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Title	モデル検査におけるゴール指向分析を用いた外部入力値の時系列変化の制約による状態削減手法
Author(s)	乾，道孝
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Description	Supervisor:鈴木　正人，情報科学研究科，博士

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Abstract

We propose methods to apply a technology for behavior verification of embedded systems containing sensors and actuators. As the applied technology in recent years, model checking techniques are used in many cases. On running the model checking, it needs to reduce a state number for the verification because information based on the external environment of sensors and actuators systems is enormous and the information is included as the state. As generally methods to reduce the state number, there are abstraction methods or input limitation methods.

In this paper, we focus on a limitation method that limits a range of the time-series variation of sensor values. To extract the range, we need to focus on these values and to analyze a scenario ("worst case scenario") which the range of the variations is max.

However, it is difficult to extract these values because the values that should be focused are different by properties to verify the model. Also, it is difficult to eliminate contexts that are not needed for extracting the range when analyzing the use case because there are no information about the relationship between the use case and contexts　in general requirement specifications.

To alleviate these problems, we propose EIVP (Extraction method of Input Values related to a verification Property) which use existed goal-oriented analysis and GWEU (Goal-oriented analysis of the Worst case scenario with Eliminating Unnecessary contexts).
Also, we determined the feasibility of our method by performing case studies.

By the results of our research, the occurrence probability of state explosion can be reduced in comparison with the conventional, against the design verification for systems based on sensor and actuator.
Also, the results contribute as an effective means to ensure the reliability of the software system.

Key words:　model-checking, goal-oriented analysis, embedded systems, contexts, time-series variation.