

Claims:

1. A proxy interpreter system controlling a legacy machine using artificial intelligence connected to ~~the a~~ PC control system, the proxy interpreter system comprising:

5 a server, communicatively coupled to a PC control system through multiple channels such as inputs and outputs, which operates the legacy machine, receives and sends operating commands through hardware interfaces such as Ethernet, USB...etc, teaching sequences and ~~the~~ respective responses with reference to ~~the~~ an image displayed on the a display terminal; said operating commands being
 10 with respect to the image; and
a Reinforcement learning module arranged to
learn and store the operating commands and sequences as part of a process
triggered by an operator when setting up and configuring the legacy machine; and
create an operating flow for the operating commands related to a process, such
 15 that the proxy interpreter can operate the legacy equipment with no human
intervention.

2. The proxy interpreter system according to claim 1, wherein the ~~external~~ hardware interfaces include, the Input/Output ports, USB ports, Ethernet port, VGA port, Mouse, Keyboard and Display interface, to operate the legacy system through the PC control system, and are utilised to learn & create ~~the~~ domain knowledge required to
 20 operate the legacy system.

3. The proxy interpreter system according to claim 2, wherein the proxy interpreter may reside as a software module within the PC control system that is controlling the

legacy system and utilise its interfaces to learn and create the Domain knowledge required to operate the legacy system.

4. The proxy interpreter system according to claim 2, wherein the proxy interpreter accumulates the domain knowledge from interactions with the legacy system through commands and responses monitored through the various interfaces for all operating states of the legacy system.

5. The proxy interpreter system according to claim 4, wherein the commands and responses stored in a recipe file for a specific device type, are acquired from ~~the~~ keyboard commands and mouse movements made by ~~the~~ a human operator with reference to the image on the display, combined with the relevant responses received on the Ethernet and I/O interface from the legacy system to the proxy interpreter to create the Domain knowledge for the legacy system.

6. The proxy interpreter system of claim 4, wherein the Domain knowledge created through ~~the~~ an application of deep learning techniques and continuous reinforced learning, is subsequently utilised to operate the legacy system without ~~the~~ an intervention of a human operator.

~~7. A method of training the proxy interpreter system to build an Artificial intelligence module through deep learning modules, used to select actions to be performed by interacting with the legacy system and by receiving observations of the operating sequence and states of the system, wherein the method comprises:~~

- ~~obtaining a set of activities triggered from the legacy system interactive environment, with each activity comprising a process characterizing a set of events and a related command or set of commands in response to the activity;~~

building domain knowledge through reinforcement learning of the multiple operating states of the legacy system, using a Double Deep Q Network implementation to create a set of recipe file with various parameters for a specific device type;

5 processing the observations and their related actions during the legacy system setup and operation and implementing a method of of rewards and penalty for positive and negative behaviour to arrive at an optimum behavioral model to operate the legacy system effectively;

10 creating a confidence vector for every single action, for use as a filter to prevent a response by the action classifier for selected irrelevant operating states of the legacy system;

Constantly reviewing and updating the Advantage stream of the Reinforcement Learning module by implementing the concept of “Duelling Double Deep Q network”

15 8. The method of claim 6, wherein the Duelling Double Deep Q network is implemented through two streams comprising:
a **VALUE** stream for learning the common Q value (quality) of each operating state of machine and an **ADVANTAGE** stream for learning the corresponding action for a given state of the machine.

20 9. The method of claim 6, wherein the **ADVANTAGE** stream is regularly updated through an experience buffer to aid in quality improvement and fine tuning the quality value for a given machine state.

10. The method of claim 6, wherein the Deep learning model to enhance the quality of defect inspection on object surfaces comprises:

a frozen model generated and constantly updated through using an object detection model by assigning a confidence vector to ensure no action is taken by the **ACTION CLASSIFIER** for any irrelevant state of the machine.

a custom built **LSTM** (Long short term memory) model to distinguish between similar images in different states of the machine.

a set of feature maps using a modified **YOLO (You only look once)** and a modified **CTPN (Connectionist Text Proposal Network)** for the image and text respectively.

11. The method of claim 9, wherein the reinforcement learning model implemented on the images and text information is derived from the display screen and any action taken or communicated to the legacy system is streamed through the proxy interpreter.

12. The method of claim 10, wherein the Domain knowledge created within the proxy interpreter for all operating states of the legacy system, is subsequently utilised by the proxy interpreter to automatically operate the legacy system without the intervention of a human operator.