Claims

1. A robotic control platform, comprising:

one or more sensors;

a mechanical robotic structure including one or more end effectors, and one or more robotic arms;

an electronic library database, communicatively coupled to the mechanical robotic structure, of minimanipulations, each minimanipulation including a sequence of operations to achieve a predefined functional result, each operation comprising a sensing operation or a parameterized operation;

a robotic planning module, communicatively coupled to the one or more sensors, the mechanical robotic structure and the electronic library database, configured for real-time planning and adjustment based at least in part on the sensor data received from the one or more sensors in an electronic multi-stage process file, the electronic multi-stage process recipe file including a sequence of minimanipulations and associated timing data;

a robotic interpreter module, communicatively coupled to the mechanical robotic structure and the electronic library database, configured for reading the minimanipulation steps from the minimanipulation library and converting to a machine code; and

a robotic execution module, communicatively coupled to the mechanical robotic structure and the electronic library database, configured for executing the minimanipulation steps by the robotic platform to accomplish a functional result associated with the minimanipulation steps.

2. The robotic control platform of claim 1, wherein each minimanipulation includes of a set of preconditions necessary to execute correctly the minimanipulation steps and a set of postconditions that are the functional result of executing all the steps in the corresponding minimanipulation.

3. The robotic control platform of claim 1, wherein the minimanipulations have been designed and tested to perform within a threshold of optimal performance in achieving the

functional result, the optimal performance being task-specific, but defaulting to 1% of optimal when not otherwise specified for each given domain-specific application.

4. The robotic control platform of claim 1, wherein the mechanical robotic structure comprises a processor for controlling the one or more robotic sensors and the one more actuators.

5. The robotic control platform of claim 1, further comprising a robotic learning module, communicatively coupled to the mechanical robotic structure and the electronic library database, wherein the one or more robotic sensors record the actions of a human and the module in the humanoid robotic platform uses the recorded sequence of human actions to learn a new minimanipulation executable by the robotic platform in order to obtain the same functional result as observed and recorded from the human.

6. The robotic control platform of claim 5, wherein the robotic learning module estimates the probability of obtaining the functional result if the preconditions of the minimanipulation are matched by the execution module and the parameter values of the minimanipulation are within the specified range.

7. The robotic control platform of claim 1, further comprising a human robot interface mechanism to enable the human to refine the learned minimanipulation by specifying and transmitting ranges of values for the parameters of the minimanipulation and specifying the preconditions for the minimanipulation to the robotic platform via the human-robot interface mechanism.

8. The robotic control platform in claim 1, wherein the robotic planning module calculates similarity to previously stored plans and uses case-based reasoning to formulate a new plan based on modifying and augmenting one or more previously stored plans used to obtain similar results, the newly formulated plan including a sequence of minimanipulations to be stored in an electronic plan library.

9. The robotic control platform of claim 1, wherein the mechanical robotic structure comprises a robotic head with mounted sensors on an articulated neck.

10. The robotic control platform of claim 1, wherein the plurality of end effectors comprises at least one end effector coupled to a standardized handle that is attachable a kitchen utensil selected from a plurality of kitchen utensils, each utensil being designed to be fitted with the standardized handle.

11. The robotic control platform of claim 1, wherein the robotic control platform comprises a standardized kitchen module, the standardized robotic kitchen having a plurality of standardized kitchen equipment, standardized kitchen tools and/or standardized containers.

12. The robotic control platform of claim 1, wherein the robotic control platform comprises a robotic nursing module, the robotic nursing module including a plurality of standardized elements, the plurality of robotic arms and the plurality of end effectors operating and accessing the plurality of standardized elements for facilitating nursing care.

13. The robotic control platform of claim 12, wherein the plurality of standardized elements comprise a standardized bed, one or more standardized cabinets, one or more standardized storages, a standardized screen, a standardized wardrobe, medical devices, medical equipment and/or medicines.

14. The robotic control platform of claim 12, wherein the robotic execution module generates execution commands based on recorded sensor data, the robotic execution module containing standardized nursing care parameters.

15. The robotic control platform of claim 1, wherein the timing data comprises a start time for each minimanipulation.

16. The robotic control platform of claim 1, wherein the timing data comprises a duration for each minimanipulation.

17. The robotic control platform of claim 1, wherein the timing data comprises a start time for each minimanipulation and a duration for each minimanipulation.

18. The robotic control platform of claim 1, wherein the mechanical robotic structure operates in an instrument environment.

19. The robotic control platform of claim 18, wherein the one or more sensors are disposed in the instrumented environment.

20. The robotic control platform of claim 19, wherein the robotic planning module comprises, during the real-time planning and adjustment, storing a newly generated robotic script in the electronic library database.

21. A robotic control platform, comprising:

one or more sensors;

a mechanical robotic structure including one or more end effectors, and one or more robotic arms;

an electronic library database, communicatively coupled to the mechanical robotic structure, of minimanipulations, each minimanipulation including a sequence of operations to achieve a predefined functional result, each operation comprising a sensing operation or a parameterized operation;

a robotic planning module, communicatively coupled to the one or more sensors, the mechanical robotic structure and the electronic library database, configured for real-time planning and adjustment based at least in part on the sensor data received from the one or more sensors in an electronic multi-stage process file, the electronic multi-stage process recipe file including a sequence of minimanipulations and associated timing data;

a robotic interpreter module, communicatively coupled to the mechanical robotic structure and the electronic library database, configured for reading the minimanipulation steps from the minimanipulation library and converting to a machine code; and

a robotic execution module, communicatively coupled to the mechanical robotic structure and the electronic library database, configured for executing the minimanipulation steps by the robotic platform to accomplish a functional result associated with the minimanipulation steps;

wherein the minimanipulations have been designed and tested to perform within a threshold of optimal performance in achieving the functional result, the optimal performance being task-specific, but defaulting to 1% of optimal when not otherwise specified for each given domain-specific application.

22. A robotic control platform, comprising:

one or more sensors;

a mechanical robotic structure including one or more end effectors, and one or more robotic arms;

an electronic library database, communicatively coupled to the mechanical robotic structure, of minimanipulations, each minimanipulation including a sequence of operations to achieve a predefined functional result, each operation comprising a sensing operation or a parameterized operation;

a robotic planning module, communicatively coupled to the one or more sensors, the mechanical robotic structure and the electronic library database, configured for real-time planning and adjustment based at least in part on the sensor data received from the one or more sensors in an electronic multi-stage process file, the electronic multi-stage process recipe file including a sequence of minimanipulations and associated timing data;

a robotic interpreter module, communicatively coupled to the mechanical robotic structure and the electronic library database, configured for reading the minimanipulation steps from the minimanipulation library and converting to a machine code; and

a robotic execution module, communicatively coupled to the mechanical robotic structure and the electronic library database, configured for executing the

minimanipulation steps by the robotic platform to accomplish a functional result associated with the minimanipulation steps;

a robotic learning module, communicatively coupled to the mechanical robotic structure and the electronic library database, wherein the one or more robotic sensors record the actions of a human and the module in the humanoid robotic platform uses the recorded sequence of human actions to learn a new minimanipulation executable by the robotic platform in order to obtain the same functional result as observed and recorded from the human;

wherein the robotic learning module estimates the probability of obtaining the functional result if the preconditions of the minimanipulation are matched by the execution module and the parameter values of the minimanipulation are within the specified range.

23. A robotic control platform, comprising:

one or more sensors;

a mechanical robotic structure including one or more end effectors, and one or more robotic arms;

an electronic library database, communicatively coupled to the mechanical robotic structure, of minimanipulations, each minimanipulation including a sequence of operations to achieve a predefined functional result, each operation comprising a sensing operation or a parameterized operation;

a robotic planning module, communicatively coupled to the one or more sensors, the mechanical robotic structure and the electronic library database, configured for real-time planning and adjustment based at least in part on the sensor data received from the one or more sensors in an electronic multi-stage process file, the electronic multi-stage process recipe file including a sequence of minimanipulations and associated timing data;

a robotic interpreter module, communicatively coupled to the mechanical robotic structure and the electronic library database, configured for reading the minimanipulation steps from the minimanipulation library and converting to a machine code;

a robotic execution module, communicatively coupled to the mechanical robotic structure and the electronic library database, configured for executing the

minimanipulation steps by the robotic platform to accomplish a functional result associated with the minimanipulation steps; and

a human robot interface mechanism to enable the human to refine the learned minimanipulation by specifying and transmitting ranges of values for the parameters of the minimanipulation and specifying the preconditions for the minimanipulation to the robotic platform via the human-robot interface mechanism.

24. A robotic control platform, comprising:

one or more sensors;

a mechanical robotic structure including one or more end effectors, and one or more robotic arms;

an electronic library database, communicatively coupled to the mechanical robotic structure, of minimanipulations, each minimanipulation including a sequence of operations to achieve a predefined functional result, each operation comprising a sensing operation or a parameterized operation;

a robotic planning module, communicatively coupled to the one or more sensors, the mechanical robotic structure and the electronic library database, configured for real-time planning and adjustment based at least in part on the sensor data received from the one or more sensors in an electronic multi-stage process file, the electronic multi-stage process recipe file including a sequence of minimanipulations and associated timing data;

a robotic interpreter module, communicatively coupled to the mechanical robotic structure and the electronic library database, configured for reading the minimanipulation steps from the minimanipulation library and converting to a machine code; and

a robotic execution module, communicatively coupled to the mechanical robotic structure and the electronic library database, configured for executing the minimanipulation steps by the robotic platform to accomplish a functional result associated with the minimanipulation steps;

wherein the robotic planning module calculates similarity to previously stored plans and uses case-based reasoning to formulate a new plan based on modifying and augmenting one or more previously stored plans used to obtain similar results, the newly formulated plan including a sequence of minimanipulations to be stored in an electronic plan library.