



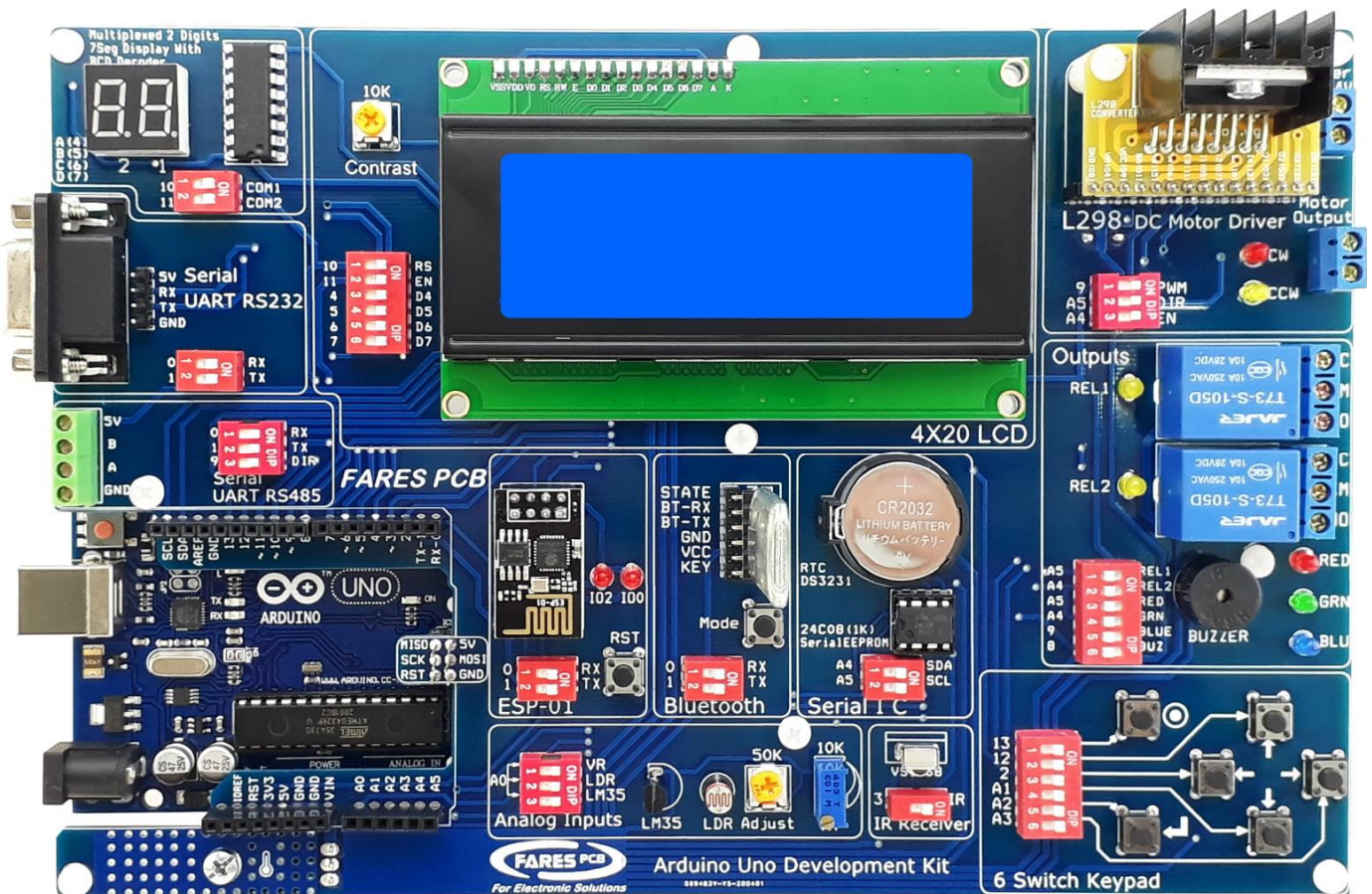
General Description

Arduino platform is one of the most popular solutions dedicated to beginners in electronics in the world. It integrates popular AVR microcontrollers and provides beginners-friendly programming language (based on C / C++) into a coherent and easy-to-use tool with a large number of applications.

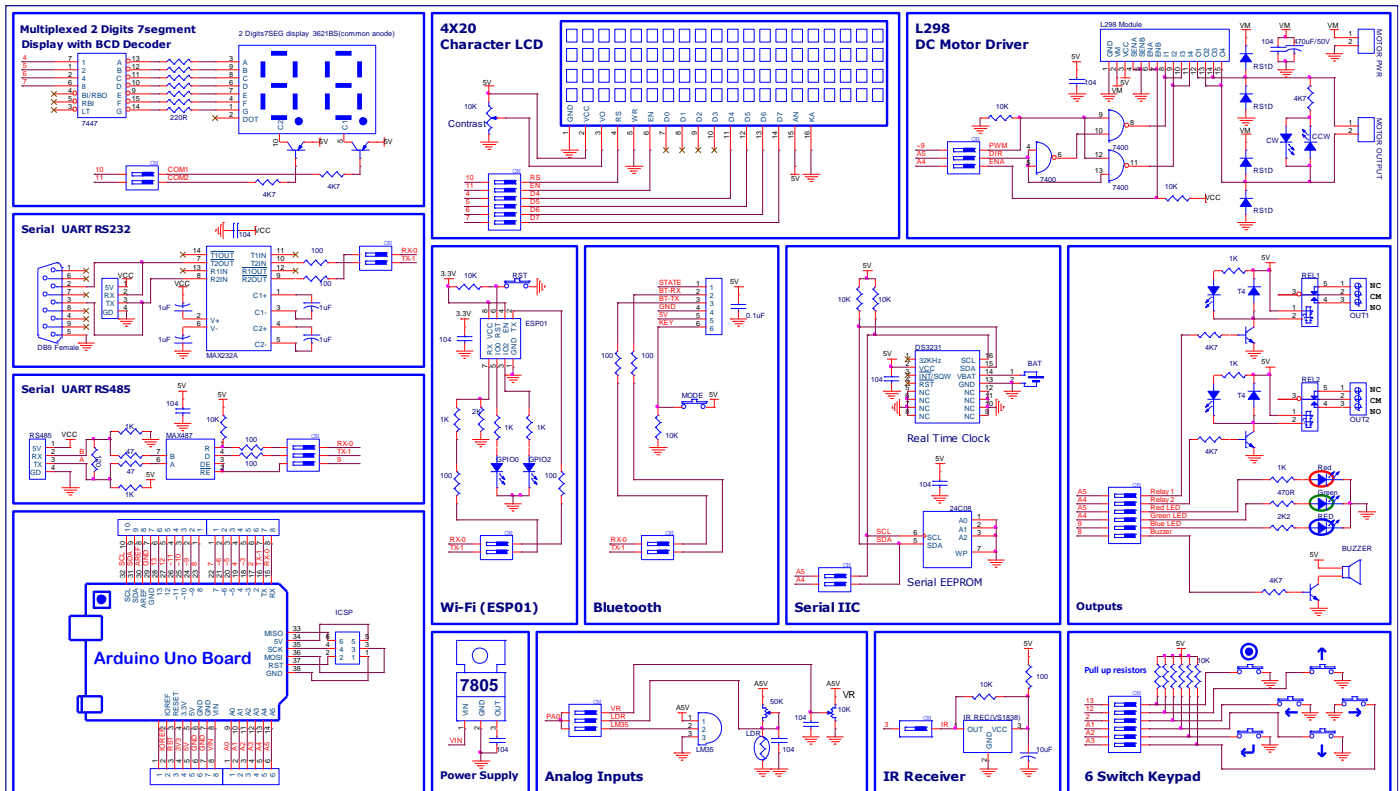
The Arduino Uno board is a microcontroller board based on the Atmega328 microcontroller. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller. simply connect it to a computer with a USB cable or power it with AC-to-DC adapter to get started.

Arduino Uno Development Kit abbreviated as **Uno Kit** is a comprehensive development kit for Arduino Uno board that provides the most essential peripherals needed to start discovering Arduino world. **Uno Kit** is designed particularly for students, beginners, and recently graduated engineers to provide easy development of Arduino-based projects.

Uno Kit provides the most common primary devices and circuits, such as LCD, KEYPAD, analog inputs, general outputs, and more. Thus, it reduces time and effort in hardware design and test, hence, the developer can focus his efforts on firmware development. All Arduino pins are brought out via a female pin header for direct port connecting or plugging an Arduino Uno shield.



Arduino Uno kit



Arduino Uno kit (schematic diagram)

Uno Kit features

- **Power supply unit**

Uno kit can be powered from DC wall wart adapter (9-15V)/1A

- **Microcontroller**

- 1) Arduino Uno board (ATMEGA328)
- 2) 14 Digital I/O pins (of which 6 pins can be used as PWM outputs)
- 3) 6 Analog inputs
- 4) 16 MHz crystal oscillator
- 5) USB connection
- 6) DC Power jack
- 7) ICSP header
- 8) Reset button

- **Display**

- 1) 80 characters LCD (4X20) with backlight.
- 2) 2 Digits (common anode) 7 segment display with BCD decoder 7447.

- **Input switches**

6 switches keypad with pull up resistors.

- **Serial Communication**

1. UART Communication
 - 1) TTL (Full-duplex) female pin header.
 - 2) RS232 (MAX232) (Full-duplex) standard DB9 female socket and pin header.
 - 3) RS485 (MAX487) (Half-duplex) screw terminal.
2. I²C
 - 1) DS3231 high precision RTC (Real Time Clock) with a backup battery.
 - 2) AT24C08 Serial EEPROM (1KB).

- **Analog Inputs and sensors**

- 1) One adjustable analog input using a high precision multi-turn potentiometer.
- 2) Temperature sensor LM35 (0°C - 150°C) (0V - 1500mV).
- 3) Light Dependent Resistor LDR with adjustable sensitivity.

- **Wireless**

1. Wi-Fi module (ESP-01) with reset switch and LED indicators for IO0 and IO2 ports.
2. Bluetooth module socket with mode switch.
3. IR (Infrared Receiver) sensor VS1838.

- **Outputs**

1. Two output relays (10A) both normally open and normally closed are available with a status LED indicator.
2. General-purpose indicator LEDs (**Red**, **Green**, and **Blue**).
3. Output buzzer.

- **Motor driver**

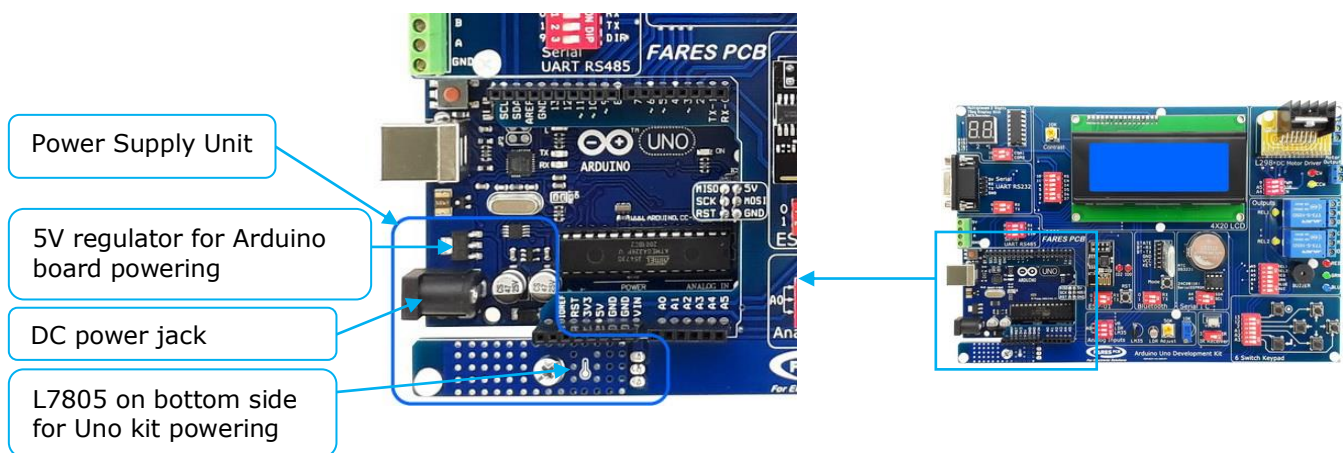
DC motor control (speed and direction) up to 4A with CW/CCW direction status LED Indicator.

- **On-board connections**

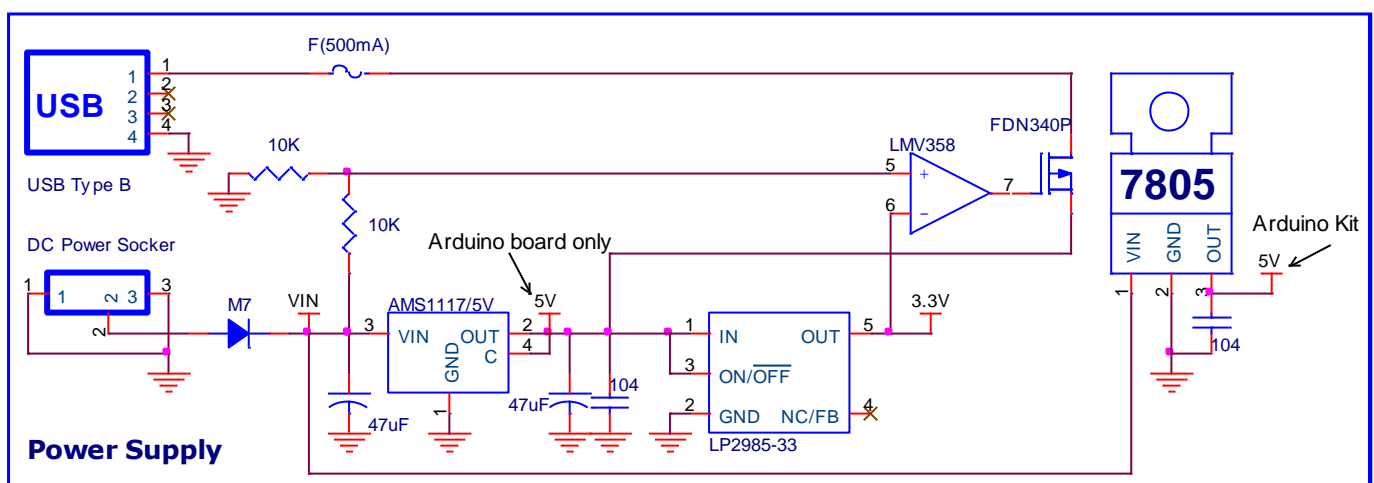
All Arduino pins are brought out via a female pin header for direct port connecting or plugging an Arduino Uno shield.

Power Supply Unit

Power could be supplied from DC power supply adaptor (9V - 15V) via DC power jack included in Arduino board where a 5V regulator is used to generate the required voltage to supply Uno board. An extra voltage regulator on Arduino Uno kit (L7805) is used to generate the required voltage to supply all other peripheral circuits on kit. Only Arduino Uno board can be powered from USB type B socket, but other kit parts powering need adaptor.



Power supply unit



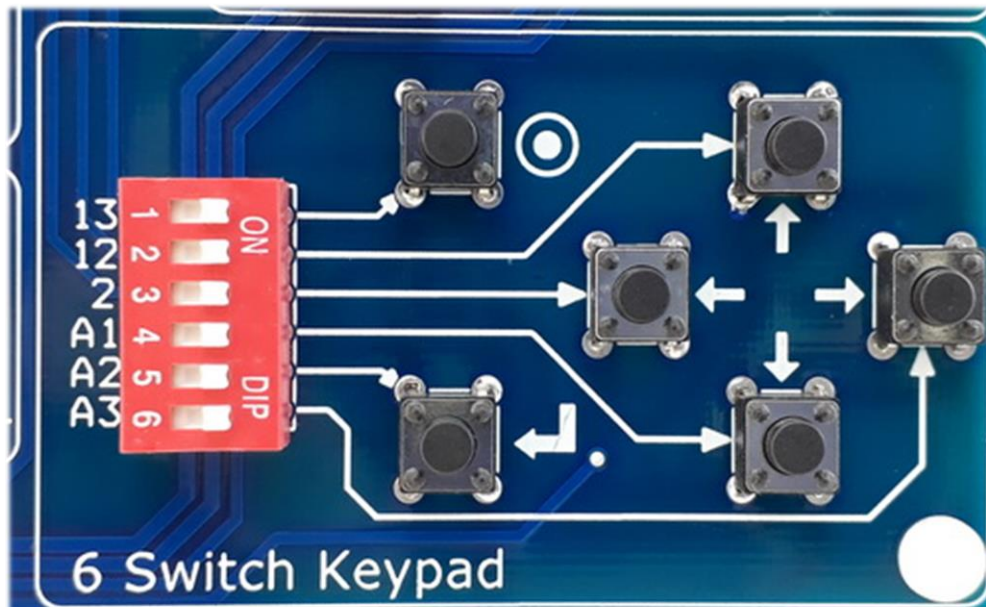
Power supply unit (schematic diagram)

Uno Kit comes with Arduino Uno board plugged on male/female pin header socket from the bottom side to create a copy of Arduino pins again on the top side thus allowing direct accessing for all Arduino pins or plugging any Arduino Uno compatible shield. Uno kit has a slot over the Arduino board to make it easier to be monitored and handled.

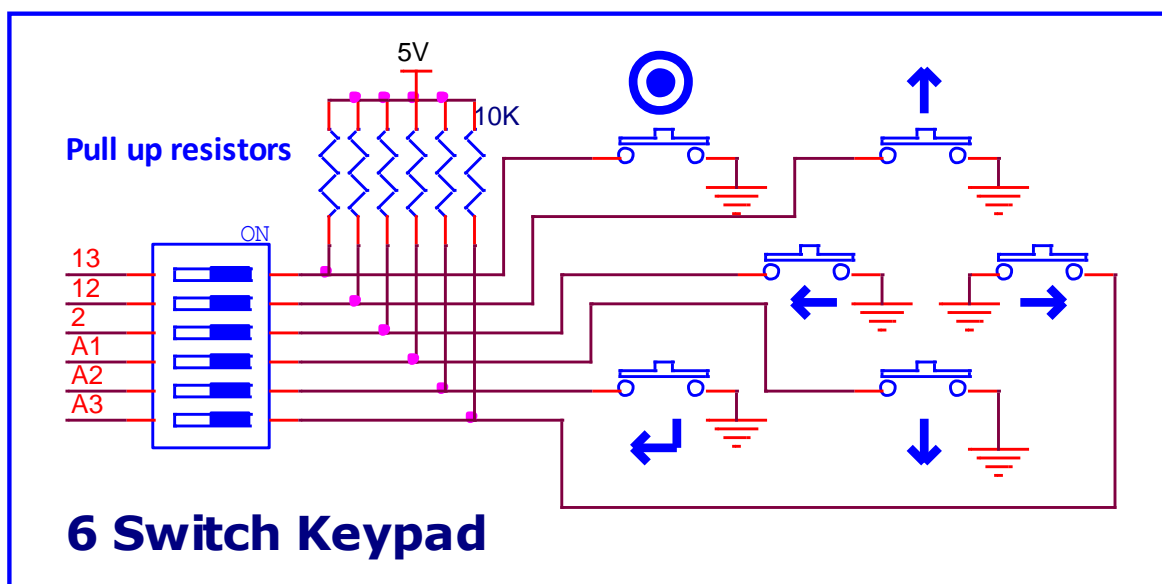


Keypad Unit

Uno Kit includes 6 push button switches with 10K Ω pull up resistors. Switches can be read directly as digital input lines. If an input line goes low, it means a switch is pressed.



Keypad Unit



Keypad Unit (schematic diagram)

Outputs Unit

This unit contains six outputs divided as follows

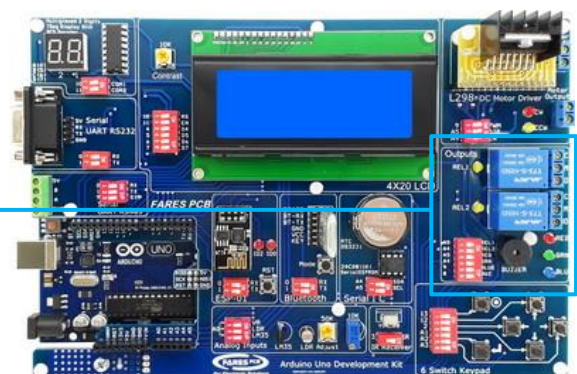
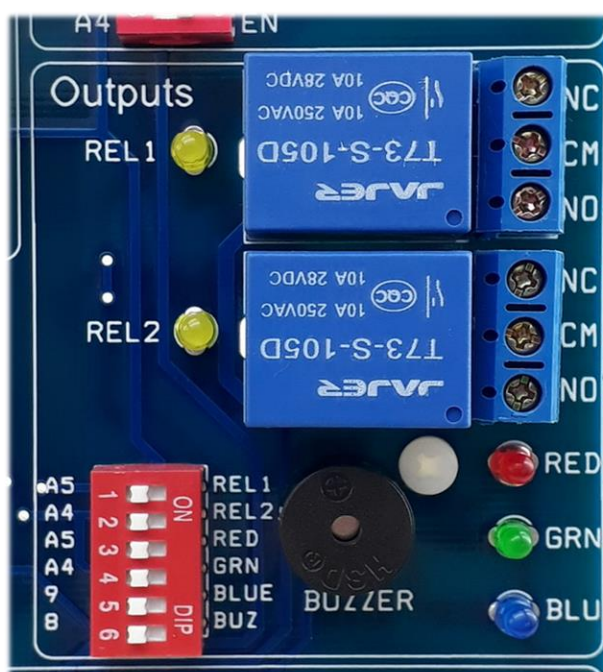
- Two output relays.
- Three output LEDs.
- One output Buzzer.

Outputs are connected to Arduino board as follows

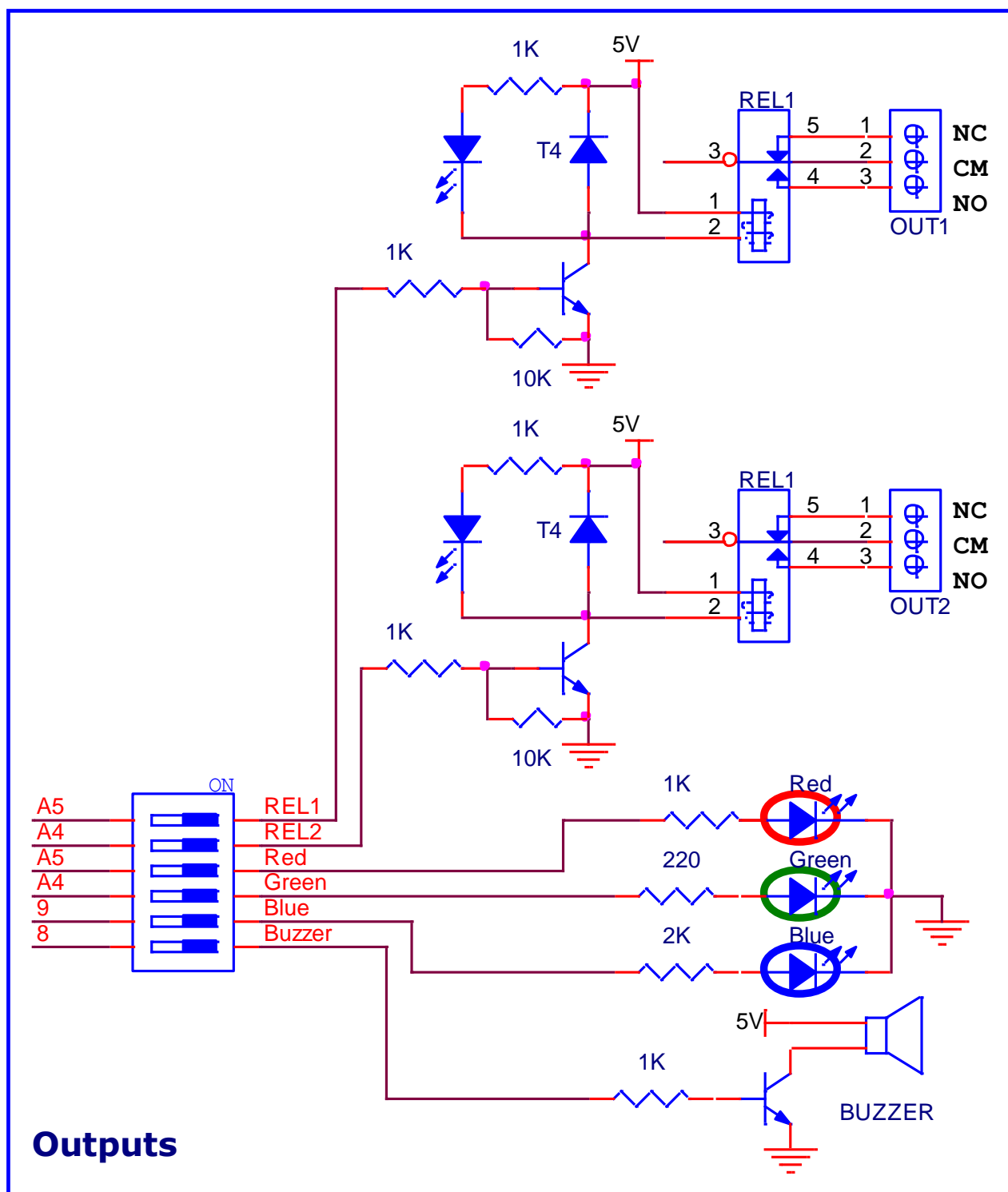
Output	Arduino pin
Relay1	A5
Relay2	A4
Red LED	A5
Green LED	A4
Blue LED	9
Buzzer	8

Notes:

- Relay1 and Red LED share the same Arduino output port pin(A5).
- Relay2 and Green LED share the same Arduino output port pin(A4).
- I/O ports **A5**, **A4**, and **9** are connected to other circuits in the kit. Insure disconnecting these ports (turning off DIP switches) in the other units before enabling them in the output unit.



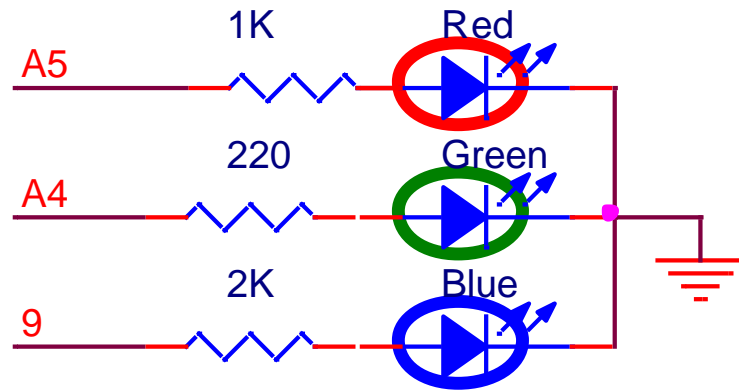
Outputs unit



Outputs unit (schematic diagram)

Output LEDs

Three LEDs with current limiting resistors.



Red LED is connected to **pin A5**

Green LED is connected to **pin A4**

Blue LED is connected to **pin 9**

Each LED can be enabled or disabled via a DIP switch. LEDs are active high. i.e. output high turns LED on and output low turns it off.

Output relays

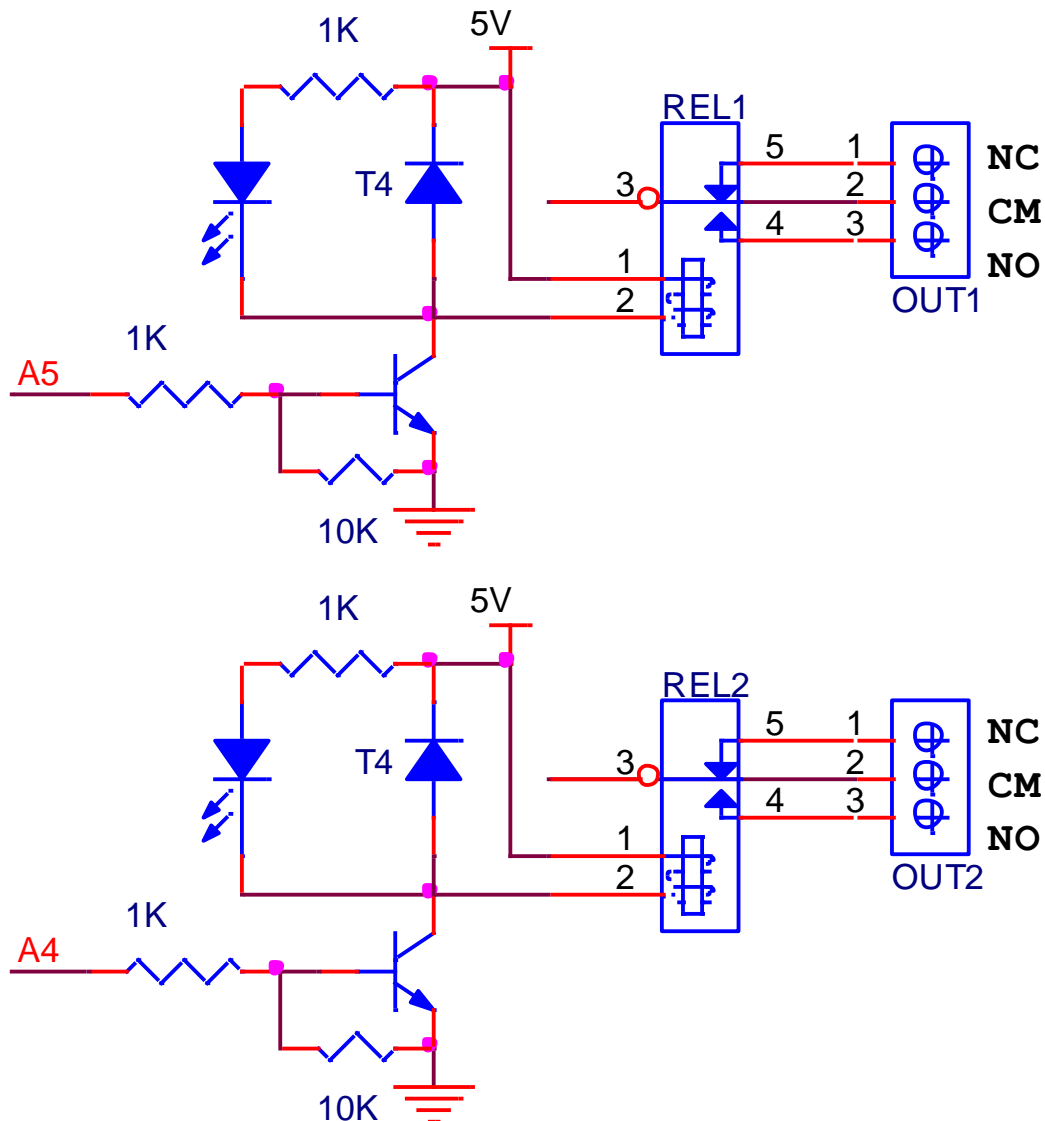
Two output relays are added to the **Arduino Uno** kit to allow dry contact switches which are suitable for AC or DC switching applications. Each relay has its own related LED for status indication and can be individually enabled via a DIP switch. Relays are driven by NPN transistors.

Freewheeling diodes are included to protect transistors from back EMF voltage that arises on the relay coil during switching off.

Relay1 is attached to port pin **A5** and relay2 is attached to port pin **A4**.

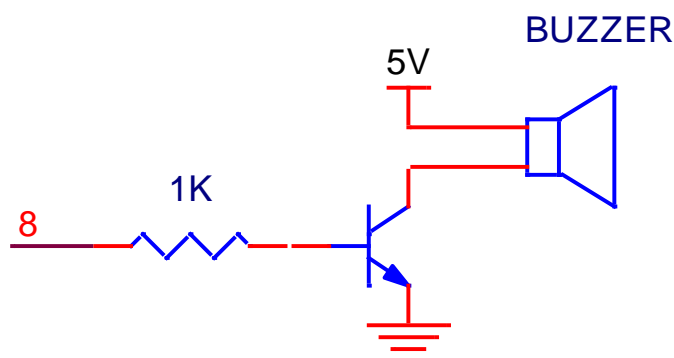
Relays are 5V coil and rated to 10A contacts (resistive load)(recommended current is limited to be not more than 5A).

Both of normally open and normally closed contacts are brought out via screw clamp terminals.



Output buzzer

One output buzzer (5VDC) is included in the output unit to port pin **8**. Also, it can be enabled using a DIP switch.



7Segment Display

7segment display is used to indicate numerical data. It can display digits from 0 to 9. 7segment display is very popular and has many applications. **Uno Kit** includes multiplexed common anode two digits 7segment display in addition to 7447 BCD decoder to simplify firmware.

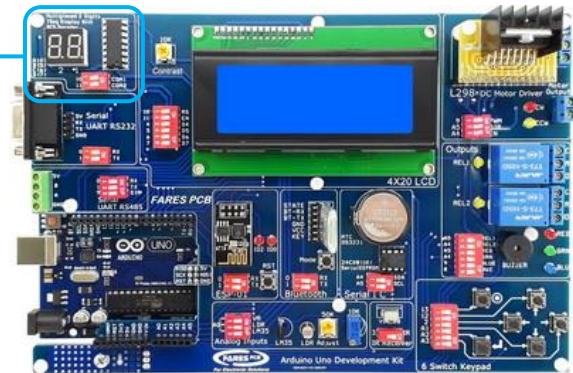
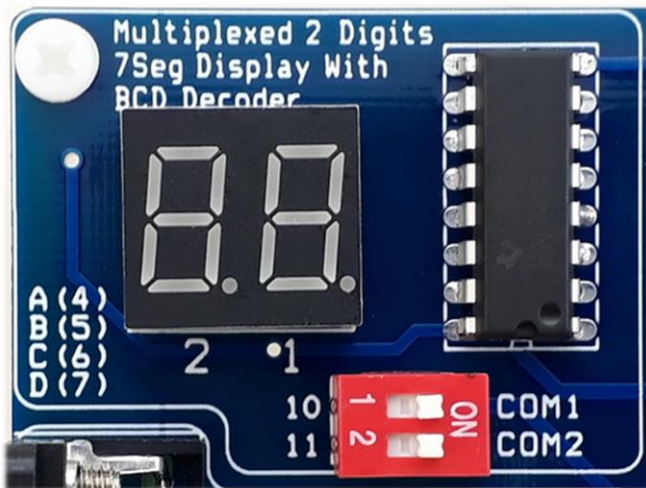
Multiplexed Two Digits 7seg Display Unit

Two multiplexed 7segment digits are included in **Uno Kit**. 7segments are referred to by letters "A", "B", "C", "D", "E", "F", "G". All digits share the same segments. i.e. segment "a" is the same for all digits. 7segment code is generated from 7447 BCD decoder IC, 7447 converts binary data received from the microcontroller into 7 segment code.

The table below shows binary data vs the generated 7 segment code.

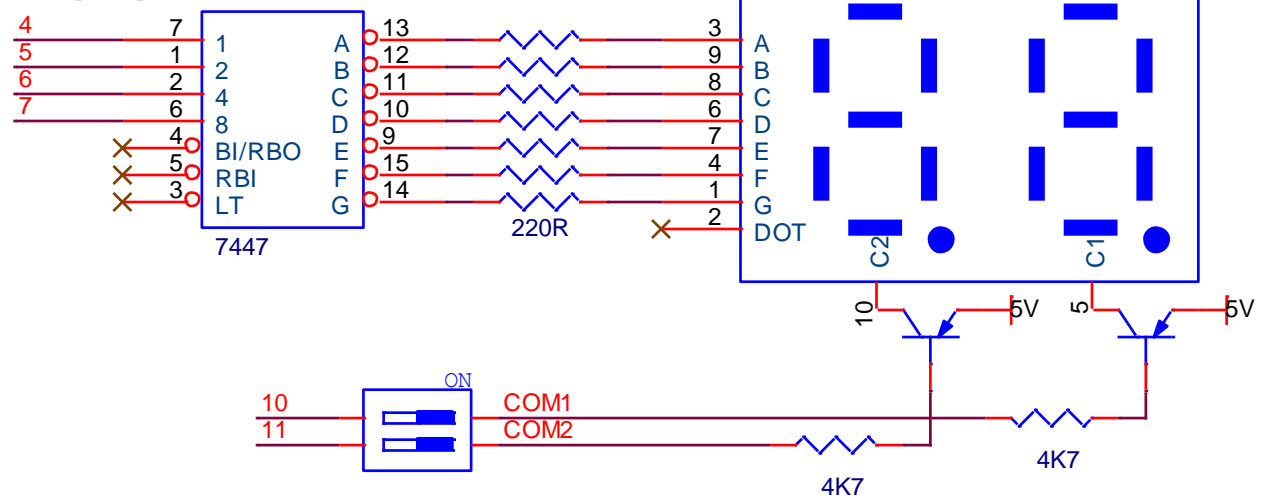
Digit	Decoder input				Decoder output						
	D(Bit3)	C(Bit2)	B(Bit1)	A(Bit0)							
	PB4	PB2	PB1	PB0	A	B	C	D	E	F	G
0	0	0	0	0	0	0	0	0	0	0	1
1	0	0	0	1	1	0	0	1	1	1	1
2	0	0	1	0	0	0	1	0	0	1	0
3	0	0	1	1	0	0	0	0	1	1	0
4	0	1	0	0	1	0	0	1	1	0	0
5	0	1	0	1	0	1	0	0	1	0	0
6	0	1	1	0	0	1	0	0	0	0	0
7	0	1	1	1	0	0	0	1	1	1	1
8	1	0	0	0	0	0	0	0	0	0	0
9	1	0	0	1	0	0	0	0	1	0	0

Each digit has its own common (Anode type), which is derived by discrete PNP transistors which in turn is connected to Arduino via DIP switch. To enable a digit, initiate the specific pin to low level to bias transistor which pulls the anode common to 5V, and upon the decoder outputs, data will be displayed.



7Segment display

Multiplexed 2 Digits 7segment Display with BCD Decoder



7Segment display (schematic diagram)

BCD decoder inputs are connected to Arduino uno as shown in the table

BCD Decoder Input	Arduino Pin
A (Bit0)	4
B (Bit1)	5
C (Bit2)	6
D (Bit3)	7

7Seg Commons are connected to Arduino uno ports as shown in the table

Common	Arduino Pin
COM 1	10
COM 2	11

Note:

- Each 7seg digit can be enabled or disabled individually using a DIP switch.
- 7 Segment unit and LCD unit share the same I/O ports **4, 5, 6, 7, 10,** and **11**. Insure disconnecting these ports (turning off DIP switches) in LCD unit before enabling them in 7 segment unit.

4X20 LCD Display Unit

LCD (Liquid Crystal Display) is a more informative output device than 7segment digits. The power of LCD lies in its capability of showing characters.

Standard LCD module pin out number, symbol, and function are shown in the table below.

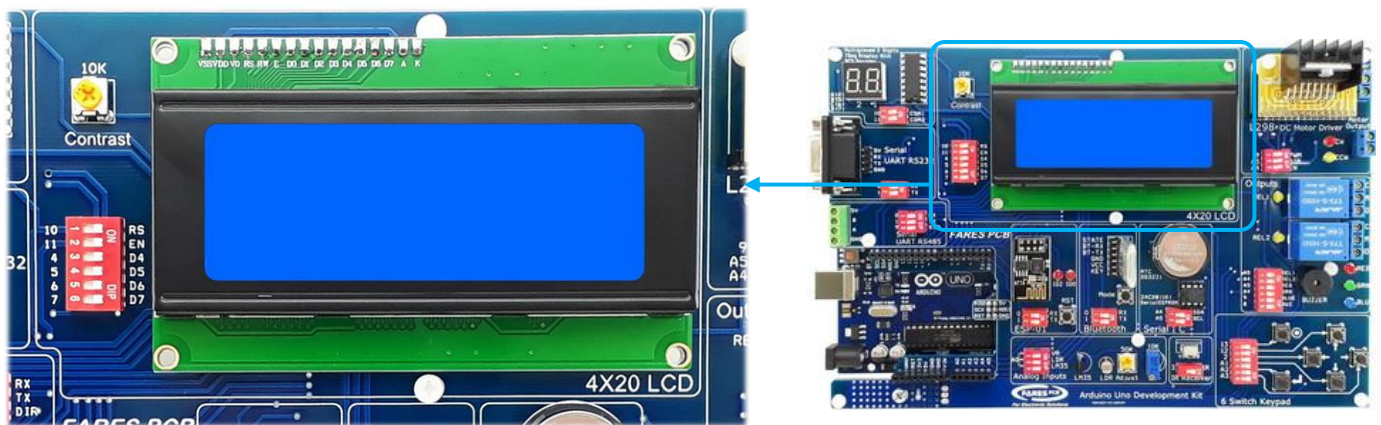
LCD pin number	LCD pin symbol	LCD pin function
1	VSS	Ground
2	VCC	+5V
3	VO	Contrast adjustment
4	RS	Register Select(0:Command , 1:Data)
5	R/W	R/W(0:Write , 1:Read)
6	EN	Enable
7	D0	Data bit 0
8	D1	Data bit 1
9	D2	Data bit 2
10	D3	Data bit3
11	D4	Data bit4
12	D5	Data bit5
13	D6	Data bit6
14	D7	Data bit7
15	A	Back light anode(+)
16	K	Back light cathode(-)

Uno Kit contains a 4X20 character LCD. Four lines of characters each have 20 characters line length is quite sufficient to show quite amount of information. LCD is configured in 4-bit mode and connected to Arduino via a DIP switch as shown in table

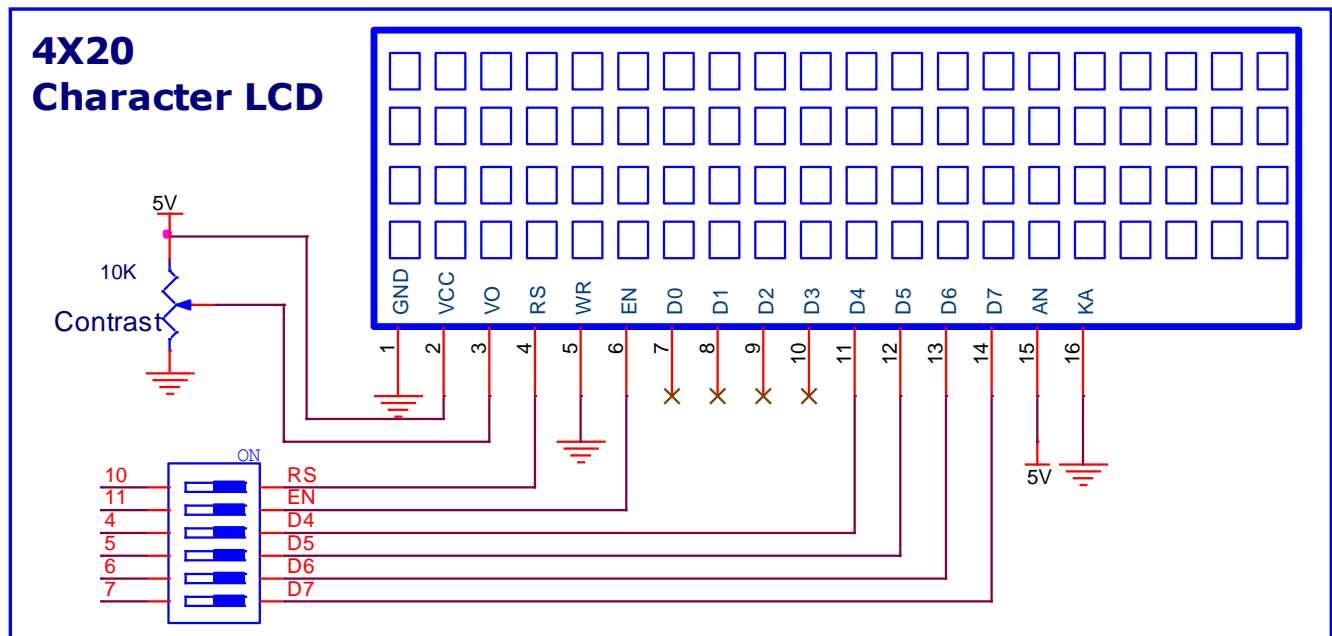
LCD pin number	LCD pin symbol	Arduino Pin
4	RS	10
6	EN	11
11	D4	4
12	D5	5
13	D6	6
14	D7	7

Note:

- LCD R/W signal is tied to ground.
- 10K Ω variable resistor labeled "Contrast" is adjusted to control the LCD contrast.
- LCD unit and 7 Segment unit share the same I/O ports **4, 5, 6, 7, 10,** and **11**. Insure disconnecting these ports (turning off DIP switches) in 7 Segment unit before enabling them in LCD unit



4X20 LCD display unit

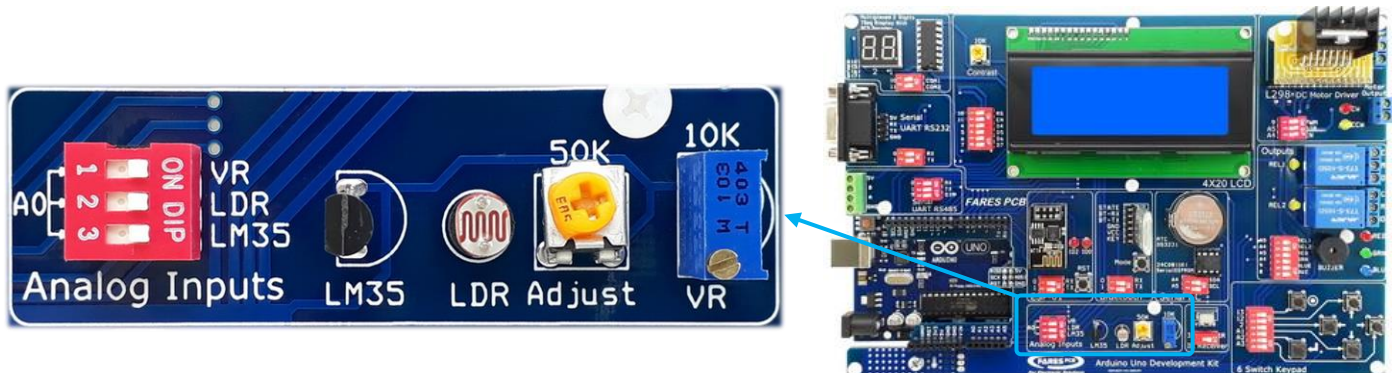


4X20 LCD display unit (schematic diagram)

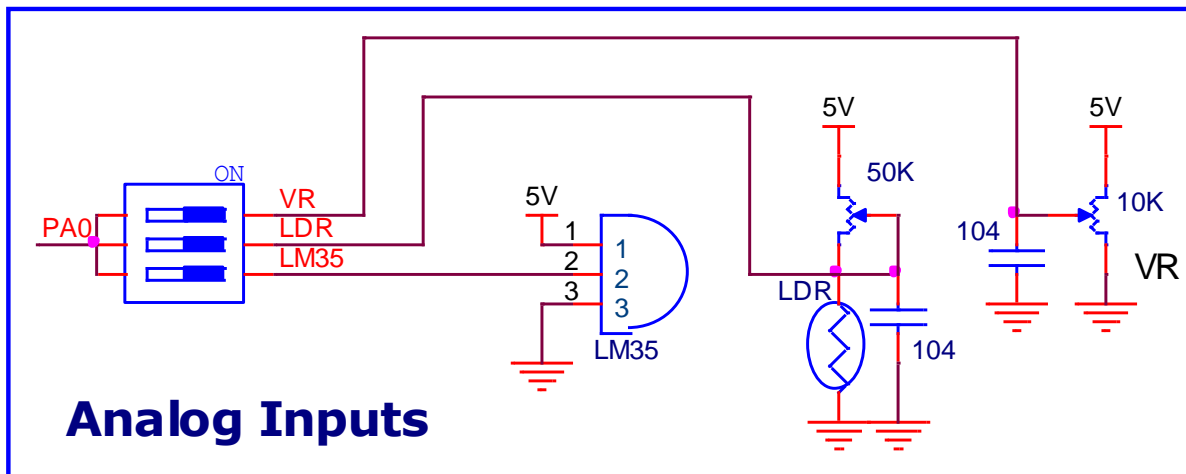
Analog Input Unit

Uno Kit includes three sources of analog input signal that can be measured by Arduino uno board.

1. Variable Resistor (VR).
2. Light Dependent Resistor (LDR).
3. Temperature sensor (LM35).



Analog input unit



Analog input unit (schematic diagram)

Note:

All analog input sources share the same analog input A0. So, only one analog source can be read at a time.

Variable Resistor (VR)

Multi-turn potentiometer provides stable and precise resistance so it is used mainly for trimming and precision adjustments.

VR is a 10KΩ multi-turn variable resistor. The fixed terminals of the variable resistor are connected to GND and 5V whereas the variable terminal is connected to Arduino pin A0 via DIP switch (channel 1). The resistor can be adjusted precisely to the required voltage (0.00V to 5.00V).

Light Dependent Resistor (LDR)

LDR is a passive electronic component that has a resistance which varies depending on the light intensity. LDR resistance is ranged from Several hundreds of Kilo ohms in darkness to few hundreds of ohms when light falls on it.

LDR and a 50K ohm potentiometer form a voltage divider circuit that provides a variable voltage that is inversely proportional to the light intensity. Adjust the variable resistor to obtain the required sensitivity. The analog voltage is delivered to Arduino pin A0 Via DIP switch(channel 2).

Temperature sensor (LM35)

LM35 is a precision integrated circuit temperature sensor whose output voltage varies based on the temperature around it. It can be used to measure temperature anywhere between -55°C to 150°C. It doesn't require any calibration. LM35 provides an analog voltage that is linearly proportional to the Celsius temperature. Each increase in one degree Celsius causes an increase of 10mV in output voltage.

Follow the next equation to calculate the temperature:

$$\text{Temp}(^{\circ}\text{C}) = \text{Output Voltage (mV)} / 10$$

Output voltage connected to the Arduino pin A0 via DIP switch (channel 3).

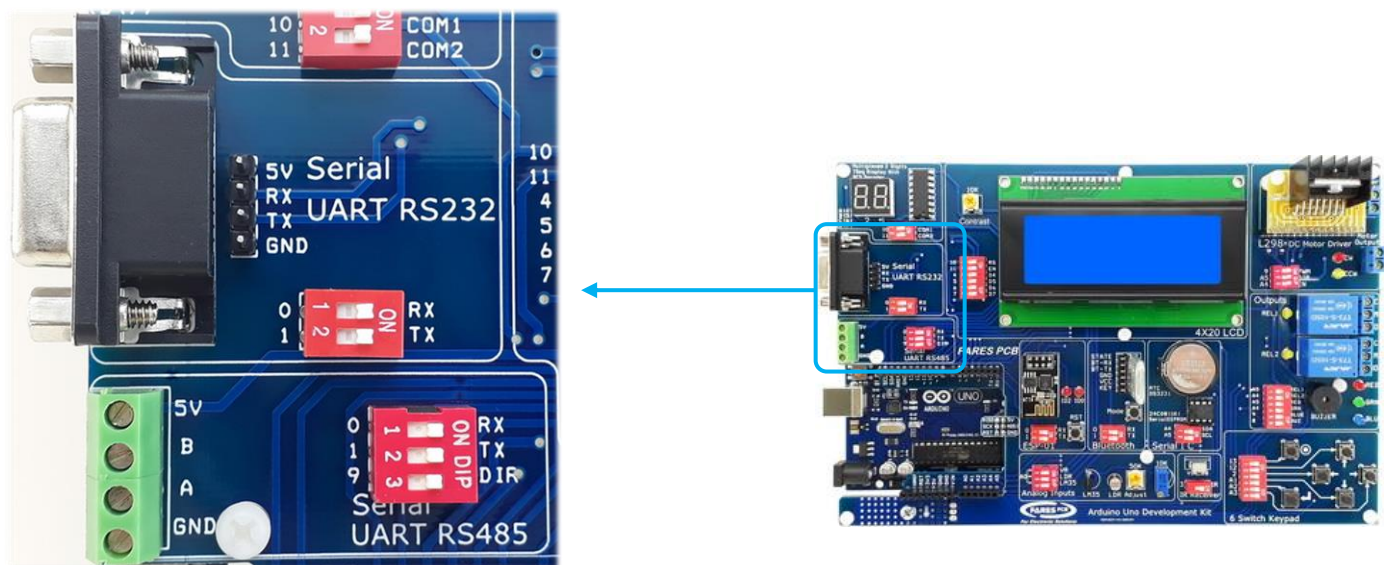
Analog inputs are connected to Arduino uno board as shown in the table

Analog Input	Arduino Pin
Variable resistor (VR)	A0
Light Dependent Resistor(LDR)	
Temperature sensor (LM35)	

UART serial communication

UART is one of the most famous ways to communicate between microcontrollers or microcontroller and PC. UART is a byte-oriented protocol that determines a specific way to transmit a byte serially between two devices.

This type of protocol sends data as a string of characters. UART only requires two signal lines to successfully communicate, a TXD (transmit data) and RXD (receive data) line as well as a common ground line (used as a reference point). When communicating with another UART device, the TXD line will be attached to a corresponding RXD line, and vice-versa. No clock line is used with the UART protocol. Rather, users instead specify a particular baud rate for the two devices to operate at. A baud rate indicates how many bits, including data, start, stop, and parity bits, are transferred over the data lines in one second time frame. A common UART communication configuration uses a start bit, 8 data bits, no parity, and a single stop bit.



UART serial communication unit

Note:

UART serial pins RX, TX are connected to other circuits in the kit such as Wi-Fi and Bluetooth modules. Insure disabling these modules (turning off DIP switches) before enabling in UART serial unit.

TX and RX signals can be physically represented in various values. TTL, RS232 or RS485.

In UART TTL signals are represented as following

$V_{OL} = 0V$ to $0.4V$

$V_{OH} = 2.4V$ to $5V$

$V_{IL} = 0V$ to $0.8V$

$V_{IH} = 2V$ to $5V$

This voltage level is adequate for transmitting data between two adjacent devices (normally $< 50cm$) and has a limited baud rate vs distance.

Uno Kit provides UART TTL via available female pin header socket TX-1, RX-0.

In UART RS232 signals are represented as following

$V_{OL} = +5V$ to $+25V$

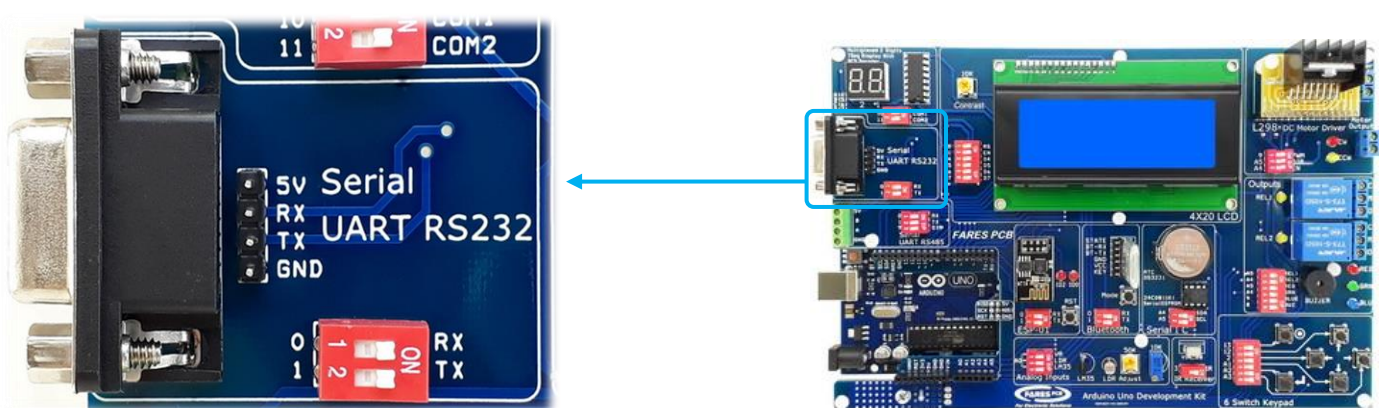
$V_{OH} = -5V$ to $-25V$

$V_{IL} = +3V$ to $+25V$

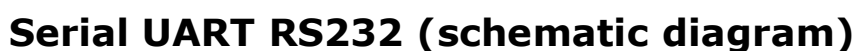
$V_{IH} = -3V$ to $-25V$

This voltage level is more suitable for transmitting data between more far devices (several meters) and improves baud rate vs distance.

Uno Kit provides UART RS232 via standard DB9 socket for direct connection to PC's serial port or any other board that supports DB9 socket. Also, RS232 signals are provided via 4 pin header socket GND, TX, RX, and 5V for external using flexibility. Logic level conversion from TTL (Arduino side) to RS232 (DB9 Side) is realized using MAX232 chip.



Serial UART RS232

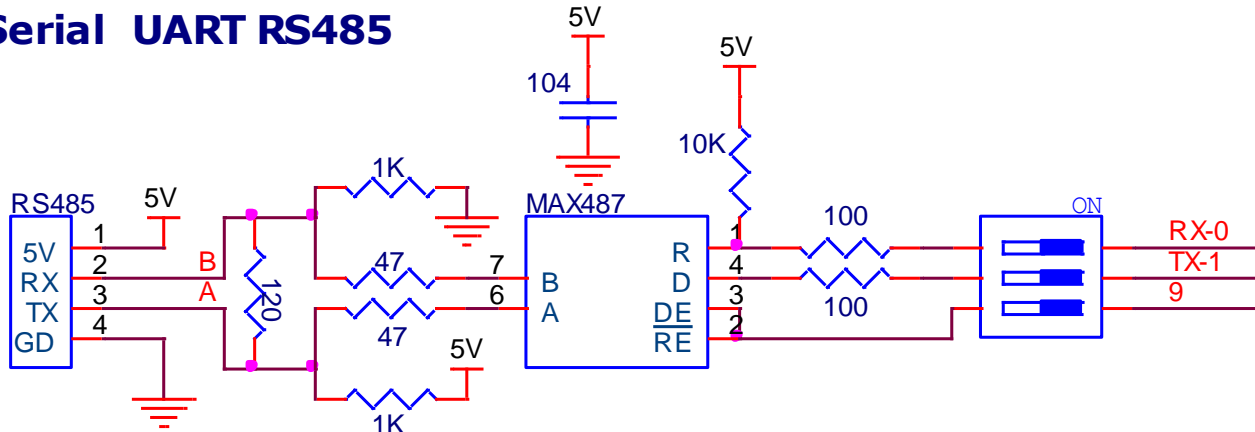


Differential signals are immune to noise far than single-ended signals. The differential signal representation is suitable for transmitting data for long distances 1KM with high baud rates.

An additional control pin (DIR) required for direction setting to switch between TX and RX mode and vice versa.



Serial UART RS485



Serial UART RS485 (schematic diagram)

I²C serial communication

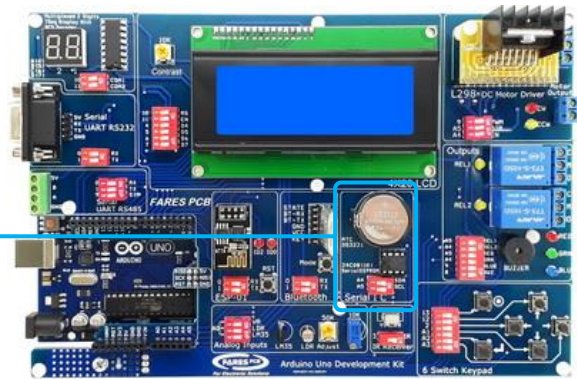
I²C is a serial protocol for Two-Wire Interface to connect low-speed devices like microcontrollers, EEPROMs, A/D, D/A, and other similar peripherals in embedded systems.

I²C uses two wires, SCL(Serial Clock) and SDA(Serial Data). Both lines need a pulled up resistor to 5V. Each data bit is transmitted on SDA line is synchronized with a clock pulse on the SCL line.

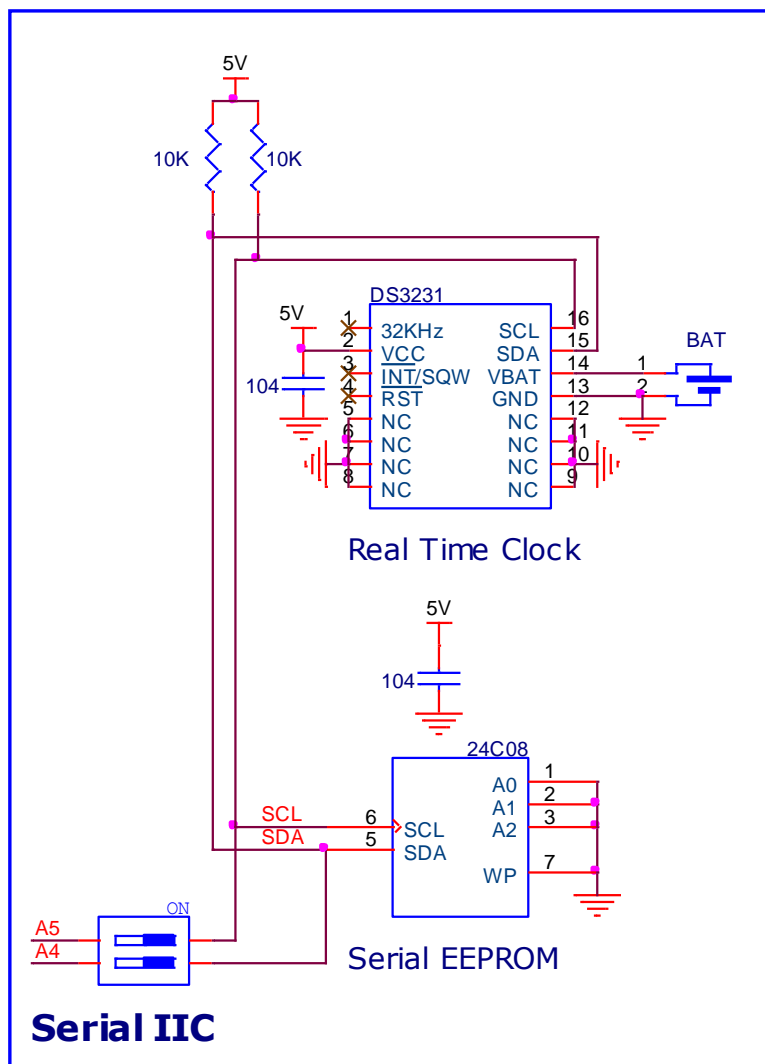
I²C bus allows multiple slaves to communicate with one or more masters. Each slave device has a unique address that is represented by 7 bits. In the normal state, both lines (SCL and SDA) are high. The communication is initiated by the master upon generating a Start condition followed by the device address. If bit 0 of the address byte was set to 0 the master will write to slave otherwise the next byte will be read from the slave. Once all bytes are written or read the master generates a Stop condition.

ATMEGA328 microcontroller provides Two-Wire serial interface peripheral which supports speed up to 400kbps and can be configured as master or slave with 7 bit address space that allows up to 128 different slave addresses.

Uno Kit includes two I²C serially interfaced devices. 1KB Serial EEPROM (AT24C08) and real-time clock IC RTC (DS3231). Both chips share the I²C bus lines SDA(A4) and SCL(A5) via a DIP switch.



Serial I²C



Serial I²C (schematic diagram)

Serial EEPROM (AT24C08)

The AT24C08 memory provides 8192 bits of serial electrically erasable and programmable read-only memory (EEPROM) organized as 1024 bytes of 8 bit.

The device address byte of the chip (AT24C08) is &HA0

1	0	1	0	0	0	0	R/W
---	---	---	---	---	---	---	-----

For more details about AT24C08 chip, refer to its datasheets.

RTC (DS3231)

The DS3231 is an extremely accurate I²C real-time clock (RTC) with an integrated temperature-compensated crystal oscillator.

The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. DS3231 operates as a slave device on the I²C bus. Access is obtained by implementing a START condition and providing a device identification code followed by a register address. Subsequent registers can be accessed sequentially until a STOP condition is executed. A backup battery is included. When VCC falls below VBAT, the device switches into a low current battery-backup mode. Upon power-up, the device switches from battery to VCC when VCC is greater than VBAT +0.2V.

The device address byte of the chip (DS3231) is &HD0

1	1	0	1	0	0	0	R/W
---	---	---	---	---	---	---	-----

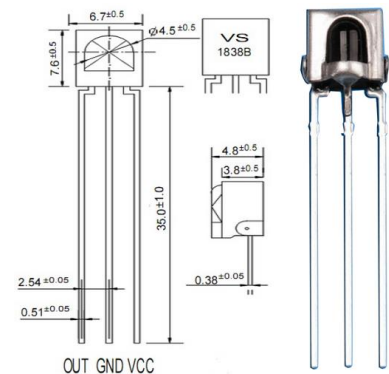
Note:

I²C serial pins A4,A5 are connected to other circuits in the kit such as Outputs unit and DC motor driver unit. Insure disabling these units (turning off DIP switches) before enabling in I²C serial unit.

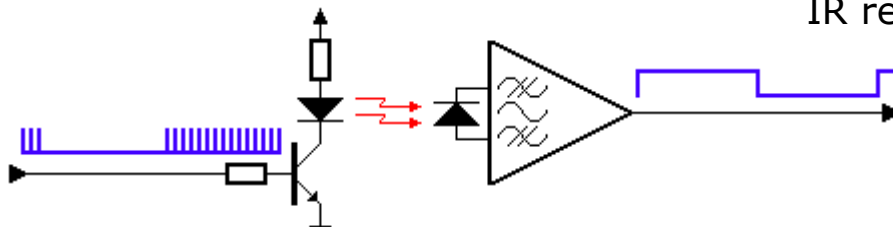
IR receiver (VS1838)

VS1838 is a miniaturized receiver for infrared remote control systems. It consists of a PIN diode and preamplifier assembled on a lead frame while the epoxy package acts as an IR filter.

VS1838 can be used to receive all common IR remote control data formats. When you hit a key on your remote, the IR LED will transmit encoded data to the IR receiver. Transmitted data is a stream of pulses of 38KHz frequency. VS1838 receives this signal and demodulates it to extract a binary waveform that can be read by a microcontroller.



IR receiver terminals

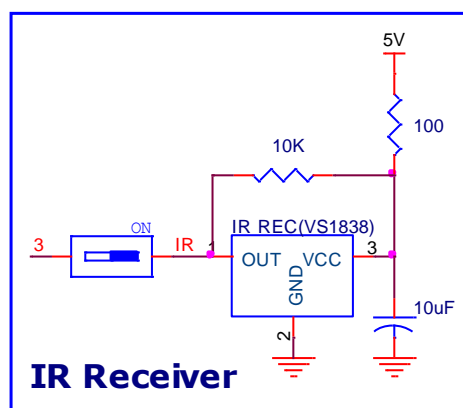


Conceptual view of how IR transmitter receiver pair works

VS1838 connected to Arduino Uno board pin3 via DIP switch. Pin 3 can be used to trigger INT1, This helps in simplifying firmware design.



IR Receiver

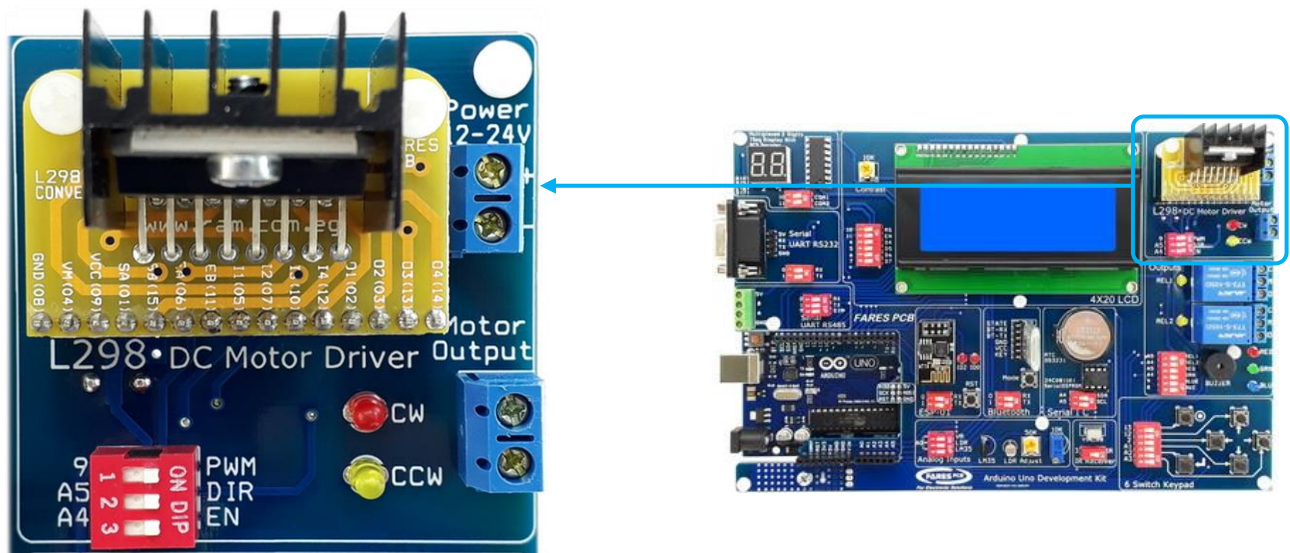


IR Receiver (schematic diagram)

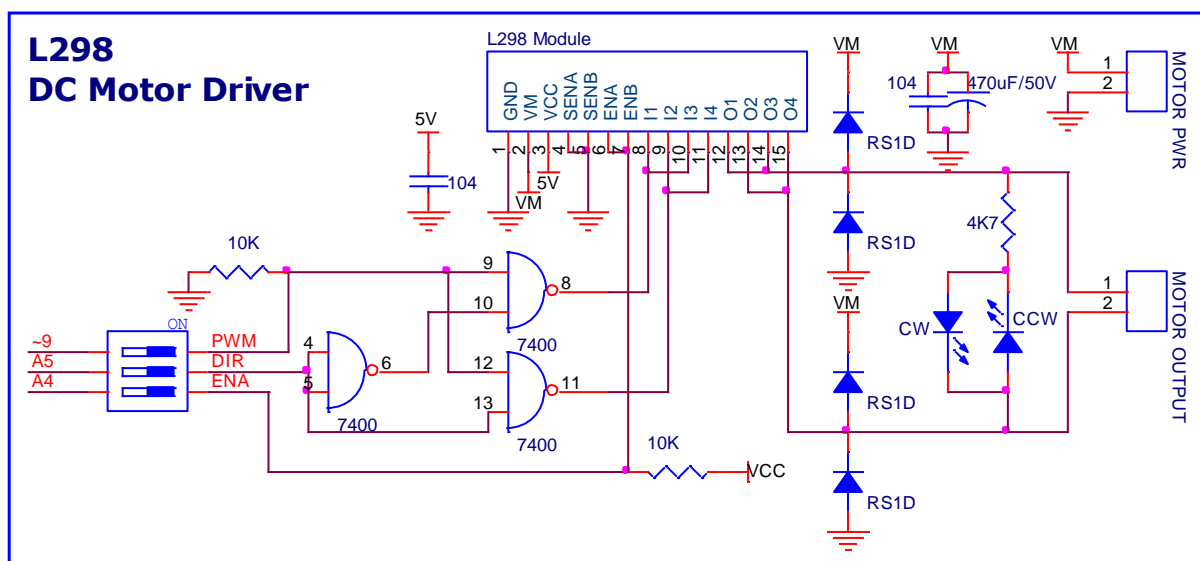
DC Motor Driver

DC motors have many applications in today's field of engineering and technology such as robots, air compressors, lifts, elevators, ... etc. If you plan on working with robots or just building moving objects you will eventually need to learn how to control a DC motor. One of the easiest and most inexpensive ways to control DC motors is to interface an L298N motor driver with a microcontroller. It can control both the speed and direction of two 2A motors or one 4A motor.

Uno Kit includes a 4 ampere DC motor driver based on L298N. The Circuit is designed to simplify writing code to control speed and direction. There are three control signals required to drive motor PWM, DIR, and EN. These signals are connected to Arduino Uno board pins 9, A5, A4 respectively via a 3 way DIP switch.



DC Motor Driver



DC Motor Driver (schematic diagram)

Motor Driver Control Signal	Arduino Pin
PWM	9
DIR	A5
EN	A4

PWM signal is used to control speed. With PWM the motor sends a series of pulses. each pulse is of the full voltage supplied. The width of pulses is varied to control the motor speed, pulses with a narrow width will cause the motor to rotate quite slowly. Increasing the pulse width will increase the speed of the motor. The average voltage applied to the DC motor will depend on the duty cycle. The duty cycle is the ratio of the ON time signal to the total period time. The duty cycle is usually expressed in percent. 50% means an average voltage of about half the supplied voltage. In order to run the motor at full speed, you just set PWM signal high for all period time Duty cycle = 100%. To stop the motor completely you just set PWM to low for all period time. PWM signal is derived from port 9 which can be functioned as a PWM output.

DIR signal is used to control the motor direction of rotation. To reverse direction just reverse the DIR state from high to low or vice versa. DIR signal connected to Arduino Uno port pin A5 via DIP switch.

EN signal is used to enable the driver. This signal can be omitted. EN signal connected to Arduino Uno port pin A4 via DIP switch.

Note:

I/O ports **A5**, **A4**, and **9** are connected to other circuits in the kit. Insure disconnecting these ports (turning off DIP switches) in the other units before enabling them in the DC motor driver unit.

Arduino Uno pin mapping table

Arduino Pin	Uno Kit Peripheral
A0	Variable resistor(VR) / Light Dependant Resistor(LDR) / Temperature sensor(LM35)
A1	Keypad (Down switch)
A2	Keypad (Enter switch)
A3	Keypad (Right switch)
A4	Relay2(REL2) / Green LED / DC Motor Driver(EN) / I ² C (SDA)
A5	Relay1(REL1) / Red LED / DC Motor Driver(DIR) / I ² C (SCL)
0	RX
1	TX
2	Keypad (Left switch)
3	IR Receiver VS1838
4	7 Seg (Bit A) / LCD (D4)
5	7 Seg (Bit B) / LCD (D5)
6	7 Seg (Bit C) / LCD (D6)
7	7 Seg (Bit D) / LCD (D7)
8	Buzzer
9	Blue LED / DC Motor Driver(PWM)
10	7 Seg (COM1) / LCD (RS)
11	7 Seg (COM2) / LCD (EN)
12	Keypad (Up switch)
13	Keypad (Set switch)

HOW TO START?

Step1

Download and install Arduino IDE from the following link.

<https://www.arduino.cc/en/Main/Software>

Step2

Connect **Arduino uno Kit** to PC using USB cable type B.

Step3

Plug power supply adapter jack into DC power socket.

Step4

Open Arduino IDE. Select serial port and Arduino Uno board from Tools menu.

Step5

Now you are ready to upload your code and enjoy working with **Arduino uno Kit**.

If it's the first time to work on kit, we recommend uploading test codes included in CD to ensure correct kit functioning. Each sketch tests a unit in the kit as follows

Outputs testing

Turn off all DIP switches in the kit to disable all unused units except one related to the outputs unit only.

Open **Outputs** sketch file and upload the code to the Arduino.

All digital outputs are tested continuously as following







- Red LED/Relay1 turned on for 400 msec then turned off.
- Green LED/Relay2 turned on for 400 msec then turned off.
- Blue LED turned on for 400 msec then turned off.

Keypad testing

Turn off all DIP switches in the kit to disable all unused units except one related to the Keypad and Outputs units only.

Open **Keypad** sketch file and upload the code to the Arduino.

All switches can be tested as follows

- If switch  is pressed then Red LED/Relay1 will be turned on.
- If switch  is pressed then Red LED/Relay1 will be turned off.
- If switch  is pressed then Green LED/Relay2 will be turned on.
- If switch  is pressed then Green LED/Relay2 will be turned off.
- If switch  is pressed then blue LED will be turned on.
- If switch  is pressed then blue LED will be turned off.

LCD testing

Turn off all DIP switches in the kit to disable all unused units except one related to the LCD unit only.

Open **LCD** sketch file and upload the code to the Arduino.

LCD displays the following message



7 Segment display testing

Turn off all DIP switches in the kit to disable all unused units except one related to the 7Segment Display unit only.

Open **7Segments** sketch file and upload the code to the Arduino.

- Digit 1 counts from 0 to 9.
- Wait 500 msec before turning off digit.
- Digit 2 counts from 0 to 9.
- Wait 500 msec before turning off digit.

Analog testing

Turn off all DIP switches in the kit to disable all unused units except one related to the Analog unit only.

Open Analog sketch file and upload the code to the Arduino.

LCD displays the analog value read on port input A0 in various forms

- The digital reading of A/D.
- The corresponding analog voltage on A0 in V with 0.1 volt resolution.
- The light level (High Light / Low Light / Dark).
- The corresponding temperature value in Celsius.

Real Time Clock RTC testing

Turn off all DIP switches in the kit to disable all unused units except one related to the Serial I²C unit only.

Open **DS3231** sketch file and upload the code to the Arduino.

LCD shows the date and time starting from

```
"Time  12:59:00  PM "
```

```
"Date  01/01/2020 WED"
```

Serial EEPROM AT24C08 testing

Turn off all DIP switches in the kit to disable all unused units except one related to the Serial I²C unit only.

Open **AT24C08** sketch file and upload the code to the Arduino.

The test process is performed as follows

Arduino reads the first address of the memory and stores it.

Arduino tries to write &H55 in the first address.

Arduino reads again the first address and compares it to the previously written value &H55.

If the compare is true then it restores the original value of memory and proceeds to check the next address, Otherwise, it initiates an error message indicating a memory test failing.

If all memory addresses are tested without error a memory test success message is displayed.

L298 DC Motor Driver testing

Connect external motor power (12-24V)

Connect motor terminals to motor output.

Turn off all DIP switches in the kit to disable all unused units except one related to the L298 DC Motor Driver module only.

Open **Motor** sketch file and upload the code to the Arduino.

The motor testing process is started and repeated continuously as follows

- Motor accelerates from 0 to max speed in CW direction within about 2.5 seconds.
- Wait for 3 seconds.
- Motor stops.
- Wait 1 second.
- Motor accelerates from 0 to max speed in CCW direction within about 2.5 seconds.
- Wait for 3 seconds.
- Motor stops.
- Wait 1 second.

Serial UART testing

Turn off all DIP switches in the kit to disable all unused units except one related to the Serial UART RS232 unit only.

Connect PC to the Arduino Uno kit via DB9 socket or USB virtual com.

Open UART sketch file and upload the code to the Arduino.

Open serial monitor of Arduino IDE and set baud rate to 9600 bps.

[Transmitting test \(from Uno kit to PC\).](#)

Uno kit transmits this message upon power reset

"FARESPCB Co."

"Arduino Uno Development Kit."

If any switch is pressed, Arduino Uno kit will transmit serially a message declares the switch name.

Receiving test (from PC kit to Uno)

Try to write a tiny message of few characters and click the <Send> button to transmit it to the Arduino Uno kit. Any data received serially will be displayed on LCD. Don't transmit characters bulky. Send characters one by one as characters displaying on LCD take some time.

IR testing

Turn off all DIP switches in the kit to disable all unused units except that related to the IR Receiver unit and blue LED only.

Apply IR testing using any IR remote. Just direct it to the IR receiver on kit and press any key. If the blue LED flashes, it indicates that IR receiver can detect the IR signal.

Special Thanks to:

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