Automatic Hand Sanitizer Using MSP430F5529

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Introduction

- Touching alcohol containers or hand sanitizers with infected hands can spread the virus to the next person.

- We will design and implement a smart hand sanitizer dispenser that uses ultrasonic sensor to detect the presence of a hand and automatically pour sanitizer.

Components

MSP430F5529LP (Microcontroller Launchpad)

Ultrasonic Sensor (HC SR04)

Servo Motor (MG995)

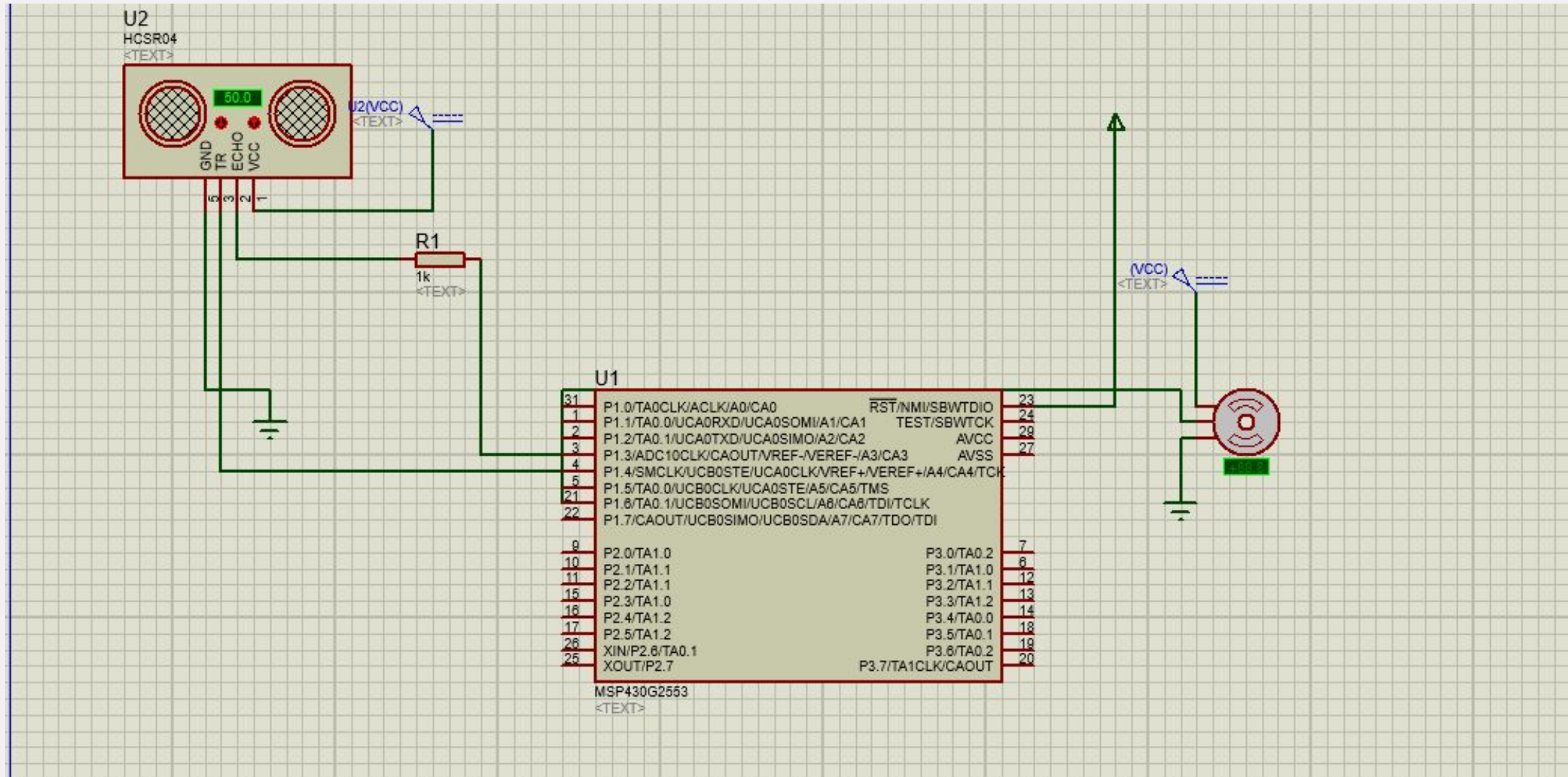Jumper wires

Hand sanitizer dispenser

DC power supply

MSP430F5529 microcontroller

- **12-bit analog-to-digital converter (ADC)**

- **Wake up from standby mode in 3.5 μs (typical)**

- **16-bit RISC architecture, extended memory, up to 25-MHz system clock.**

- **Non-volatile memory 128(kB)**

- **RAM 8(KB)**

- **Number of I2Cs 2**

- **SPI 4**

- **Comparator channels (#) 12**

Schematic

Code

```cpp
#include <Servo.h>
Servo servo;
int trigger_pin = 2;
int echo_pin = 3;
int pos = 0;
int time;
int distance;
void setup()
{
        pinMode (trigger_pin, OUTPUT);
        pinMode (echo_pin, INPUT);
        servo.attach(10);
}
void loop()
{
    digitalWrite (trigger_pin, HIGH);
    delayMicroseconds (10);
    digitalWrite (trigger_pin, LOW);
    time = pulseIn (echo_pin, HIGH);
    distance = (time * 0.034) / 2;

  if (distance>=3 && distance <= 10)
        {
        rotate(180);
        }
  else {
        rotate(180);
        }
}
```

```cpp
void rotate(int angle)
{
  for(pos=0;pos<=angle;pos++)
  {
    servo.write(pos);
    delay(15);
  }
  delay(1000);

  for(pos=angle;pos>=0;pos--)
  {
    servo.write(pos);
    delay(15);
  }
  delay(1000);
}
```
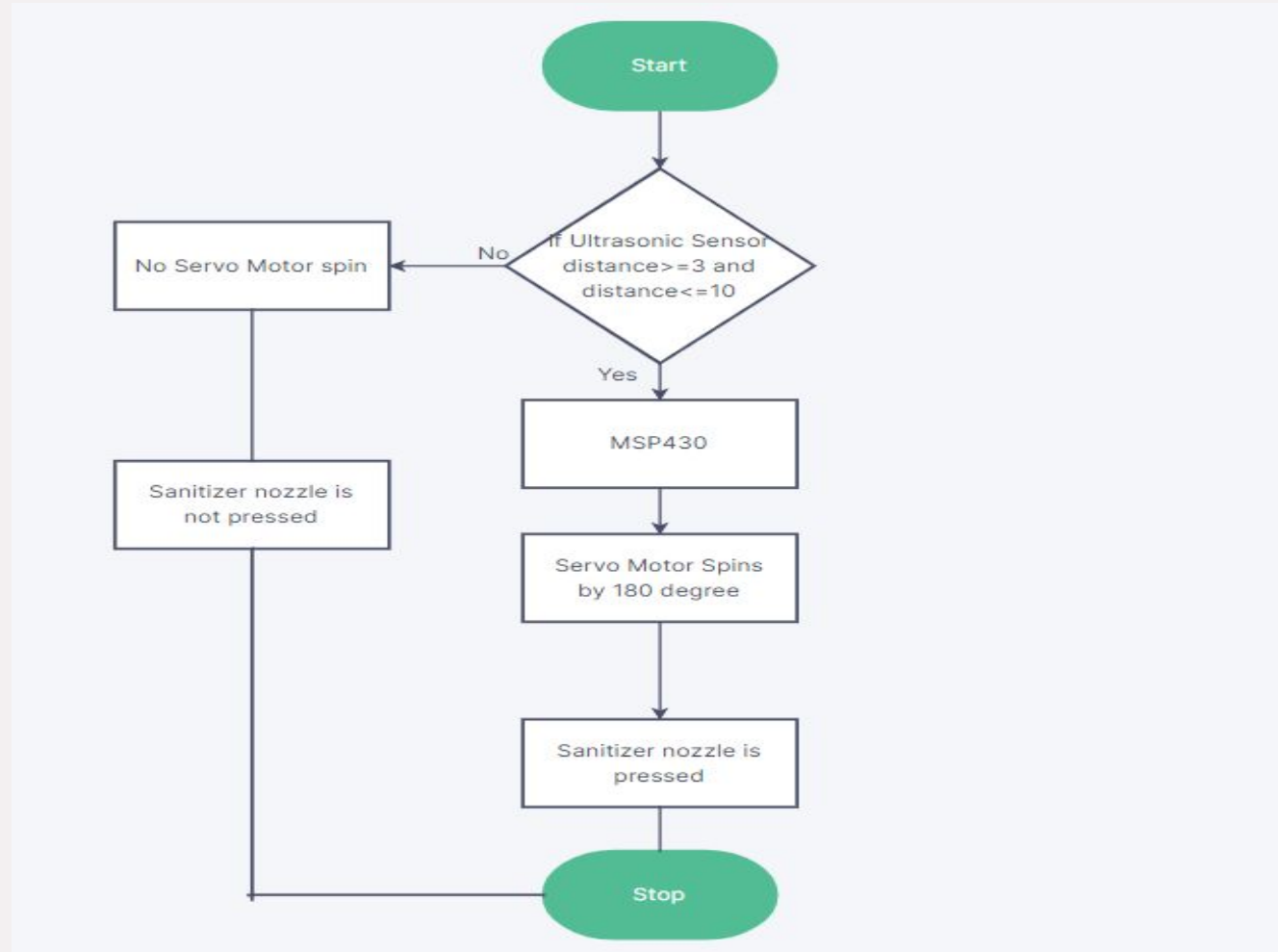
Working

When there is an object(hand) in front of the ultrasonic sensor, it will calculate object(hand) distance by using formula

distance = (time * 0.034) / 2

If object is within the range of 3cm – 10cm. Servo will rotate through 180 degree and then will be back to its original position. Due to which sanitizer will get poured on hand.

Flowchart

Working Model

Advantages

1) Low cost

2) Low power consumption

3) High accuracy

4) The sensor and motor has excellent sensitivity combined with a quick response time.

5) The sanitization process will be contactless.

Disadvantages

1) A constant DC power supply will be required.
2) The servo motor may experience some wear and tear after extended use.
3) Refilling the sanitizer dispenser is slightly difficult in this case.

Conclusion

With the proposed device, it is possible to avoid many people coming into contact with the pump handle, thus preventing fomite viral transmission and making the use of hand sanitizer much more convenient.

It ensures the actual hygiene and sanitization because of being contactless.

THANK YOU!