CLAIMS

1. A toilet bowl cleaning system comprising:

a robotic arm;

a base to which the robotic arm is coupled, the base comprising a plurality of cleaning head attachments for the robotic arm;

a camera assembly; and

a computing platform configured to

analyse received images from the camera assembly for presence of a toilet bowl with an algorithm trained to differentiate between parts of a toilet bowl and detect the toilet bowl part on which a stain is located;

select, based on the stain location, a cleaning head attachment for use to clean the stain from the plurality of cleaning head attachments; and

transmit a command to the robotic arm to couple with the selected cleaning head attachment for cleaning the stain.

2. The toilet bowl cleaning system of claim 1, wherein the computing platform is further configured to:

verify for stain removal from images received from the camera assembly after the robotic arm has cleaned the stain; and

transmit a command to re-clean the stain or for human intervention, in response to detecting that the stain remains.

3. The toilet bowl cleaning system of any one of the preceding claims, wherein the computing platform is further configured to:

analyse the received images for presence of a marker arrangement; and

query a database with data extracted from the marker arrangement to retrieve information about the toilet bowl configuration.

4. The toilet bowl cleaning system of claim 3, wherein the toilet bowl configuration comprises any one or more of: number of toilet bowl parts; measurements for each toilet bowl part; and assembly arrangement of the toilet bowl parts.

5. The toilet bowl cleaning system of claim 3 or 4, wherein the marker arrangement comprises two parts during calibration, a permanent part located on a fixture in a vicinity of the toilet bowl; and a temporary part on the toilet bowl to locate the toilet bowl relative to the permanent part, the temporary part being removed after calibration.

6. The toilet bowl cleaning system of claim 5, wherein the computing platform is further configured to, in use, factor the calibration from the marker arrangement when moving the robotic arm to clean one or more of: the stain or any other toilet bowl part.

7. The toilet bowl cleaning system of any one of the preceding claims, wherein the computing platform is further configured to:

reference one or more libraries for selection of a cleaning motion for the robotic arm based on any one or more of: the stain location, the toilet bowl configuration and surroundings of the toilet bowl; and

transmit a command for the robotic arm to execute the selected cleaning motion.

8. The toilet bowl cleaning system of any one of the preceding claims, further comprising a compliant controller to adjust contact force the robotic arm uses with the cleaning head attachment.

9. The toilet bowl cleaning system of any one of the preceding claims, wherein the computing platform is further configured to: analyse the received images for presence of path markers for use in guiding the toilet bowl cleaning system to the toilet bowl.

10. The toilet bowl cleaning system of any one of the preceding claims, wherein the computing platform is further configured to:

analyse the received images for presence of anomaly situations; and

transmit a signal for human intervention in response to detection of one or more anomaly situations.

11. The toilet bowl cleaning system of claim 10, wherein the anomaly situations comprise any one or more of: presence of a choke, breakage.

12. The toilet bowl cleaning system of any one of the preceding claims, wherein the computing platform is further configured to: return the toilet bowl cleaning system to a docking station when cleaning task is completed.

13. The toilet bowl cleaning system of any one of the preceding claims, wherein the algorithm is trained with images of toilet bowls with stains and peripheral objects labelled.

14. The toilet bowl cleaning system of claim 13, wherein the training images comprise images having any one or more of the following conditions: different lightings, floor texture, stain colour and size.

15. The toilet bowl cleaning system of claim 14, wherein the training images are pictures or synthetic.

16. The toilet bowl cleaning system of any one of the preceding claims, wherein the camera assembly is located on the robotic arm, proximate to where the selected cleaning head attachment couples.

17. The toilet bowl cleaning system of any one of the preceding claims, further comprising:

a detergent tank; and

a cleaning nozzle with one end disposed proximate to where the selected cleaning head attachment couples and another end coupled to draw from the detergent tank when performing a cleaning task.

18. The toilet bowl cleaning system of claim 17, further comprising

a waste water tank into which the selected cleaning head attachment is introduced when a cleaning task is completed; and

one or more disinfecting nozzles with each end disposed proximate to the waste water tank and another end coupled to draw from the detergent tank to wash the selected cleaning head attachment.

19. The toilet bowl cleaning system of any one of the preceding claims, wherein one or more of cleaning head attachments is motorised; configured to draw power when coupled with the robotic arm or when stored.

20. The toilet bowl cleaning system of any one of the preceding claims, wherein the robotic arm further comprises a retractable prod to actuate the toilet bowl flush.