Hand Wash Aiding System

Description:

In this project we deign a Hand wash aiding system for humans.

This is based on controlling the water faucet by checking the presence of Hand under water faucet.

When a user presses the button, water faucet is opened. Current time is sent to serial terminal by measuring it through RTC module. Water temperature is continuously measured and is displayed on LCD. User's hand is detected by ultrasonic sensor and count down timer is set for 30 seconds.

After completing 30 seconds faucet is closed. A green led is glowed to indicate proper hand washing and a fan is turned on for 15 seconds to make the hands dry.

If user removes his hand before 30 seconds, the system blinks a warning yellow led and waits user for 10 seconds to put his hand back under the faucet. If the hand is detected the counter is rest to 30 seconds and restart the cycle. If hand is not detected within 10 seconds, the system resets to its initial state and wait for user to press button.

Hardware:

We chose the best components to simulate the faucet and other components.

Arduino Mega 2560 is used as main controller for this task.

Servo motor is chosen to indicate water faucet open and close mechanism. It is included in the kit and is easy to operate using Servo library in Arduino IDE. It simulates better to open and close mechanism. E.g 1000usec is equal to close and 2000usec value indicate close.

16x2 LCD is used to display water temperature and count down timer values. LCD is used is 4-bit display mode.

To read and send current time whenever user presses push button, DS1307 RTC module is used. It interfaces Arduino mega over i2c interface.

Ultrasonic sensor HS-SR04 is used to find the presence of hand under faucet. There is a fix distance between water faucet and sink. Let us assume fixed distance is 20cm. If there is a hand present, the measured distance will be less than 20 cm. In our program we say if we get distance value less than 15cm, it means user's hand is present under water faucet. Ultrasonic sensor is interface with Arduino mega using two GPIOs.

Dc motor with fan blades is used to simulate Fan. Fan mechanism consists of following items

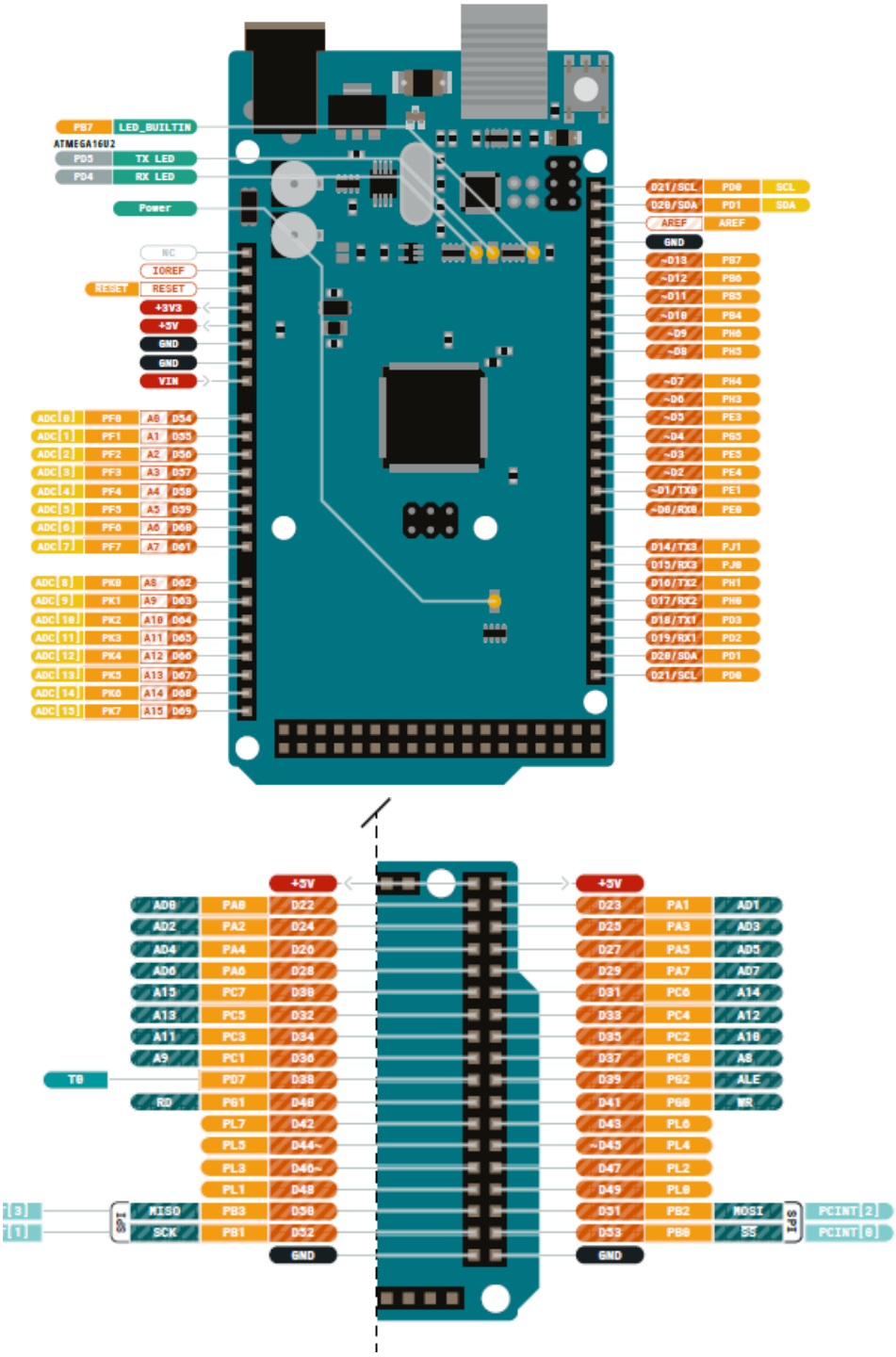
1. Dc motor with fan blades
2. 5V Relay
3. NPN Transistor
4. Resistor

Only one GPIO of Arduino mega is required to switch ON/OFF the fan. Resistor is used between the GPIO and base of the transistor. The transistor is used to switch on relay which finally power up the dc motor of fan.

DHT11 is used to measure the temperature of the water. It is interfaced with Arduino mega using one wire interface.

One Push button and two LEDs are also used. A resistor is used with both LEDs to limit the current.

ARDUINO MEGA



Hardware Connections

S.No	Part	Simulated Part	Arduino Mega Pinout
1	Water Faucet	Servo Motor	D13
2	Temperature sensor	DHT11	D11
3	Ultrasonic Sensor	HC-SR04	D49, D53
4	LCD	16x2 LCD	D4, D5, D6, D7, D8, D9
5	RTC	DS1307 RTC	D20, D21
6	FAN	Transistor, Relay, DC motor with blades	D23
7	Push button	Push button	D12
8	LED GREEN	LED GREEN	D24
9	Warning Light	LED YELLOW	D25