CLAIMS

1. A method of operation of a robot, the method comprising:

receiving, by a communication interface of the robot, control selection input indicating a select control paradigm from a plurality of control paradigms;

selecting and accessing, by at least one processing unit of the robot, the select control paradigm based on the control selection input;

determining, by the at least one processing unit of the robot, at least one candidate action of at least one actuatable component based on the select control paradigm;

causing, by the at least one processing unit of the robot, actuation of at least one actuatable component of the robot in accordance with one or more of the at least one candidate action;

receiving, by the communication interface of the robot, feedback input on one or more of the at least one candidate action from a tele-operation system configured to operate the robot; and

updating, by the at least one processing unit, the select control paradigm based on the feedback input to produce an updated control paradigm.

2. The method of claim 1 wherein receiving, by the communication interface, control selection input indicating a select control paradigm from a plurality of control paradigms includes receiving, by the communication interface, control selection input indicating the select control paradigm from the plurality of control paradigms based on at least one property selected from a group consisting of: a task to be performed by the robot; a description of a human operator of the tele-operation system; and a description of the select control paradigm.

3. The method of claim 1, wherein:

the tele-operation system is operable by a plurality of candidate human operators, the plurality of control paradigms including a respective control paradigm specific to each respective candidate human operator;

receiving the control selection input includes receiving an identification of a particular human operator from the plurality of candidate human operators; and

selecting and accessing the select control paradigm comprises selecting the control paradigm specific to the particular human operator identified in the control selection input.

4. The method of claim 1, wherein:

the tele-operation system is operable by a plurality of candidate human operators;

a plurality of subsets of human operators are defined among the plurality of candidate human operators, the plurality of control paradigms including a respective control paradigm specific to each subset of human operators;

receiving, by the communication interface, control selection input indicating a select control paradigm from a plurality of control paradigms includes receiving, by the communication interface, control selection input indicating a description of a human operator of the tele-operation system; and

selecting and accessing the select control paradigm comprises selecting the control paradigm specific to a subset of human operators corresponding to the description of the human operator in the control selection input.

5. The method of claim 1, wherein:

the robot is operable to perform a plurality of sets of tasks;

the plurality of control paradigms includes a respective control paradigm specific to each set of tasks;

receiving, by the communication interface, control selection input indicating a select control paradigm from a plurality of control paradigms includes receiving, by the communication interface, control selection input indicating at least one task to be performed by the robot; and

selecting and accessing the select control paradigm comprises selecting the control paradigm specific to a set of tasks which includes the at least one task indicated in the control selection input.

6. The method of claim 1, wherein the robot further includes a non-transitory processor-readable storage medium communicatively coupled to the at least one processing unit, and wherein accessing the select control paradigm comprises retrieving the select control paradigm from the non-transitory processor-readable storage medium by the at least one processing unit.

7. The method of claim 1, wherein accessing the select control paradigm comprises retrieving, by the communication interface, the select control paradigm from the tele-operation system.

8. The method of claim 1, further comprising outputting an indication of the at least one candidate action, wherein receiving feedback input occurs before causing actuation of at least one actuatable component, and receiving feedback input comprises receiving, from the tele-operation system, at least one instruction selected from a group consisting of: approval to proceed with one or more actions of the at least one candidate action; disapproval to proceed with the at least one candidate action; and at least one alternate action instruction indicating an alternate action to be performed instead of the at least one candidate action.

9. The method of claim 8, wherein updating, by the at least processing unit, the select control paradigm based on the feedback input comprises:

increasing confidence in the one or more of the at least one candidate action if the feedback input indicates approval;

decreasing confidence in the at least one candidate action if the feedback input indicates disapproval; or

specifying new behavior or increasing the confidence of existing behavior in the select control paradigm which corresponds to the alternate action provided by the tele-operation system.

10. The method of claim 1, wherein receiving feedback input occurs after causing actuation of at least one actuatable component in accordance with a candidate action,

and receiving feedback input comprises receiving, from the tele-operation system, positive or negative feedback input on the actuation, wherein updating, by the at least one processing unit, the select control paradigm based on the feedback input comprises:

increasing confidence in the candidate action if the feedback input is positive; or

decreasing confidence in the candidate action if the feedback input is negative.

11. The method of claim 1, further comprising providing for storage, by the at least one processing unit, the updated control paradigm for subsequent access.

12. The method of claim 1 wherein the robot further includes a non-transitory processor-readable storage medium communicatively coupled to the at least one processing unit, and wherein the method further comprises storing the updated control paradigm in the non-transitory processor-readable storage medium.

13. The method of claim 1, further comprising transmitting, by the communication interface, the updated control paradigm to be received by the tele-operation system.

14. A method of operation of at least one robot via a tele-operation system, the method comprising:

receiving, by at least one input device of a tele-operation system configured to operate the robot, control selection input indicating a select control paradigm from a plurality of control paradigms;

selecting, by at least one processing unit of the tele-operation system, the select control paradigm from the plurality of control paradigms, based on the received control selection input;

sending, by a communication interface of the tele-operation system, to be received by the at least one robot, an indication of the select control paradigm;

receiving, by the at least one input device of the tele-operation system, feedback input on at least one candidate action to be performed by the at least one robot based on the select control paradigm; and

determining, by the at least one processing unit of the tele-operation system, at least one update to the select control paradigm based on the feedback input.

15. The method of claim 14 wherein receiving, by the at least one input device of the tele-operation system, control selection input indicating a select control paradigm from a plurality of control paradigms includes receiving, by the at least one input device of the tele-operation system, control selection input indicating the select control paradigm from the plurality of control paradigms based on at least one property selected from a group consisting of: a task to be performed by the robot; a description of a human operator of the tele-operation system; and a description of the select control paradigm.

16. The method of claim 14, wherein:

the tele-operation system is operable by a plurality of candidate human operators, the plurality of control paradigms including a respective control paradigm specific to each respective candidate human operator;

receiving the control selection input includes receiving an identification of a particular human operator from the plurality of candidate human operators; and

selecting the select control paradigm comprises selecting the control paradigm specific to the particular human operator identified in the control selection input.

17. The method of claim 14, wherein:

the tele-operation system is operable by a plurality of candidate human operators;

a plurality of subsets of human operators are defined among the plurality of candidate human operators, the plurality of control paradigms including a respective control paradigm specific to each subset of human operators;

receiving, by the at least one input device of the tele-operation system, control selection input indicating a select control paradigm from a plurality of control paradigms includes receiving, by the at least one input device of the tele-operation system, control selection input indicating a description of a human operator of the tele-operation system; and

selecting the select control paradigm comprises selecting the control paradigm specific to a subset of human operators corresponding to the description of the human operator in the control selection input.

18. The method of claim 14, wherein:

each control paradigm in the plurality of control paradigms is specific to a respective set of tasks in a plurality of sets of tasks to be performed by the robot;

receiving, by the at least one input device of the tele-operation system, control selection input indicating a select control paradigm from a plurality of control paradigms includes receiving, by the at least one input device of the tele-operation system, control selection input indicating at least one task to be performed by the robot; and

selecting the select control paradigm comprises selecting a control paradigm specific to a set of tasks which includes the at least one task indicated in the control selection input.

19. The method of claim 14, further comprising receiving, by the communication interface, an indication of at least one candidate action to be performed by the at least one robot based on the select control paradigm, wherein:

receiving feedback input on at least one candidate action occurs before the at least one candidate action is performed by the robot;

receiving feedback input on the at least one candidate action comprises receiving, by the at least one input device of the tele-operation system at least one feedback input selected from a group consisting of:

approval to proceed with at least one candidate action;

disapproval to proceed with the at least one candidate action; and

at least one alternate action instruction indicating at least one alternate action to be performed instead of the at least one candidate action; and

the method further comprises sending, by the communication interface of the tele-operation system, the feedback input to be received by the at least one robot.

20. The method of claim 19, wherein determining, by the at least processing unit, at least one update to the select control paradigm based on the feedback input comprises:

increasing confidence in the at least one candidate action if the feedback input indicates approval;

decreasing confidence in the at least one candidate action if the feedback input indicates disapproval; or

specifying new behavior or increasing the confidence of existing behavior in the select control paradigm which corresponds to the at least one alternate action.

21. The method of claim 14, wherein receiving feedback input on the at least one candidate action occurs after a candidate action is performed by the robot, and receiving feedback input on the performed action comprises receiving, by the at least one input device of the tele-operation system, positive or negative feedback input on the performed action, wherein determining, by the at least processing unit, at least one update to the select control paradigm based on the feedback input comprises:

increasing confidence in the performed action if the feedback input is positive; or

decreasing confidence in the performed action if the feedback input is negative.

22. The method of claim 14, wherein:

the select control paradigm is stored on a non-transitory processor-readable storage medium included in the tele-operation system; and

sending, by the communication interface of the tele-operation system, to be received by the at least one robot, an indication of the select control paradigm comprises: sending, by the communication interface, to be received by the at least one robot, the select control paradigm.

23. The method of claim 14, wherein:

the select control paradigm is stored on a non-transitory processor-readable storage medium remote from the tele-operation system; and

sending, by the communication interface of the tele-operation system, to be received by the at least one robot, an indication of the select control paradigm comprises:

sending, by the communication interface, an indication of the select control paradigm without sending contents of the select control paradigm itself.

24. The method of claim 14, further comprising providing, by the at least one processing unit, instructions to store an updated control paradigm for subsequent access based on the at least one update.

25. A robot comprising:

a body;

at least one physically actuatable component mechanically coupled to the body;

at least one processing unit;

a communication interface communicatively coupled to a tele-operation system configured to operate the robot;

at least one non-transitory processor-readable storage medium communicatively coupled to the at least one processing unit, the at least one non-transitory processor-readable storage medium storing processor-executable instructions that, when executed by the at least one processing unit, cause the robot to:

receive, by the communication interface, control selection input indicating a select control paradigm from a plurality of control paradigms;

select and access the select control paradigm based on the control selection input;

determine at least one candidate action of the at least one actuatable component based on the select control paradigm;

actuate one or more of the at least one actuatable component in accordance with one or more of the at least one candidate action;

receive feedback input on one or more of the at least one candidate action from the tele-operation system; and

update the select control paradigm based on the feedback input to produce an updated control paradigm.

26. The robot of claim 25 wherein the instructions which cause the robot to receive control selection input indicating a select control paradigm from a plurality of control

paradigms cause the robot to receive, by the communication interface, control selection input indicating the select control paradigm from the plurality of control paradigms based on at least one property selected from a group consisting of: a task to be performed by the robot; a description of a human operator of the tele-operation system; and a description of the select control paradigm.

27. The robot of claim 25, wherein:

the tele-operation system is operable by a plurality of candidate human operators, the plurality of control paradigms including a respective control paradigm specific to each respective candidate human operator;

the instructions which cause the robot to receive the control selection input cause the robot to receive, by the communication interface, an identification of a particular human operator of the plurality of candidate human operators; and

the instructions which cause the robot to select the select control paradigm cause the robot to select, by the at least one processing unit, the control paradigm specific to the particular human operator identified in the control selection input.

28. The robot of claim 25, wherein:

the tele-operation system is operable by a plurality of candidate human operators;

a plurality of subsets of human operators are defined among the plurality of candidate human operators, the plurality of control paradigms including a respective control paradigm specific to each subset of human operators;

the instructions which cause the robot to receive, by the communication interface, control selection input indicating a select control paradigm from a plurality of control paradigms cause the robot to receive, by the communication interface, control selection input indicating a description of a human operator of the tele-operation system; and

the instructions which cause the robot to select the select control paradigm cause the robot to select, by the at least one processing unit, the control paradigm specific to a subset of human operators corresponding to the description of the human operator in the control selection input.

29. The robot of claim 25, wherein:

the robot is operable to perform a plurality of sets of tasks;

the plurality of control paradigms includes a respective control paradigm specific to each set of tasks;

the instructions which cause the robot to receive, by the communication interface, control selection input indicating a select control paradigm from a plurality of control paradigms cause the robot to receive, by the communication interface, control selection input indicating at least one task to be performed by the robot; and

the instructions which cause the robot to select the select control paradigm cause the robot to select, by the at least one processor, the control paradigm specific to a set of tasks which includes the at least one task indicated in the control selection input.

30. The robot of claim 25, wherein the instructions which cause the robot to access the select control paradigm cause the processing unit to retrieve the select control paradigm from the non-transitory processor-readable storage medium.

31. The robot of claim 25, wherein the instructions which cause the robot to access the select control paradigm cause the robot to retrieve, by the communication interface, the select control paradigm from the tele-operation system.

32. The robot of claim 25, wherein:

the instructions further cause the robot to output, by the communication interface, an indication of the at least one candidate action, wherein reception of feedback input occurs before actuation of at least one actuatable component; and

the instructions which cause the robot to receive feedback input cause the robot to receive, from the tele-operation system, at least one instruction selected from a group consisting of: approval to proceed with at least one candidate action; disapproval to proceed with the at least one candidate action; and at least one alternate action instruction indicating an alternate action to be performed instead of the at least one candidate action.

33. The robot of claim 32, wherein the instructions which cause the robot to update, by the at least processing unit, the select control paradigm based on the feedback input cause the at least one processing unit to:

increase confidence in the at least one candidate action if the feedback input indicates approval;

decrease confidence in the at least one candidate action if the feedback input indicates disapproval; or

specify new behavior or increase the confidence of existing behavior in the select control paradigm which corresponds to the alternate action provided by the tele-operation system.

34. The robot of claim 25, wherein:

reception of feedback input occurs after causing actuation of the at least one actuatable component in accordance with a candidate action;

the instructions which cause the robot to receive feedback input cause the robot to receive, from the tele-operation system by the communication interface, positive or negative feedback input on the actuation; and

the instructions which cause the robot to update, by the at least one processing unit, the select control paradigm based on the feedback input cause the robot to: increase confidence in the candidate action if the feedback input is positive; or decrease confidence in the candidate action if the feedback input is negative.

35. The robot of claim 25, wherein the instructions further cause the robot to provide for storage the updated control paradigm for subsequent access.

36. The robot of claim 25 wherein the instructions further cause the robot to store the updated control paradigm in the non-transitory processor-readable storage medium.

37. The robot of claim 25, wherein the instructions further cause the robot to transmit, by the communication interface, the updated control paradigm to the tele-operation system.

38. The robot of claim 25, further comprising a plurality of sensors communicatively coupled to the at least one processing unit, wherein the instructions further cause the robot to:

collect, by the plurality of sensors, environmental data from an environment of the robot; and

transmit, by the communication interface, the environmental data to be received by the tele-operation system.