

Multifunction Device STANESCU-FLOREA

David-Ioan

— *David-Ioan STANESCU-FLOREA (116583) 2022/05/23 17:48*

Introduction

Short presentation of the project:

- Measures the atmospheric temperature around the device, acts as a proximity detector(Sonar Ranger), can be used as a potentiometer and has both a stopwatch function and a 24h Clock function.
- This device isn't focused on solely doing one thing - just as a multimeter - can have different uses in different scenarios ; and it's main advantage is the modulation - can be added or swapped any kind of function
- As mentioned before, having a multifunctional device is an advantage in an uncertain situation - so, I wanted to create a device with multiple uses

General Description

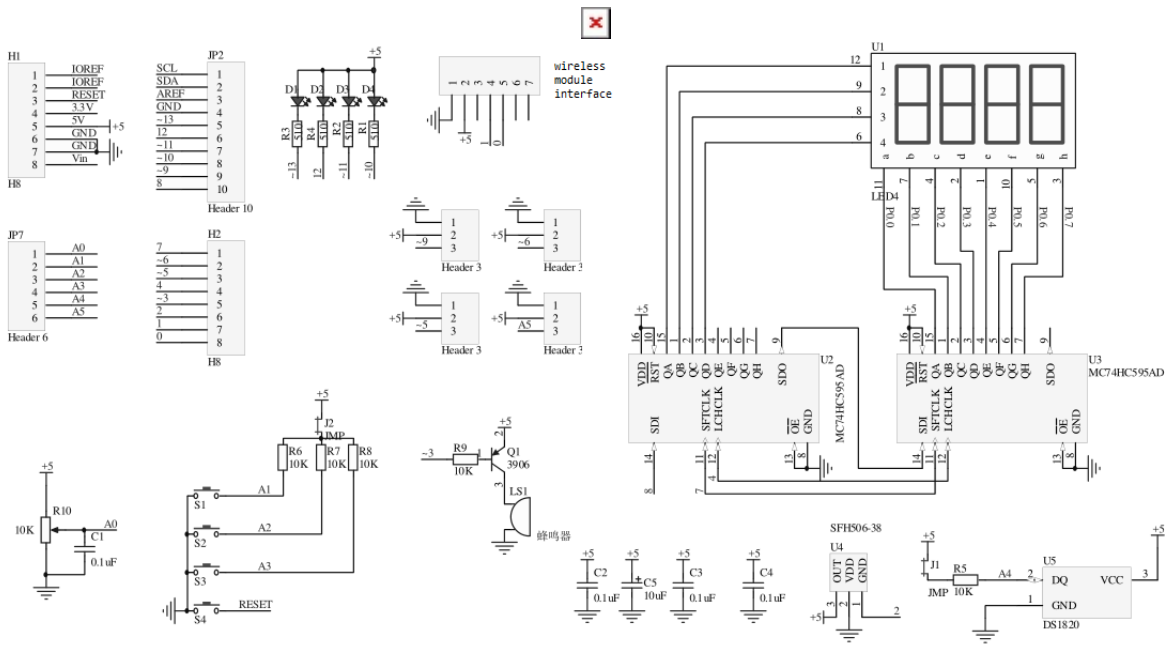


Hardware Design

Modules & Pieces:

1. Multifunction Shield
2. Arduino Uno R3
3. HC SR04 Sonar Module
4. LM35 Temperature Sensor
5. 3 Resistors
6. 3 LEDs
7. Colored Wires

Project Design (without the Multifunction shield *not found on Tinkercad)



Software Design

Firmware Description:

- Arduino IDE
- MultiFuncShield Library, Timer1, Wire
- for each mode there will be a separate function which on button press, it will reset (if already in a mode) or change to the assigned mode (if in neutral mode)
- Sources: Hackatronics ; implemented functions: startFunc(), temp(), potentiometer(), sonar(), stopwatch(), alarmClock(), displayTime(), clockISR() ;

Obtained Results

The project works as intended - with selectable modes, with multiple functions and modular:

1. Button 1: Temperature Mode
2. Button 2: Potentiometer Mode (it is also used as a bridge between the modes that must be Long-Pressed)
3. Button 3: Sonar Mode (or Proximity Sensor/Parking Sensor Mode)
4. Button 1 Long-Pressed: Stopwatch Mode
5. Button 2 Long-Pressed: Alarm-Clock Mode

- The main advantage is that it can host multiple uses and can add other uses to it.

Conclusions

This project was thought to be much like a multimeter - modular and with many uses.

- Please watch the demonstration video → <https://photos.app.goo.gl/sDCjmLzVembbbYsE9>

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[arduino_project_stanescu-florea_david-ioan.zip](#) — *David-Ioan STANESCU-FLOREA (116583)* 2022/05/23 17:48

User's Manual

1. Connect the Arduino through the USB port using a computer or using the 5V special socket.

Please do research before using the special powering socket because you might connect an improper PSU and risk to damage irreparably the device and its components

1. After the device has power, on the display will appear a message: "HI [...] Lets Code" ; you will also see the Red LED turn on, then the Yellow LED
2. When the device is ready to use, only the Green LED will be turned on and you will hear a beep (after a short delay, the Green LED will turn off)

There are 5 different selectable modes from which you can use the device for:

1. By pressing once the LEFT BUTTON, you will select the Temperature Mode
2. By pressing once the MIDDLE BUTTON, you will select the Potentiometer Mode (bridge between modes)
3. By pressing once the RIGHT BUTTON, you will select the Proximity Sensor Mode (Sonar Ranger)
4. By LONG-PRESSING the RIGHT BUTTON, you will select the Stopwatch Mode
5. By LONG-PRESSING the MIDDLE BUTTON, you will select the Alarm-Clock Mode

To go from one mode to another, you must press once one of the buttons of the modes that ARE NOT IN USE! When the device is good to change modes, the message "CODE" will appear on the display.

- If you are in the MODE 4, to reset the mode, you must LONG-PRESS the MIDDLE BUTTON - this will change to the Alarm-Clock Mode (both modes 4 and 5 are thought to be used together, so they are

linked)

- If you are in the MODE 5, in order to reset the mode, go to the alarm-setting mode and LONG-PRESS the RIGHT BUTTON

Please note that the MODE 4 and MODE 5 have different uses for the buttons, so please read ahead

MODE 4 BUTTON MAP:

1. When in the MODE 4, the Yellow LED will turn on and will stay on until either Start/Stop the countdown
 2. By LONG-PRESSING the LEFT BUTTON when the counting is stopped/reached 0(notice the Red LED being turned on) you will reset the counter (and the Yellow LED will be turned on)
 3. By pressing the RIGHT BUTTON when the counter is either reset(or reached 0) or stopped, you will add 10sec to the counter
 4. By pressing the MIDDLE BUTTON when the counter is either reset(or reached 0) or stopped, you will add 60sec to the counter
- The display will prompt any modification done to the counter
 - When the counter reaches 0, you can add seconds right away (notice that the Red LED will remain on to prompt that the stopwatch wasn't reset)
 - **To exit the Stopwatch Mode, LONG-PRESS the MIDDLE BUTTON**

MODE 5 BUTTON MAP:

1. When in the MODE 5, the display will prompt 12:00 in 24h-format
 2. By LONG-PRESSING the RIGHT BUTTON when showing the Hour or the Alarm-Hour, you will be able to modify the clock
 3. By LONG-PRESSING the LEFT BUTTON when the clock is showing the current time, you will activate/deactivate the alarm (see the top built-in Red LED turning on/off)
 4. By pressing the MIDDLE BUTTON you will be able to change between the clock and the set alarm
- The display will prompt any modification done to either the clock or the alarm
 - **To exit the Alarm-Clock Mode, go in alarm set mode (MIDDLE BUTTON) and LONG-PRESS the RIGHT BUTTON**

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Bibliography/Resources

–see the project archive <https://www.arduino.cc/reference/en/libraries/> <https://docs.arduino.cc/>

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