What is claimed is:

1. A portable fan configured with a high-speed three-phase motor, the portable fan comprising: a control module, a drive module, and the high-speed three-phase motor,

wherein the high-speed three-phase motor has an operating voltage of 2V to 18 V and an operating current of 0.1 to 10 A, and/or has a rated operating power of 0.5 to 100 W;

the control module is configured to control, via the drive module and based on the operating voltage, the operating current, and/or the rated operating power, a rated operating rotation speed of the high-speed three-phase motor to reduce noise generated due to a high rotation speed of the high-speed three-phase motor and to control an air speed to be within a preset air speed range.

2. The portable fan according to claim 1, wherein when the high-speed three-phase motor has the operating voltage of 6V to 8.4 V, the operating current of 0.12A to 1 A, and/or the rated operating power of 0.8W to 9 W, the control module controls, based on the operating voltage, the operating current, and/or the rated operating power and through the drive module, the high-speed three-phase motor to have the rated operating rotation speed of 6000 to 15000 RPM/MIN; or

when the operating voltage of the high-speed three-phase motor is in a range of 5.9V to 8.4 V, the operating current of the high-speed three-phase motor is in a range 0.5A to 6 A, and/or the rated operating power of the high-speed three-phase motor is in a range 5W to 50 W, the control module controls, based on the operating voltage, the operating current, and/or the rated operating power and through the drive module, the rated operating rotation speed of the high-speed three-phase motor to be in a range of 20,000 to 80,000 RPM/MIN; or

when the operating voltage of the high-speed three-phase motor is in a range of 2V to 5.8 V, the operating current of the high-speed three-phase motor is in a range 0.25A to 2 A, and/or the rated operating power of the high-speed three-phase motor is in a range 1W to 8 W, the control module controls, based on the operating voltage, the operating current, and/or the rated operating power and through the drive module, the rated operating rotation speed of the high-speed three-phase motor to be in a range of 15000 to 41000 RPM/MIN; or

when the operating voltage of the high-speed three-phase motor is in a range of 8.5V to 12.6 V, the operating current of the high-speed three-phase motor is in a range 0.5A to 5 A, and/or the rated operating power of the high-speed three-phase motor is in a range 6W to 60 W, the control module controls, based on the operating voltage, the operating current, and/or the rated operating power and through the drive module, the rated operating rotation speed of the high-speed three-phase motor to be in a range of 25000 to 85000 RPM/MIN; or

when the operating voltage of the high-speed three-phase motor is in a range of 12V to 18 V, the

operating current of the high-speed three-phase motor is in a range 0.1A to 1 A, and/or the rated operating power of the high-speed three-phase motor is in a range 2W to 16 W, the control module controls, based on the operating voltage, the operating current, and/or the rated operating power and through the drive module, the rated operating rotation speed of the high-speed three-phase motor to be in a range of 2000 to 6000 RPM/MIN; or

when the operating voltage of the high-speed three-phase motor is in a range of 3.7V to 4.3 V, the operating current of the high-speed three-phase motor is in a range 0.25A to 2 A, and/or the rated operating power of the high-speed three-phase motor is in a range 1W to 8W, the control module controls, based on the operating voltage, the operating current, and/or the rated operating power and through the drive module, the rated operating rotation speed of the high-speed three-phase motor to be in a range of 15000 to 41000 RPM/MIN.

3. The portable fan according to claim 1 or 2, further comprising an input module, wherein the input module is connected to the control module, the drive module comprises a first bridge arm, a second bridge arm, and a third bridge arm; each of the first bridge arm, the second bridge arm, and the third bridge arm comprises: an upper bridge arm transistor switch located at a side of a center point of the bridge arm; and a lower bridge arm transistor switch located at the other side of the center point of the bridge arm; the center point of each of the first bridge arm, the second bridge arm, and the third bridge arm is connected to a coil of one phase of the high-speed three-phase motor;

the input module is configured to output an air speed adjustment control signal according to a user instruction, the control module is configured to generate a PWM control signal according to the air speed adjustment control signal and control, based on the PWM control signal, each transistor switch of each of the first bridge arm, the second bridge arm, and the third bridge arm to adjust the rotation speed of the high-speed three-phase motor;

and/or

the input module is configured to output a switch signal according to the user instruction; the control module is configured to generate a switch control signal according to the switch signal and control, through the switch control signal, each transistor switch of each of the first bridge arm, the second bridge arm, and the third bridge arm to drive the high-speed three-phase motor to start operating or stop operating.

4. The portable fan according to claim 3, wherein when the input module is a touch module, the touch module is configured to output the switch signal when detecting a touch action, and the control module is configured to generate the switch control signal according to the switch signal;

the touch module is configured to output the air speed adjustment signal when detecting a sliding parameter, and the control module is configured to calculate a duty cycle of a PWM signal according to the air speed adjustment signal and generate a PWM control signal according to the duty cycle of the PWM signal;

or

when the input module is a voice module, the input module is configured to capture a voice signal of a user and convert the voice signal into the switch signal and the air speed adjustment control signal.

5. The portable fan according to claim 4, wherein the touch control module is a touch-slide adjustment chip comprising a plurality of contacts; the touch-slide adjustment chip is configured to generate the switch signal when the plurality of contacts detecting the touch action and to generate the air speed adjustment control signal when the plurality of contacts detecting the sliding parameter; or

the touch control module is a touch screen chip comprising a switch region and a sliding region, the touch screen chip generates the switch signal when detecting the touch action in the switch region and generates the air speed adjusting control signal when detecting the sliding parameter in the sliding region; or

the touch control module comprises a plurality of single-contact touch chips, the touch control module is configured to generate the switch signal when detecting the touch action by any single touch of the plurality of single-contact touch chips and to generate the air speed adjustment control signal when detecting the sliding parameter by a plurality of contacts of the plurality of single-contact touch chips; or

the voice module comprises a voice capture module, a voice recognition module, and a voice output module, the voice recognition module is connected to the voice capture module, the voice output module, and the control module; the voice module is configured to capture the voice signal of the user, the voice recognition module is configured to convert the voice signal into the switch signal and the air speed adjustment control signal and send the switch signal and the air speed adjustment control signal to the control module; the voice recognition module is configured to control the voice output module to output or not output an execution result according to a feedback from the control module; or

the portable fan further comprises a networking module, the connected to the voice module and the control module; the voice module is configured to upload the voice signal to a cloud server via the networking module, the cloud server is configured to convert the voice signal into the switch

signal and the air speed adjustment control signal and output the switch signal and the air speed adjustment control signal to the networking module, the networking module is configured to send the switch signal and the air speed adjustment control signal to the control module.

6. The portable fan according to any one of claims 1 to 5, wherein the portable fan comprises at least: a handheld fan to be used by being held in a hand, a desktop fan that is portable and is used by standing on a desktop, or a neck fan worn to a neck of a user; and

the portable fan is arranged with a battery to supply power to the high-speed three-phase motor when the portable fan is being carried by a user.

7. The portable fan according to any one of claims 1 to 6, wherein when the control module detecting a change in the operating voltage, the control module is configured to maintain the operating voltage within a constant voltage range by boosting or bucking the operating voltage; or

when the control module detecting a change in the operating current, the control module is configured to maintain the operating current within a constant current range by adjusting a PWM control signal; or

when the control module detecting a change in the operating power, the control module is configured to stabilize the operating power by adjusting the operating voltage or the operating current; or

the portable fan further comprises a rotation speed measurement module, connected to the high-speed three-phase motor and the control module; and

the rotation speed measurement module is configured to measure an actual rotation speed of the motor and send the actual rotation speed to the control module; the control module obtains a rotation-speed change amount based on the actual rotation speed and a target rotation speed, adjusts a duty cycle of a PWM signal according to the rotation-speed change amount, and outputs an adjusted PWM control signal to the drive module.

8. The portable fan according to claim 3, wherein the input module and the control module are connected to each other by in a wired or wireless manner, the input module is arranged on a shell of the portable fan or on another electronic device; or

the input module comprises a manual switch module, a touch module, a voice module, a networking module, and a wireless module, all of which are connected to the control module; the portable fan further comprises an atomization module, a refrigeration module, a heating module, a lighting module, and a swinging module connected to the control module.

9. The portable fan according to claim 3, wherein the first bridge arm comprises a first upper bridge arm transistor switch and a second lower bridge arm transistor switch; the second bridge arm comprises a third upper bridge arm transistor switch and a fourth lower bridge arm transistor switch; the third bridge arm comprises a fifth upper bridge arm transistor switch and a sixth lower bridge arm transistor switch; a center point of the first bridge arm is connected to a first coil, a center point of the second bridge arm is connected to a second coil, a center point of the third bridge arm is connected to a third coil;

the first upper bridge arm transistor switch, the first coil, the second coil, and the fourth lower bridge arm transistor switch cooperatively form a first loop; the first upper bridge arm transistor switch, the first coil, the third coil, and the sixth lower bridge arm transistor switch cooperatively form a second loop; the third upper bridge arm transistor switch, the second coil, the third coil, and the sixth lower bridge arm transistor switch cooperatively form a third loop; the third upper bridge arm transistor switch, the second coil, the first coil, and the second lower bridge arm transistor switch cooperatively form a fourth loop; the fifth upper bridge arm transistor switch, the third coil, the first coil, and the second lower bridge arm transistor switch cooperatively form a fifth loop; the fifth upper bridge arm transistor switch, the third coil, the second coil, and the fourth lower bridge arm transistor switch cooperatively form a sixth loop;

the control module controls, through the switch control signal, the first loop, the second loop, the third loop, the fourth loop, the fifth loop, and the sixth loop to be conducted one by one in a preset order to drive the motor to start operating; the control module controls, through the PWM control signal, a conduction time length of each transistor switch in each of the first loop, the second loop, the third loop, the fourth loop, the fifth loop, and the sixth loop to adjust the rotation speed of the motor.

10. A control method of the portable fan according to any one of claims 1 to 9, wherein the portable fan comprises at least: a handheld fan to be used by being held in a hand, a desktop fan that is portable and is used by standing on a desktop, or a neck fan worn to a neck of a user; and the method comprising:

controlling the operating voltage of the high-speed three-phase motor to be in a range of 2 to 18 V, controlling the operating current of the high-speed three-phase motor to be in a range of 0.1 to 10 A, and/or controlling the rated operating power of the high-speed three-phase motor to be in a range of 0.5 to 100 W; and

controlling, by the drive module based on the operating voltage, the operating current, and/or the

rated operating power, the rated operating rotation speed of the high-speed three-phase motor to reduce noise generated due to the high rotation speed and to control the air speed to be in the predetermined air speed range;

wherein the portable fan is arranged with a battery to supply power to the high-speed three-phase motor when the portable fan is being carried by a user.

11. A motor drive control circuit of the portable fan according to any one of claims 1 to 9, the motor drive control circuit comprising: a battery power supply, a voltage regulator unit, a master control unit, the high-speed three-phase motor, a USB access circuit, an analog-to-digital converter power supply circuit, and a display unit;

wherein the motor drive control circuit of the portable fan comprises at least one of: a motor drive control unit, a motor drive circuit, and a rotor position detection circuit; and

wherein the portable fan comprises at least: a handheld fan to be used by being held in a hand, a desktop fan that is portable and is used by standing on a desktop, or a neck fan worn to a neck of a user; and the portable fan is arranged with a battery to supply power to the high-speed three-phase motor when the portable fan is being carried by a user.

12. The motor drive control circuit according to claim 11, wherein a permanent magnet is arranged on a rotor of the motor, and a first winding, a second winding, and a third winding are connected to each other to form a Y shape and are arranged on a stator of the;

a MOS transistor switch circuit of the motor drive circuit is connected to the first winding, second winding, and third winding of the motor; the motor drive control unit controls magnitudes, flowing directions, and phase relationships of currents flowing through the first winding, second winding, and third winding.

13. The motor drive control circuit according to claim 12, wherein, in the motor drive circuit, an end of a first MOS transistor switch is connected to a power supply voltage, and the other end of the first MOS transistor switch is connected to the first winding; conductivity of the first MOS transistor switch is controlled by a second MOS transistor switch; an end of the second MOS transistor switch is connected, through a first resistor, to the power supply voltage, the other end of the second MOS transistor switch is grounded; the second MOS transistor switch receives a PWM control signal of the motor drive control unit.

14. The motor drive control circuit according to claim 13, wherein, in the motor drive circuit, an

end of a third MOS transistor switch is connected to the first winding, and the other end of the third MOS transistor Q7 is grounded through a current sampling resistor; the third MOS transistor switch receives the PWM control signal of the motor drive control unit.

15. The motor drive control circuit according to claim 14, the MOS transistor switch is arranged with a reversed diode.

16. The motor drive control circuit according to claim 15, wherein the first MOS transistor switch is a P-type MOS transistor; and each of the second MOS transistor switch and the third MOS transistor switch is an N-type MOS transistor.

17. The motor drive control circuit according to claim 16, wherein a second resistor is connected to a drain and a source of the second MOS transistor switch, and a third resistor is connected to a drain and a source of the third MOS transistor switch.

18. The motor drive control circuit according to claim 17, wherein, in the motor drive circuit, a fourth MOS transistor switch, a fifth MOS transistor switch, a sixth MOS transistor switch, a fourth resistor, a fifth resistor, and a sixth resistor cooperatively form a MOS transistor switch circuit to control a current flowing into and out of the second winding;

a seventh MOS transistor switch, an eighth MOS transistor switch, a ninth MOS transistor switch, a seventh resistor, an eighth resistor, and a ninth resistor cooperatively form another MOS transistor switch circuit to control a current flowing into and out of the third winding.

19. The motor drive control circuit according to claim 18, wherein the motor drive control unit comprises a motor drive chip, and the motor drive chip outputs a motor drive signal to a gate of a MOS transistor of the motor drive circuit.

20. The motor drive control circuit according to claim 19, wherein a control chip of the master control unit is connected to the USB access circuit, a battery voltage detection ADC circuit, and the display unit.