WHAT IS CLAIMED IS:

1. A nucleic acid analysis apparatus, comprising:

a casing having an upper casing and a lower casing;

a main frame disposed in the lower casing and having a chamber for mounting a cartridge therein;

a fluid delivery unit disposed in the lower casing and connected with the main frame, being adapted to transport reagents within the cartridge for sample purification and/or nucleic acid extraction, wherein the fluid delivery unit comprises a plurality of microchannels for connecting with the cartridge and a pump adapted to provide pneumatic force to transport the reagents stored within the cartridge;

a thermal unit disposed on the main frame of the lower casing and comprising a heater to provide a predefined temperature for nucleic acid amplification;

a driving unit disposed in the lower casing and connected with the main frame, the driving unit comprising a motor, a shaft, a driven gear, and a motion control gear, wherein the motion control gear is engaged with the driven gear mounted on the shaft, and the motor drives rotations of the driven gear and the motion control gear, and thus drives movement and rotation of the cartridge clamped by the motion control gear, wherein the motion control gear comprises at least one protrusion, the cartridge comprises at least one guiding groove having a vertical groove and an inclined groove, and the protrusion is able to slide in the guiding groove, so that the motion control gear is capable of pressing the cartridge toward the fluid delivery unit during sample purification and/or nucleic acid extraction and rotating the cartridge during nucleic acid amplification and/or detection; and

at least one optical unit disposed on the main frame of the lower casing and comprising at least one light source and at least one optical detector for detection.

2. The nucleic acid analysis apparatus according to claim 1, wherein the motor comprises a stepper motor, which actuates a rotation of the motion control gear through gear transmission.

3. The nucleic acid analysis apparatus according to claim 2, wherein the motion control gear comprises a plurality of rollers, which are accommodated in an annular groove of the main frame.

4. The nucleic acid analysis apparatus according to claim 1, wherein the nucleic acid analysis apparatus further comprises a fluid connector located between the main frame and the fluid delivery unit, and a flat spring equipped on the fluid connector.

5. The nucleic acid analysis apparatus according to claim 4, wherein a forward rotation of the motion control gear allows the cartridge to be locked and in contact with the fluid connector.

6. The nucleic acid analysis apparatus according to claim 5, wherein a reverse rotation of the motion control gear allows the cartridge to be bounced up by the flat spring, detach the fluid connector, and rotate according to the predefined program.

7. The nucleic acid analysis apparatus according to claim 1, wherein the nucleic acid analysis apparatus further comprises a sensor to recognize a position of the cartridge.

8. The nucleic acid analysis apparatus according to claim 1, wherein the nucleic acid analysis apparatus further comprises an indicator, which is shining when the cartridge is pressed to the end to inform a user to release his hand.

9. The nucleic acid analysis apparatus according to claim 1, wherein the optical unit comprises a light source and an optical detector.

10. The nucleic acid analysis apparatus according to claim 1, wherein the nucleic acid analysis apparatus comprises multiple optical units, and each optical unit offers a unique wavelength of illumination to detect multiple targets.

11. The nucleic acid analysis apparatus according to claim 1, wherein the nucleic acid analysis apparatus further comprises a touch screen disposed on the lower casing with adjustable operation angles.

12. The nucleic acid analysis apparatus according to claim 1, wherein the cartridge comprises a reaction chip and a cartridge body, and the reaction chip is disposed on one side of the cartridge body.

13. The nucleic acid analysis apparatus according to claim 12, wherein the main frame further comprises at least one positioning pin, and the reaction chip comprises at least one alignment slot capable of being aligned with the at least one positioning pin on the main frame.

14. The nucleic acid analysis apparatus according to claim 12, wherein the cartridge body comprises plural chambers used to store reagents for sample purification and nucleic acid extraction.

15. The nucleic acid analysis apparatus according to claim 12, wherein the reaction chip further comprises at least one sample loading hole at a top surface of the reaction chip for adding sample into the cartridge.

16. The nucleic acid analysis apparatus according to claim 12, wherein the thermal unit carries the reaction chip thereon to provide heating.

17. The nucleic acid analysis apparatus according to claim 12, wherein the reaction chip is a planar fluidic chip and comprises a plurality of detection wells and at least one microchannel connected with the detection wells.

18. The nucleic acid analysis apparatus according to claim 17, wherein the shape of the reaction chip is substantially a regular polygon, and each of the detection wells has at least one planar surface.