- Table 1: why there are many timeouts when the number of disrupting individuals is low?

We have found a mistake in our implementation and re-ran this analysis. The new times are shown in the table in the paper, where we do not see those timeouts anymore. Thanks for pointing that out!

Review 2 - 035 Julia Klein, Tatjana Petrov: Exploring robustness in reaching consensus in robot swarms with disruptive individuals.

Please rate the following (5 = excellent, 1 = poor)

Relevance to the REoCAS track: 5
Scientific contribution of the paper: 3
Structure of the paper: 4
Standard of English: 5
Appropriateness of the abstract as description of the paper: 5
Discussion and conclusions: 3
Reference list, adequate and correct citations: 3

Overall evaluation: 3

Specific reviewer comments and recommendations for Improvements (to be passed to the author/s anonymously. Please expand on any weak areas in the above list and offer specific advice as to how the author(s) may improve the paper):

The paper can be improved in different directions. Authors should expand the related works section which is very short. We have added two paragraphs to the related work section.
BLTL should be better described, at lesst defining the syntax, and similarly, SMC should be explained more in detail. We have included a sentence explaining that the syntax of BLTL is equivalent to LTL, which is a well-known temporal logics language. We have also added another sentence and a included another reference to explain SMC.

The experiments part is well presented and well organized. It would be nice to have a discussion about the model, e.g. how is it manageable this analysis having more than 2 variables? We have extended our discussion about the future work we plan to do, and included a statement about the scalability of our methods wrt. the number of variables.

Table 1 is not very clear. In the text is written “increasing their count causes longer times to reach a majority ” but in the table it seems the opposite. We have found a mistake in our implementation and re-ran the analysis. The new times are shown in the table in the paper and agree now with the intuition of having longer times for more disruptive agents.

General comments from the authors:

We have added Alberto d’Onofrio as co-author of the paper after fruitful discussions and valuable insights into the mathematical foundations of our studied systems.

We have changed the name of one parameter of the second property of switching consensus; instead of holding time h, we call it now switching time s.

We have added further analyses of robustness in different group sizes in section 3.5.