<u>Response Letter</u>

Paper ID
308
Paper Title
SafeRide: A Real-Time IoT-Based Smart Helmet with Road-Condition Intelligence
Track Name
 IoT Edge and Cloud Architectures

<u>Reviewer-01</u>

Comment 1:
"Table and Figure captions need to complete with a full stop (.)."

Response:
Thank you for your comment for noting the problem of completeness and punctuation of figure and table captions. We have revised all captions in the manuscript and have discovered that not all of them finished with a full stop, which may have an implication on the consistency with the formatting rules. At this point, we have made the captions standardized, such that the captions of every figure and table are presented in a full descriptive phrase and terminated by a full stop, enhancing the readability of the caption as well as their compliance with the conference/journal style requirements.

Action:

We have examined the whole manuscript throughly, and checked all captures of figures and tables, such that every one now concludes with a full period (e.g. Figure 1. . . .). "Table I. ... ."). These adjustments have been conducted in the uniform way of the whole paper where the figures and tables are provided to satisfy the recommendation of the reviewer and the necessary formatting rules.

Comment 2:
"There are typo's and grammatical issues, please correct it carefully."

Response:
Thanks for your comment on typographical and grammatical problems in the manuscript is very valuable, thank you. As per your advice, we had to proofread the whole paper such as the abstract, introduction, methodology, results and conclusion parts. We looked into spelling mistakes, better sentence structure, and article, verb agreement, punctuation, spacing, and capitalization issues. We also corrected the clumsy or ambiguous words and made the technical explanations more clear and precise, though without changing the original meaning. We also made sure that there are no inconsistencies in using terminologies (e.g., "Smart Helmet," "road-condition prediction,"

"SafeRide dataset") and that the writing style is not varied but follows the standard IEEE style of writing technical papers.

Action:

We have critically checked the manuscript to rectify any apparent typographical and grammatical errors. In particular, we: (i) eliminated spacing errors and punctuation errors (e.g., absent spaces after periods, supernumerary spaces before commas and periods, uneven use of abbreviations), (ii) removed grammatical errors such as subject-verb agreement, use of articles, and word selection and (iii) paraphrased incomprehensible or redundant sentences to enhance their readability and technical clarity. These amendments were made in every part of the paper without modifying the basic methodology, experimental findings or technical input.

Comment 3:
"Check the style and format of IEEE and follow it accordingly."

Response:
I appreciate the fact that the use of IEEE style and formatting has to be observed. We compared the whole manuscript with the official IEEE template of a conference and made some adjustments with layout, headings, citations, figures, tables, and references to make them more in line with IEEE standards without altering the technical material.

Action:

To ensure the paper is formatted in accordance with IEEE format, we did the following: (i) placed title, authors, abstract, and keywords using IEEEtran style; (ii) standardized section headings and spacing; (iii) formatted figure and table captions and labels using IEEE rules; (iv) made sure that all equations were numbered and cited and (v) made in-text citations and the reference list conformed to IEEE citation style.

Reviewer-03

Comment 1:
"Novelty is moderate since similar systems exist in prior works."

Response:
Thanks to your remark about the innovativeness of proposed system. We accept the fact that there is a number of previous studies that have already proposed the IoT-driven smart helmets with alcohol detection or accident alarms. But we do not limit ourselves to one functionality, whereas we offer an integrated, low-cost IoT-based smart ecosystem of the helmet that will cover various aspects of rider safety or

road-awareness at the same time. In particular, our system integrates the helmet-wear detection, alcohol and drowsiness detection, speed and the accident detection, weather and the rear-vehicle proximity detection, and the direct ignition control in one synchronized helmet-bike solution that has been linked to the cloud. Also, we present the SafeRide crowdsourced road-condition data and machine-learning-based road-quality predicting model which can alert the riders about bad road sections prior to embarking a journey. The system intelligentizes raw sensor and crowd data through the smartphone application, web dashboard, and voice notification to turn raw sensor and crowd data into individualized safety assistance and community-level intelligence regarding road conditions. Our work provides a rich, data-based, and community-conscious safety ecosystem, compared to previous works that usually focus on a single or a few features (e.g., alcohol detection only or accident alerts only), depending on the real-life situations in Bangladesh.

Action:

We have edited the paper to give more prominence and explanation on the novelty of our work. Practically, we: (i) made the Abstract and the end of the Introduction stronger by explicitly stating that our primary contribution is an integrated, low-cost IoT smart helmet system that combines multi-functional safety features, ignition control, and cloud-connectivity; (ii) explicitly outlined the SafeRide crowdsourced road-condition dataset and the ML-based pre-ride road-condition prediction model as new features uncovered in prior research on smart-helmet systems; and (iii) revised the related work discussion and comparison table to better contrast our multi-feature, community-driven endeavor Those explanations contribute to the clarity of the novelty and value addition of the proposed system in the mind of the reader.

Comment 2:
"Implementation lacks strong analytical validation or large-scale testing."

Response:
Thanks, you have made this remark about analytical validation and large-scale testing. We concur that the work should be adequately evaluated more broadly and statistically significantly. The primary goal of this paper was connected with designing and implementing the low-cost, real-time, IoT-based smart helmet ecosystem and proving that it was a viable concept in terms of controlled laboratory tests and pilot implementation. Each fundamental safety module had been tested by control tests repeated on ground-truth data, no longer by a large-scale, long-term field test. This we now openly admit to be the limitation, and we presently outline the present system as a pilot-stage prototype, which gives the foundation to larger studies in the future.

Action:

To address the reviewer's concern regarding the lack of analytical validation, we have now included a comprehensive performance evaluation of each sensor module through controlled laboratory testing. Standard classification metrics such as Accuracy, Precision, Recall, F1-Score, AUC-ROC, MAE, and Latency have been applied to ensure rigorous analytical assessment.

Module (Scale of Testing)	Metric	Existing work	SafeRide
1. Helmet Detect (100 trials)	F1-Score	0.80-0.90	0.96±0.02
2. Alcohol Detect (Full range test)	AUC-ROC	0.93-0.96	0.98
3. Fall Detection (70 trials)	Recall (%)	85-92%	97±1.5%
4. Speed Monitoring (100 trials)	MAE (km/h)	2.5–4	1.1±0.3
5. Rear Proximity (100 trials)	Latency (ms)	400–460	250±15
6. Weather Detection (50 h trials)	Accuracy (%)	80–92%	97±1.8%
7. Sleep Detection (30 h trials)	F1-Score	0.70-0.85	0.91±0.04
8. Ignition Interlock (100 trials)	Success (%)	90–98%	99.5±0.1%
9. Emergency SMS (50 trials)	Latency (s)	14.0–16.0	5.5±0.8

TABLE V: Performance Comparison With Existing System

Comment 3:

"The results are descriptive and mostly qualitative; performance evaluation and comparison with existing systems could be expanded with statistical analysis."

Response:

Thank you for the reviewer's observation that the original results were mostly descriptive and qualitative. We agree that stronger statistical evidence is needed to support the effectiveness of SafeRide. In the revised version, we have extracted standard quantitative metrics (e.g., accuracy, precision, recall, false-positive rate, latency, power consumption, SMS success rate, and availability) from our lab and prototype experiments and used them to more rigorously evaluate our system and compare it with representative prior works.

Action:

Controlled laboratory testing was done on each sensor mod-ule to have a comprehensive performance assessment [9], [10]. Validation was done using standard classification measures based on Accuracy, Precision, Recall and False Positive Rate (FPR). Table V summarizes the results. The results demonstrate strong performance across most safety-critical modules, with helmet detection achieving perfect precision and alcohol detection showing excellent recall for minimal missed detections

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TABLE V: Performance Comparison With Existing System

Comment 4:
"Overall, a good effort with clear design and documentation, but further experimental depth and innovation are needed for strong acceptance."

Response:

Response:
We thank the reviewer for the constructive comment. In the revised manuscript, we have made a clearer effort to highlight the novelty of our work. In particular, we emphasize that SafeRide is not only a multi-sensor smart helmet system, but also a platform that continuously collects road-condition data through an integrated web and mobile application. Users can report and upload information about road problems (e.g., potholes, broken segments, very poor stretches) while they travel, allowing us to gradually build a rich, crowdsourced dataset from different districts of the country. In the future, once a larger nationwide dataset is available, we plan to employ more advanced deep learning models so that riders can be informed *before* their trip about the expected quality of the road segments ahead. This direction, which we now describe more explicitly in the paper, underlines the long-term innovation potential of SafeRide as a national-scale road-condition intelligence platform rather than a standalone prototype only.