CLAIMS

1. A method for reduction of computational complexity and false alarm rates via a system level detection and isolation algorithm, the method executable by a processor coupled to a non-transitory processor readable medium, the method comprising:

accumulating, by the processor, sensor data from a plurality of sensor utilizing a physics based model containing differential equations that describes components and sub-systems within a complex networked system;

selecting, by the system level detection and isolation algorithm executed by the processor, a sub-set of best sensors to capture effects of each failure mode from a plurality of sensors, each sensor being associated with at least one of the components and the sub-systems within the complex networked system,

wherein the system level detection and isolation algorithm utilizes a diagnostic tree to systematically isolate faults within the complex networked system to provide early diagnosis strategies that prevent unwanted premature replacement of equipment in which the false alarm rates are associated with and to circumvent off-nominal inputs that drive components beyond operating envelopes causing over stressed and cascading failures, the diagnostic tree being constructed using a diagnosis system as a first node while the at least one of the components and sub-systems form sub-nodes at different branches;

defining data classes for each of the components, the data classes including a healthy data class and faulty data class, the data classes enabling a plurality of neural networks to identify a healthy component when associated sensor data includes faulty readings;

training the plurality of neural networks for each subsystem and component within the complex networked system to detect and identify the faults within the sensor data; and

in response of the sub-set of best sensors being selected and the plurality of neural networks being trained for each subsystem and component, executing the system level detection and isolation algorithm to detect and isolate the faults within the sensor data by:

outputting, by each of the plurality of neural networks, a value to indicate a data class of a portion of the sensor data corresponding to that neural network; and

if a fault is indicated by the value, passing down the diagnostic tree the portion of the sensor data corresponding to that neural network until at least one component within the complex networked system is isolated,

wherein if two or more components are isolated within the complex networked system, then a component associated with a neural network that outputs a value closest to one is identified,

wherein the healthy data class of the data classes comprises data sets based on when a component under consideration is healthy while another component within the complex networked system is faulty,

wherein the faulty class of the data classes comprises a data set generated from a condition that a component under consideration is faulty while all other components within the complex networked system are healthy.

2. A computer program product, the computer program product comprising a computer readable storage medium having program instructions for reduction of computational complexity and false alarm rates via a system level detection and isolation algorithm embodied therewith, the program instructions executable by a processor to cause the processor to perform:

accumulating sensor data from a plurality of sensor utilizing a physics based model containing differential equations that describe components and sub-systems within a complex networked system;

selecting, by utilizing the system level detection and isolation algorithm, a sub-set of best sensors to capture effects of each failure mode from a plurality of sensors, each sensor being associated with at least one of the components and the sub-systems within the complex networked system,

wherein the system level detection and isolation algorithm utilizes a diagnostic tree to systematically isolate faults within the complex networked system to provide early diagnosis strategies that prevent unwanted premature replacement of equipment in which the false alarm rates are associated with and to circumvent off-nominal inputs that drive components beyond operating envelopes causing over stressed and cascading failures, the diagnostic tree being constructed using a diagnosis system as a first node while the at least one of the components and the sub-systems form sub-nodes at different branches;

defining data classes for each of the components, the data classes including a healthy data class and faulty data class, the data classes enabling a plurality of neural networks to identify a healthy component when associated sensor data includes faulty readings;

training the plurality of neural networks for each subsystem and component within the complex networked system to detect and identify the faults within the sensor data; and

in response to the sub-set of best sensors beings selected and the plurality of neural networks being trained for each subsystem and component, executing the system level detection and isolation algorithm to detect and isolate the faults within the sensor data by:

outputting, by each of the plurality of neural networks, a value to indicate a data class of a portion of the sensor data corresponding to that neural network; and

if a fault is indicated by the value, passing down the diagnostic tree the portion of the sensor data corresponding to that neural network until at least one component within the complex networked system is isolated,

wherein if two or more components are isolated within the complex networked system, then a component associated with a neural network that outputs a value closest to one is identified.