Claims:

1. An industrial process model generation system, comprising:

- an input unit; and
- a processing unit;

wherein, the input unit is configured to receive a plurality of input value trajectories comprising real input data and/or simulated input data relating to an industrial process, and wherein the input value trajectories are used to control the industrial process in a number of simulation runs to generate an initial training data set;

wherein, the processing unit is configured to implement a simulator of the industrial process;

wherein, the processing unit is configured to implement a machine learning algorithm that models the industrial process;

wherein, the processing unit is configured to train the machine learning algorithm comprising utilization of the initial training data set;

wherein, the processing unit is configured to utilize the simulator to generate a plurality of industrial process behavioural data, wherein industrial process behavioural data is generated for at least some of the plurality of input value trajectories, wherein the processing unit is configured to select the at least some of the plurality of input value trajectories, wherein the selection of the at least some of the plurality of input value trajectories comprises utilization of a determined sensitivity of the machine learning algorithm to at least a portion of the plurality of behavioural data, and wherein the industrial process behavioural data comprises one or more of: process data, actuator data, and setpoints;

wherein the processing unit is configured to train the machine learning algorithm in a stepwise process comprising:

as part of the stepwise process the processing unit is configured to process a first behavioural data of the plurality of behavioural data with the machine learning algorithm to determine a first modelled result;

as part of the stepwise process the processing unit is configured to determine to train or not to train the machine learning algorithm

using the first behavioural data, the determination comprising a comparison of the first modelled result with a performance condition;

as part of the stepwise process the processing unit is configured to process a second behavioural data of the plurality of behavioural data with the machine learning algorithm to determine a second modelled result;

as part of the stepwise process after the determination to train or not to train the machine learning algorithm using the first behavioural data, the processing unit is configured to determine to train or not to train the machine learning algorithm using the second behavioural data, the determination comprising a comparison of the second modelled result with the performance condition; and

as part of the stepwise process the processing unit is configured to continue to train the machine learning algorithm with behavioural data and associated modelled results until the machine learning algorithm has not been significantly changed in the last step of training, and wherein when the training has stopped a final trained machine learning algorithm is provided; and

wherein the final trained machine learning algorithm is configured to be fed with new data to perform one or more of: (1) detect process anomalies, (2) detect device failures, (3) predict the future behaviour of the process, and (4) select the best possible next controller output.

2. System according to claim 1, wherein the plurality of input value trajectories comprises one or more of: process data; temperature data; pressure data; flow data; level data; voltage data; current data; power data; actuator data; valve data; sensor data; controller data.

3. System according to any of claims 1-2, wherein the determination to train or not to train the machine learning algorithm using the first behavioural data, comprises a determination of a sensitivity of the trained machine learning algorithm to at least a portion of the plurality of behavioural data.

4. System according to any of claims 1-3, wherein the determination to train or not to train the machine learning algorithm using the

second behavioural data, comprises a determination of the sensitivity of the trained machine learning algorithm to at least a portion of the plurality of behavioural data.

5. System according to any of claims 1-4, wherein the determination to further train or not to further train the machine learning algorithm using the second behavioural data, comprises a determination of the sensitivity of the trained machine learning algorithm to at least a portion of the plurality of behavioural data.

6. System according to any of claims 4-5, wherein the determination of the sensitivity of the trained machine learning algorithm to at least a portion of the plurality of behavioural data comprises an analysis of a loss function of the trained machine learning algorithm with respect to at least the portion of the plurality of behavioural data.

7. System according to any of claims 1-6, wherein the processing unit is configured to determine to stop training of the machine learning algorithm, the determination comprising a determination of a sensitivity of the trained machine learning algorithm to at least a portion of the plurality of behavioural data.

8. An industrial process model generation method, comprising:

receiving a plurality of input value trajectories comprising real input data and/or simulated input data relating to an industrial process, and wherein the input value trajectories are used to control the industrial process in a number of simulation runs to generate an initial training data set;

implementing by a processing unit a simulator of the industrial process;

implementing by the processing unit a machine learning algorithm that models the industrial process,

training by the processing unit the machine learning algorithm comprising utilizing the initial training data set;

generating by the processing unit a plurality of industrial process behavioural data, wherein the industrial process behavioural data is generated for at least some of the plurality of input value trajectories, wherein the processing unit selects the at least some of the plurality of input value trajectories, wherein the selecting of the at least some of the plurality of input value trajectories comprises utilizing a determined sensitivity of the machine learning algorithm to at least a portion of the plurality of behavioural data, and wherein the industrial process behavioural data comprises one or more of: process data, actuator data, and setpoints;

training by the processing unit the machine learning algorithm in a stepwise process comprising:

as part of the stepwise process, processing by the processing unit a first behavioural data of the plurality of behavioural data with the machine learning algorithm to determine a first modelled result;

as part of the stepwise process determining by the processing unit to train or not to train the machine learning algorithm using the first behavioural data, the determination comprising a comparison of the first modelled result with a performance condition;

as part of the stepwise process processing by the processing unit a second behavioural data of the plurality of behavioural data with the machine learning algorithm to determine a second modelled result;

as part of the stepwise process after the determining to train or not to train the machine learning algorithm using the first behavioural data, determining by the processing unit to train or not to train the machine learning algorithm using the second behavioural data ,the determining comprising comparing the second modelled result with the performance condition; and

as part of the stepwise process continuing training by the processing unit the machine learning algorithm with behavioural data and associated modelled results until the machine learning algorithm has not been significantly changed in the last step of training, and wherein when the training has stopped a final trained machine learning algorithm is provided; and

wherein the final trained machine learning algorithm is configured to be fed with new data to perform one or more of: (1) detect

process anomalies, (2) detect device failures, (3) predict the future behaviour of the process, and (4) select the best possible next controller output.