ABB Modbus Project User Guide

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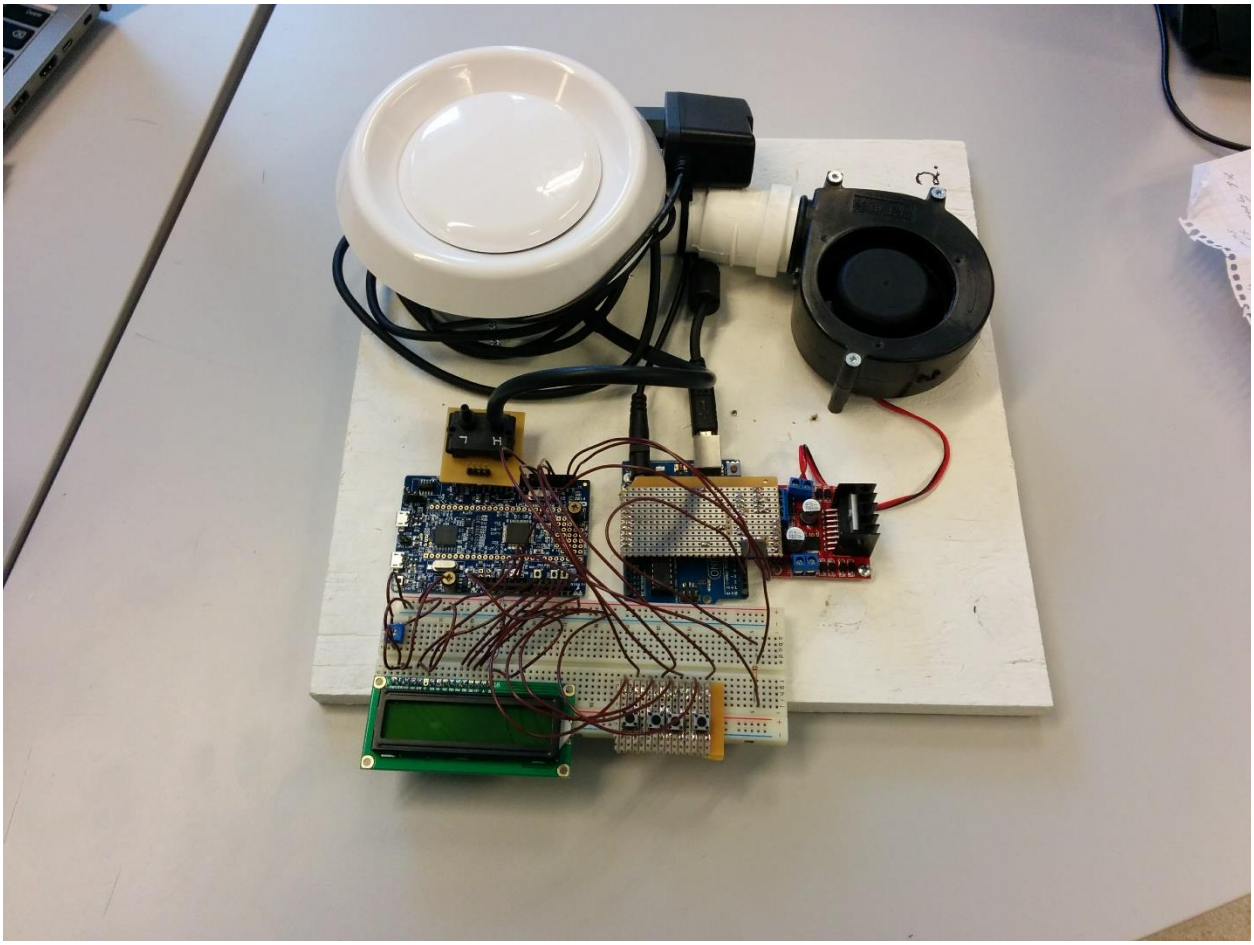
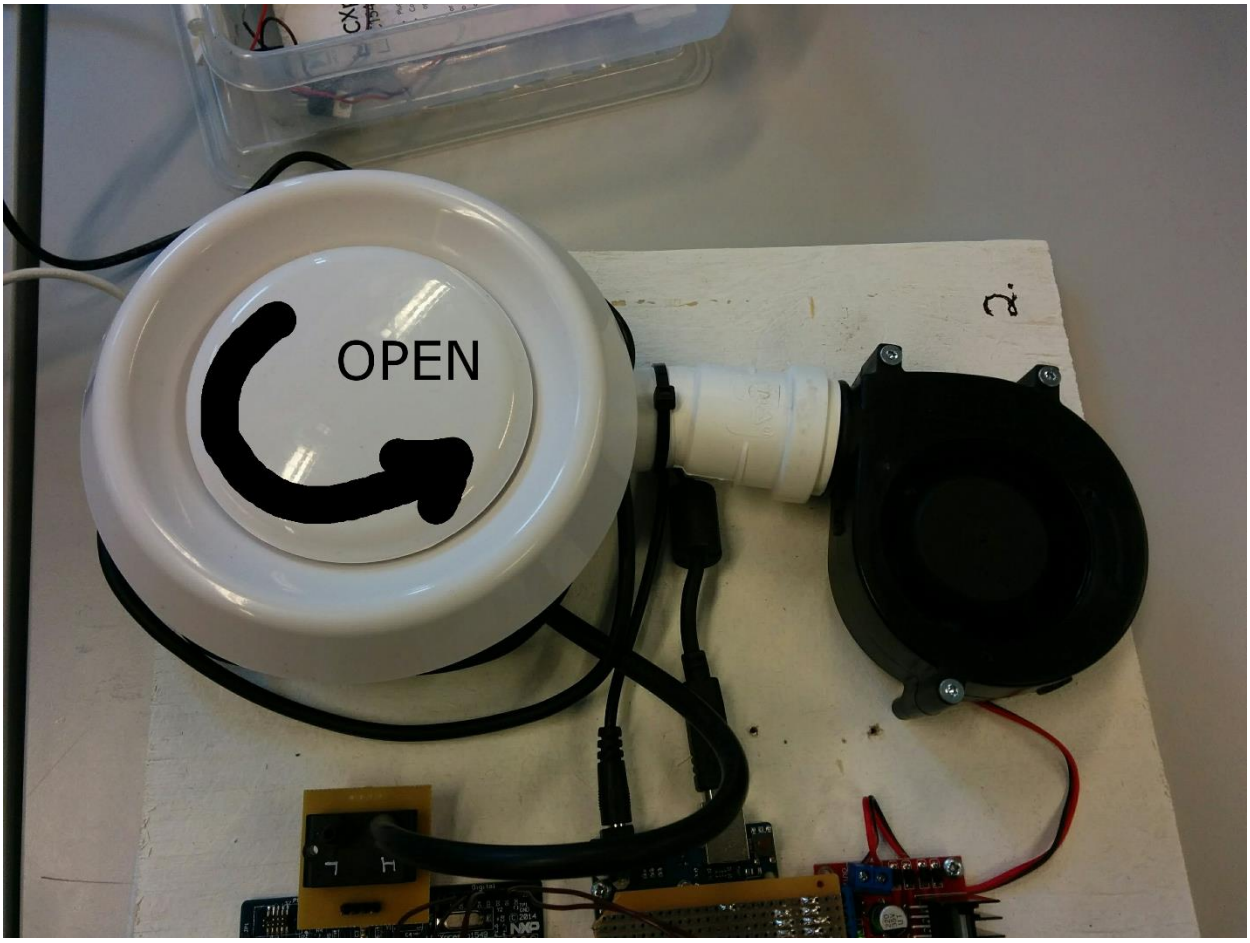


DEVICE DESCRIPTION

The device consists of a fan combined with a vent and a pressure sensor. The fan is controlled through a Modbus interface simulating an ABB frequency converter. This simulated frequency converter in turn is controlled using an LPCXpresso 1549. The LPCXpresso gets data from the frequency converter and an attached pressure sensor. This pressure sensor is used to monitor the pressure inside the vent.

The LPCXpresso is connected to an LCD screen and 4 buttons which allow the user to either manually control the speed or set the pressure inside the vent.

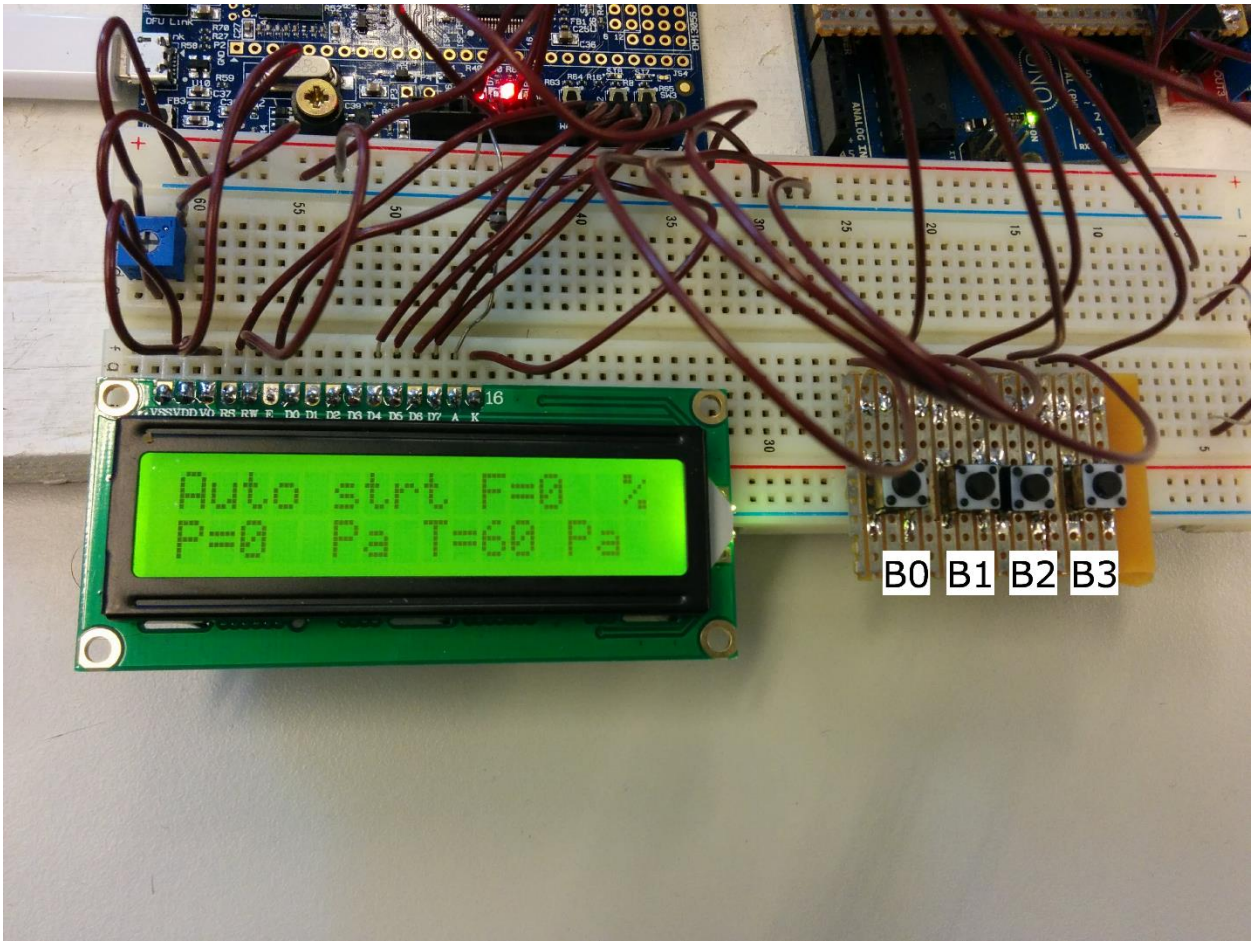
THE VENT



The vent is used to change the pressure measured by the pressure sensor by opening and closing while the fan is running. Counter-clockwise opens the vent and clockwise closes it. Do not close the vent too tight, otherwise it will be difficult to open it again. If the vent is almost closed, it can still achieve the maximum pressure.

UI

START SCREEN



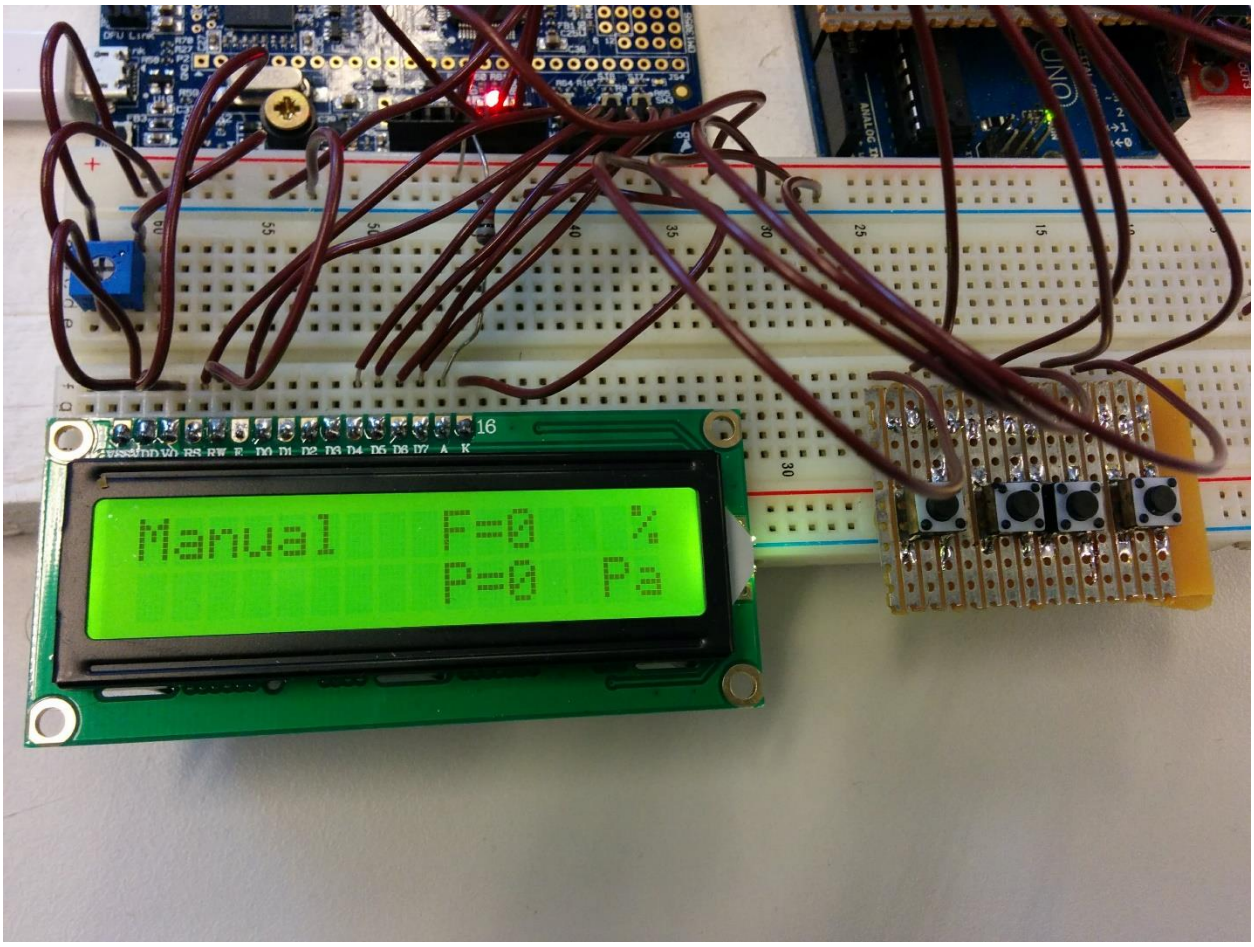
The device starts in main menu and has two principal modes of operation manual mode and automatic mode.

The buttons are number from 0 to 3 starting from the left.

In the start state, the user can go to the manual mode with B0, and to the automatic mode with B3.

Buttons	Actions
B0	Enters manual mode
B1	N/A
B2	N/A
B3	Enters automatic mode (autostart state)

MANUAL MODE



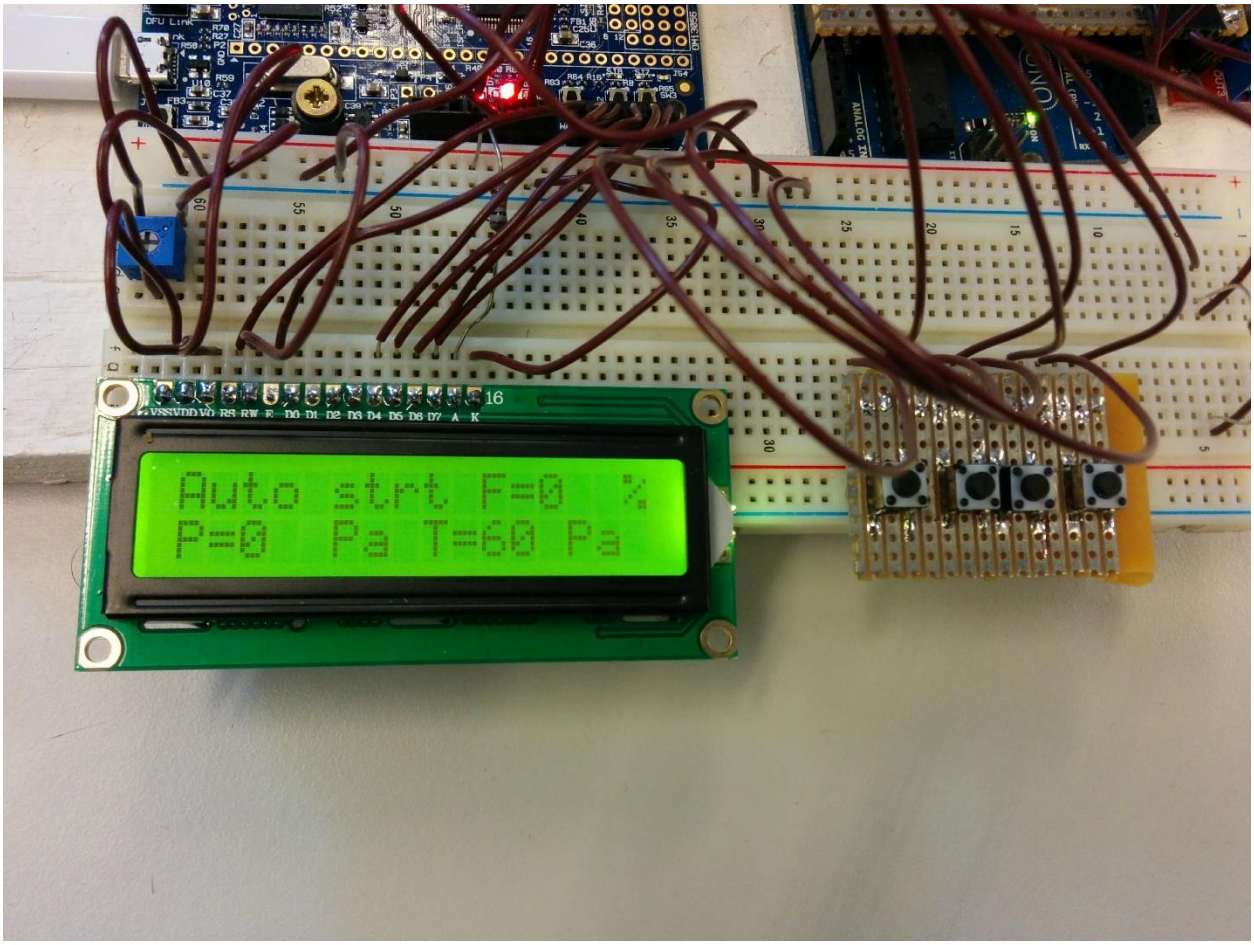
F tells the frequency as percentage of the maximum of 50 Hz. P is the pressure which is between 0 and 125 Pa with a fluctuation of about 3 Pa. B1 and B2 are used to decrement and increment the frequency, and B0 is used to switch to automatic mode. B1 and B2 can be pressed continuously to keep increasing the frequency.

Buttons	Actions
B0	Enters automatic mode (autostart state)
B1	Decrements frequency by 1%
B2	Increments frequency by 1%
B3	N/A

AUTOMATIC MODE

The automatic mode is divided to 4 states which are autostart, autotry, autosuccess and autofailure. In the automatic mode, user sets a target pressure, which the program tries to achieve by changing the frequency.

Autostart state

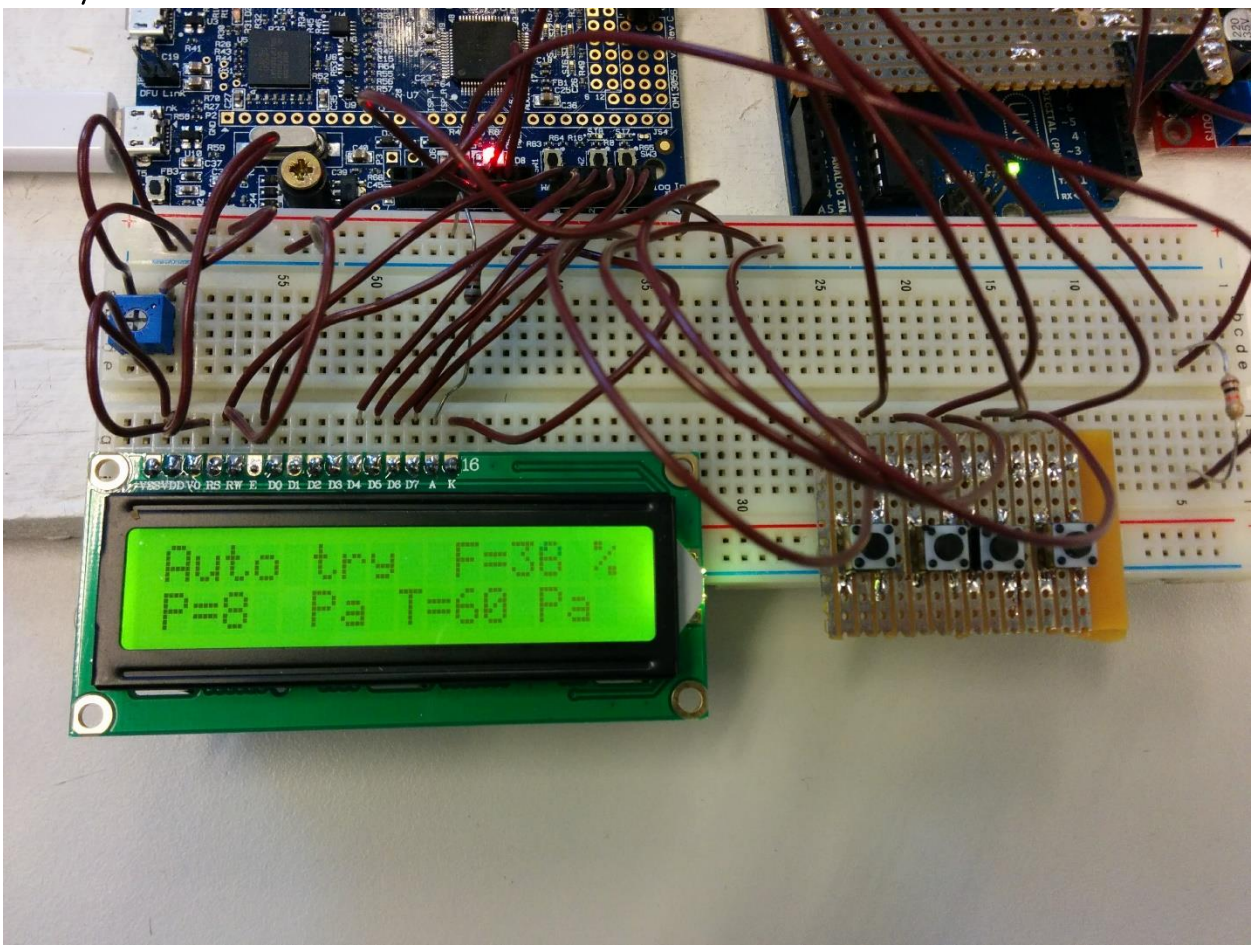


All states of the automatic mode have the same layout and the text in the middle, in this case “strt” is used to indicate the specific state. Like in the manual mode, F is used to indicate the frequency and P is used to indicate the pressure. T marks the target pressure which can be set from 0 to 120 Pa.

B0 can be used to switch to the manual mode, B1 and B2 decrement and increment the target pressure while B3 is used to start the automatic frequency adjustment.

Buttons	Actions
B0	Enters manual mode
B1	Decrements target pressure by 1%
B2	Increments target pressure by 1%
B3	Enters autotry state with the current targetPressure

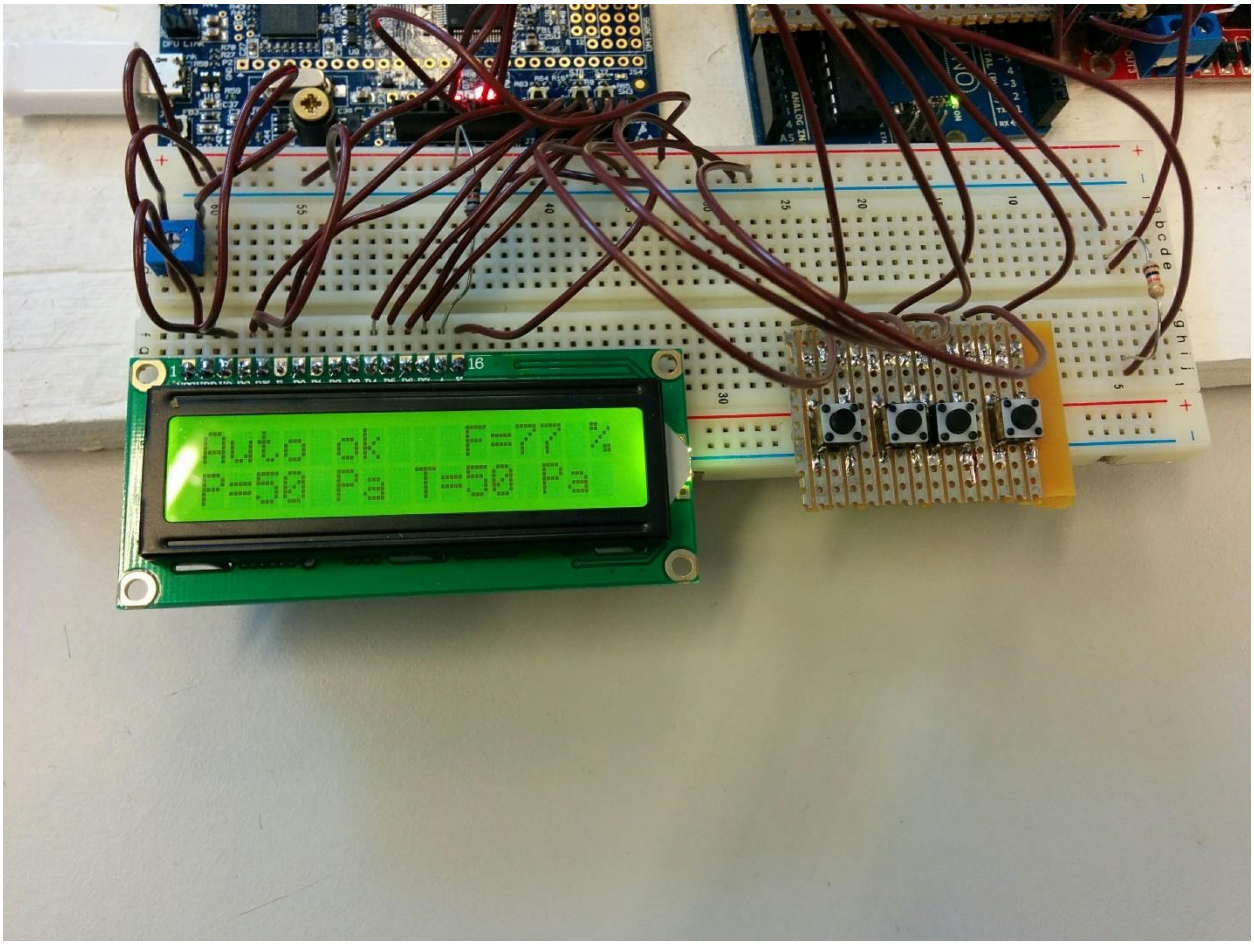
Autotry state



In this state, the program tries to achieve the pressure in less than 2 minutes by incrementing or decrementing the frequency. B0 can be pressed down to exit the state into manual mode and B3 exits back to autostart state. To exit, the buttons must be pressed down until the message “Changing state” appears, after which the button can be lifted.

Buttons	Actions
B0	Enters manual mode
B1	N/A
B2	N/A
B3	Enters autostart state

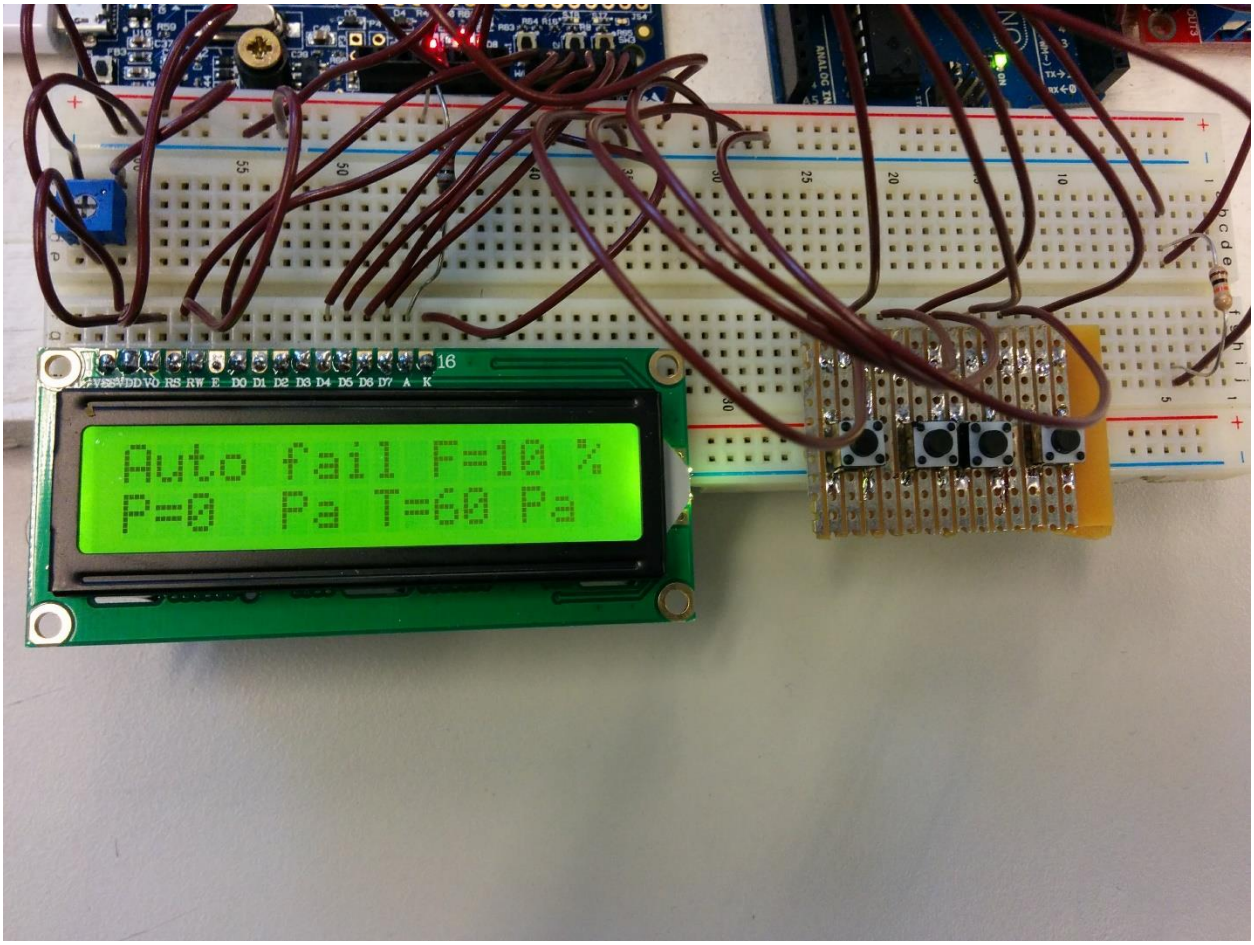
Autosuccess state



In this state, the program has achieved the target pressure. This state will enter back to the autotry state, if the pressure changes by more than 5 Pa. This state can be existed to the manual mode by pressing B0 or the autostart state by pressing B3.

Buttons	Actions
B0	Enters manual mode
B1	N/A
B2	N/A
B3	Enters autostart state

Autofailure state



The program enters this state, when it cannot reach the target pressure 2 minutes. When the program enters failure state, it reduces the frequency of the fan to 10%. The failure state can be exited by pressing B0 for manual and B3 for automode.

Buttons	Actions
B0	Enters manual mode
B1	N/A
B2	N/A
B3	Enters autostart state

KNOWN ISSUES

THE FAN

The fan will not spin if the new starting frequency is too high. This won't be issue in normal operation, because the program starts with a frequency of 0.

THE PRESSURE SENSOR

The pressure sensor will sometimes fail to measure the pressure. This can be solved by removing the USB cable from the LPCXpresso and reattaching it.

THE VENT

For unknown reasons, the vent lid, when closed tightly, seems to tighten even more by itself. Don't close the lid tightly.