MICROCONTROLLER AND EMBEDDED SYSTEM

PROJECT REPORT

SUBMITTED BY:

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SUBMITTED TO:

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DATE:

22-02-2024

INTRODUCTION:

We have to design a homemade Arduino UNO. For this, we have to use ATmega328p and respective components required for a simple ATmega328P microcontroller circuit.

COMPONENTS:

Bill Of Materials for Arduino-Project

Design Title	Arduino-Project
Author	
Document Number	
Revision	
Design Created	Friday, 16 February 2024
Design Last Modified	Friday, 16 February 2024
Total Parts In Design	32

0 Modules

Quantity	References	Value	Stock Code	Unit Cost
Sub-totals:				Rs0.00

2 Capacitors

Quantity	References	Value	Stock Code	Unit Cost
1	C1	10uF		
1	C2	1uF		
Sub-totals:				Rs0.00

4 Resistors

Quantity	References	Value	Stock Code	Unit Cost
3	R1, R3, R11	220		
1	R2	10k		
Sub-totals:				Rs0.00

0 Integrated Circuits

Quantity	References	Value	Stock Code	Unit Cost
Sub-totals:				Rs0.00

1 Transistors

Quantity	References	Value	Stock Code	Unit Cost
1	Q2	2N3903		
Sub-totals:				Rs0.00

4 Diodes

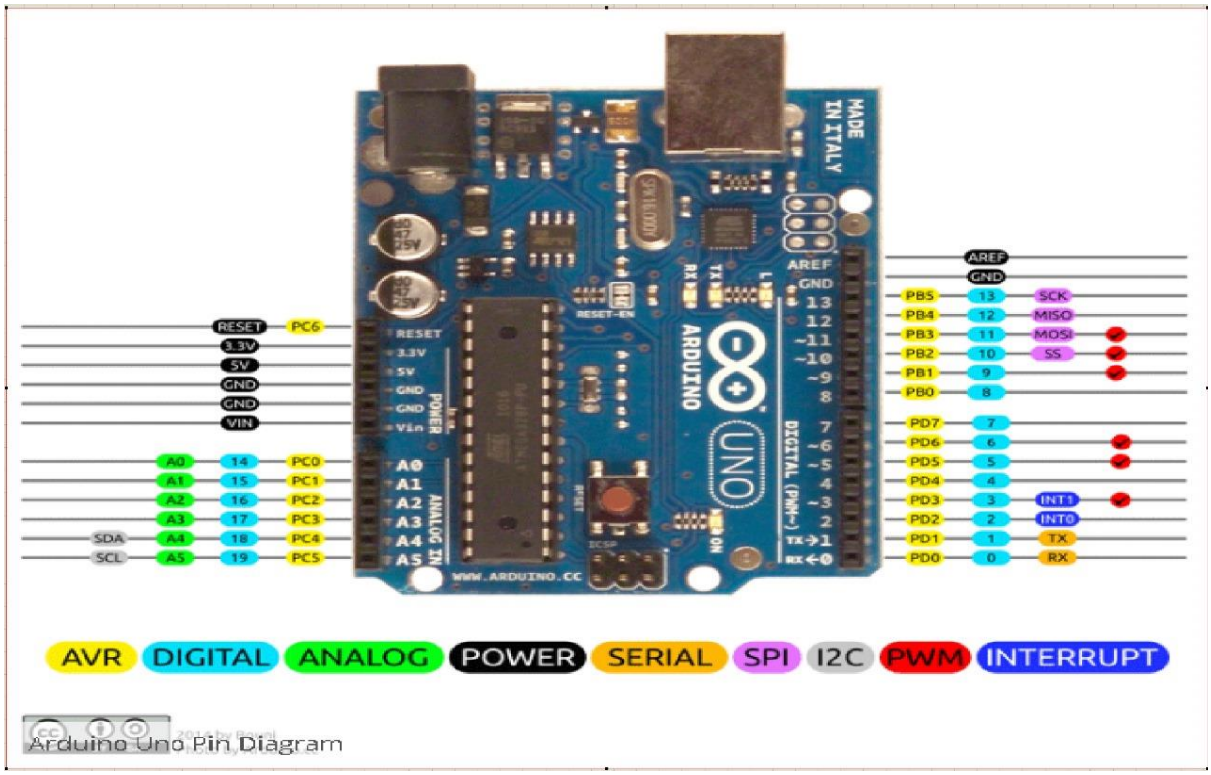
Quantity	References	Value	Stock Code	Unit Cost
2	D1-D2	SIL8		
1	D4	1N4007		
1	D5	LED-PINK		
Sub-totals:				Rs0.00

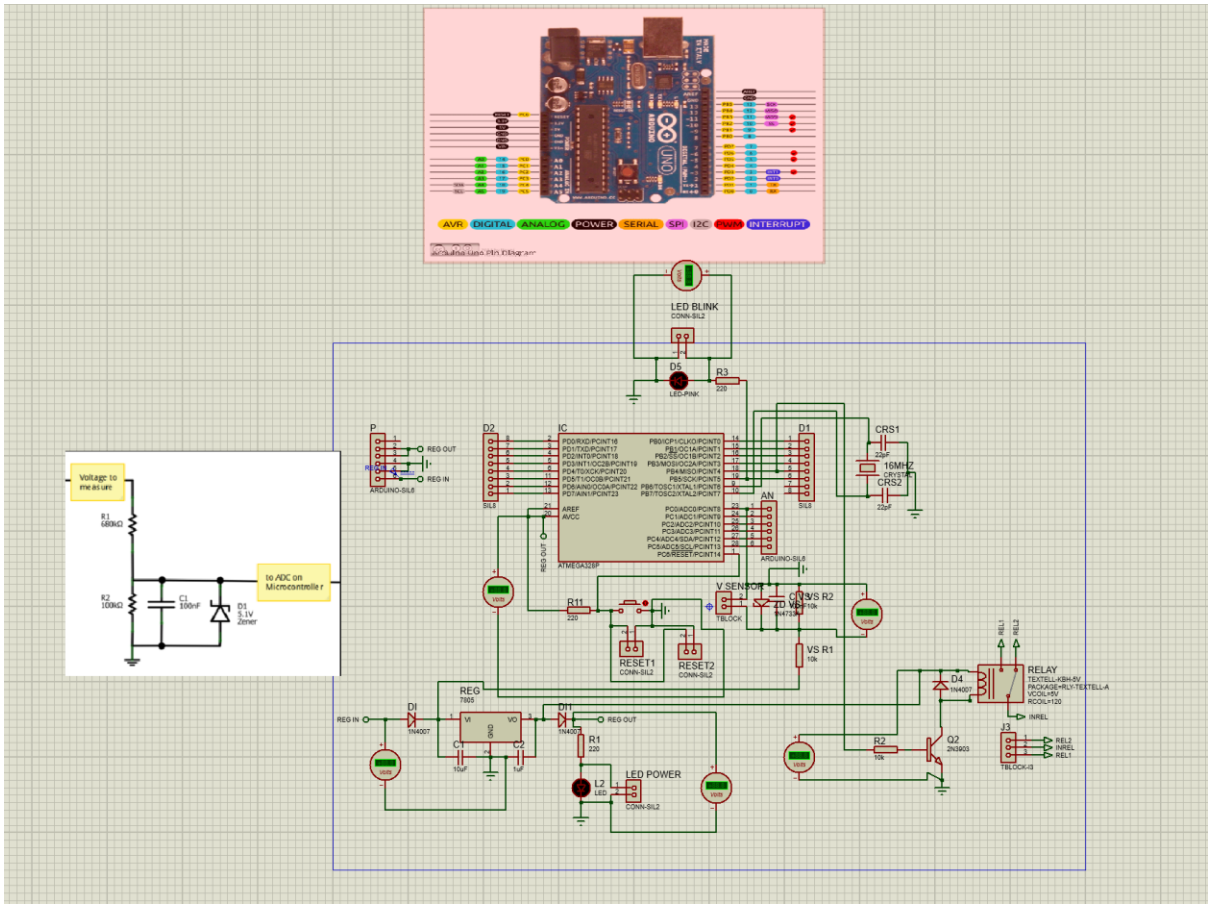
21 Miscellaneous

Quantity	References	Value	Stock Code	Unit Cost
1	16MHZ	CRY STAL		
2	AN, P	ARDUINO-SIL6		
1	C VS	100nF		
2	CRS1-CRS2	22pF	Maplin WX48C	
2	DI, DI1	1N4007		
1	IC	ATMEGA328P		
1	J3	TBLOCK-I3		
1	L2	LED		
4	LED BLINK, LED POWER, RESET1-RESET2	CONN-SIL2		
1	REG	7805		
1	RELAY	TEXTELL-KBH-5V		
1	V SENSOR	TBLOCK		
2	VS R1-VS R2	10k		
1	ZD VS	1N4733A		
Sub-totals:				Rs0.00

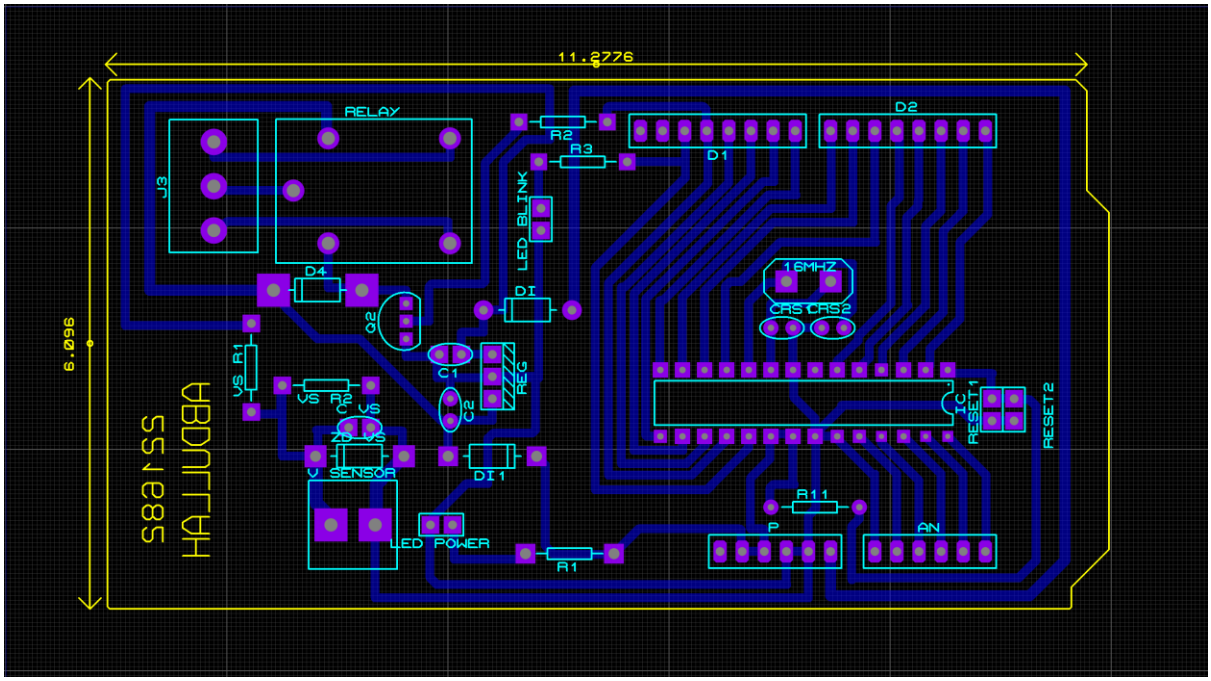
Totals: Rs0.00

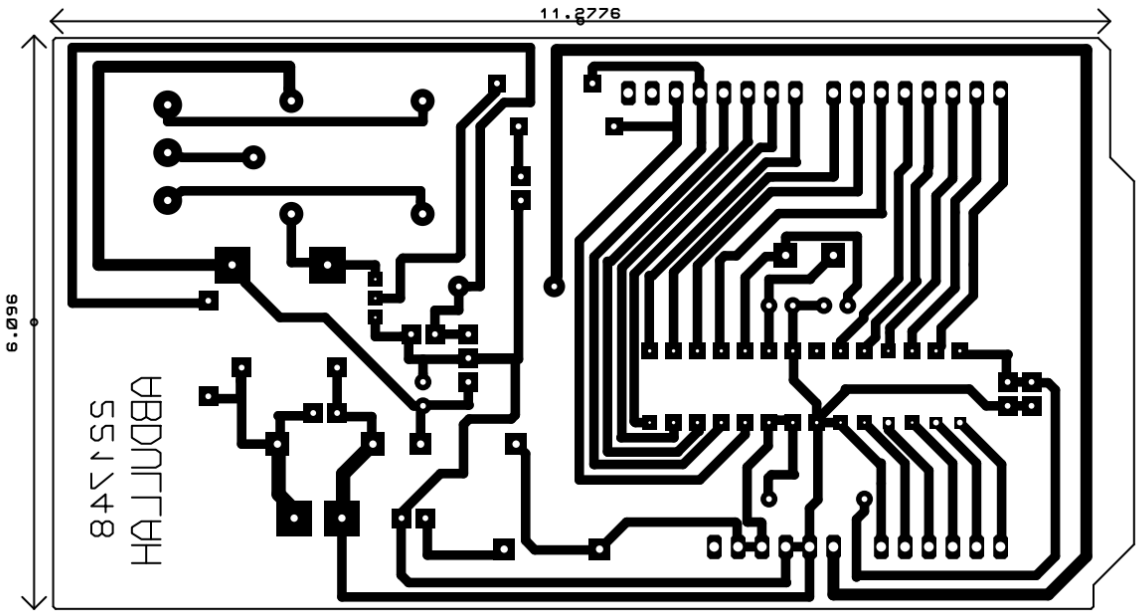
SCHEMATIC:


MADE IN ITALY
ARDUINO
UNO
WWW.ARDUINO.CC
AREF
GND
RESET
3.3V
5V
VIN
POWER
ANALOG IN
DIGITAL (PWM~)
PB5 13 SCK
PB4 12 MISO
PB3 11 MOSI
PB2 10 SS
PB1 9
PB0 8
PD7 7
PD6 6
PD5 5
PD4 4
PD3 3 INT1
PD2 2 INT0
PD1 1 TX
PD0 0 RX
A0 14 PC0
A1 15 PC1
A2 16 PC2
A3 17 PC3
SDA A4 18 PC4
SCL A5 19 PC5
AVR DIGITAL ANALOG POWER SERIAL SPI I2C PWM INTERRUPT
Arduino Uno Pin Diagram

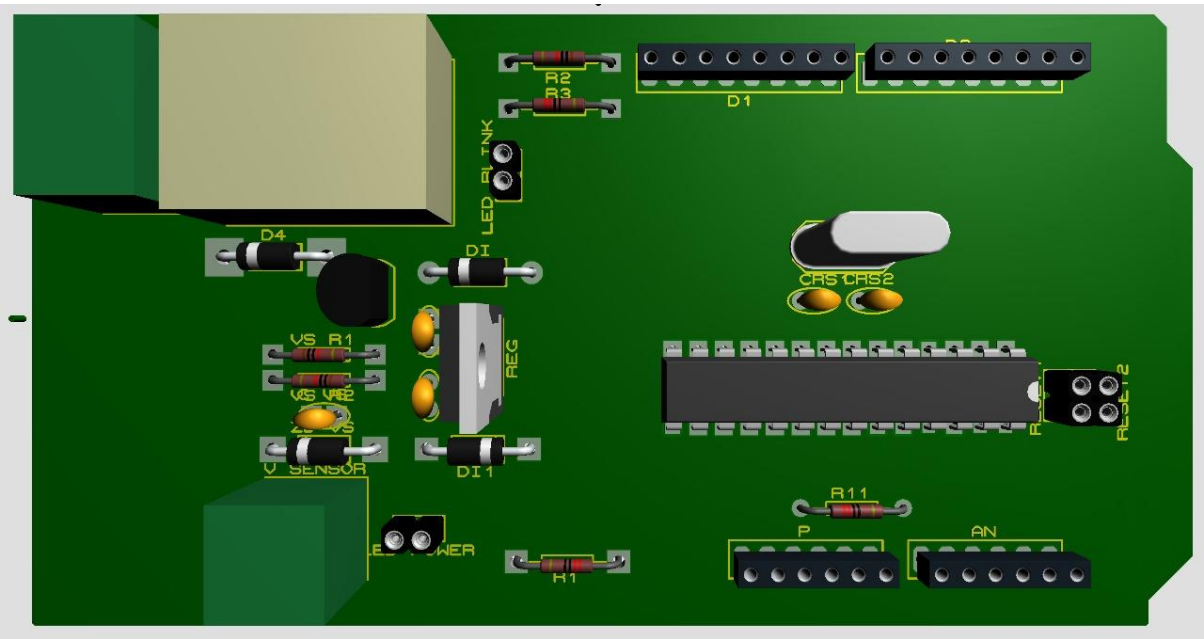

LED BLINK
LED POWER
RESET1
RESET2
RELAY
REG
ATMEGA328P
V SENSOR
Voltage to measure
to ADC on Microcontroller

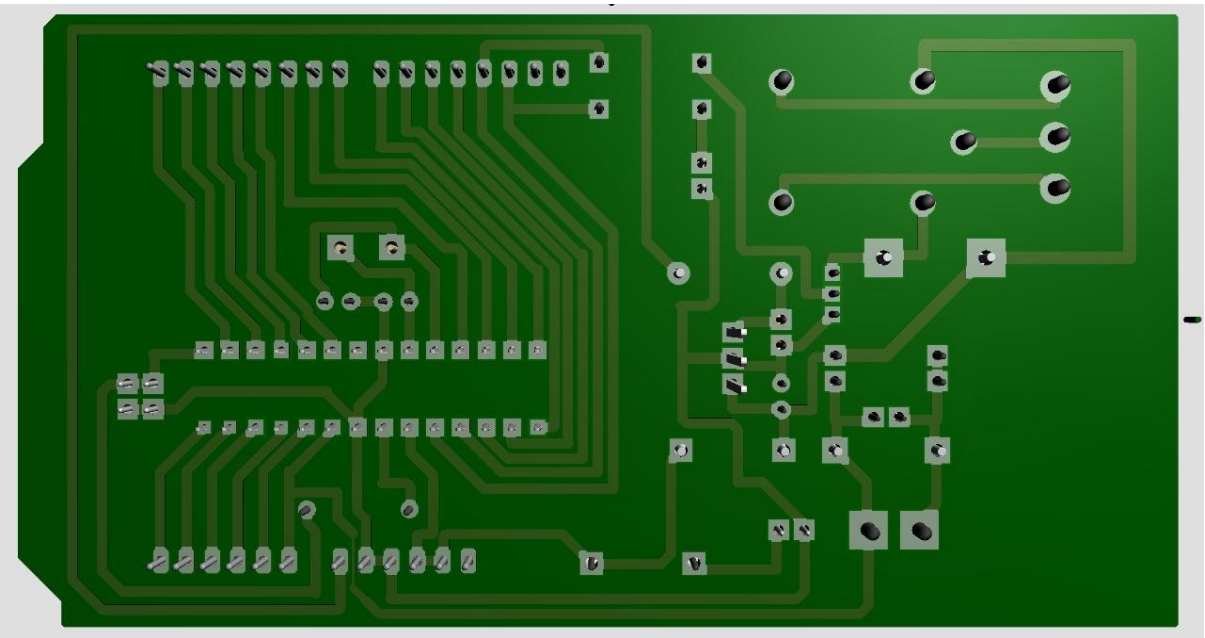
PCB LAYOUT:


11.2776
6.096
RELAY
J3
D4
R2
R3
D1
D2
LED_BLINK
DI
16MHZ
CRS CRS2
Q2
C1
C2
REG
VS R1
VS R2
C VS
ZD VS
V SENSOR
DI1
IC1
RESET1
RESET2
R11
P
AN
LED POWER
R1


11.2776
6.096

3D VISUALIZER:



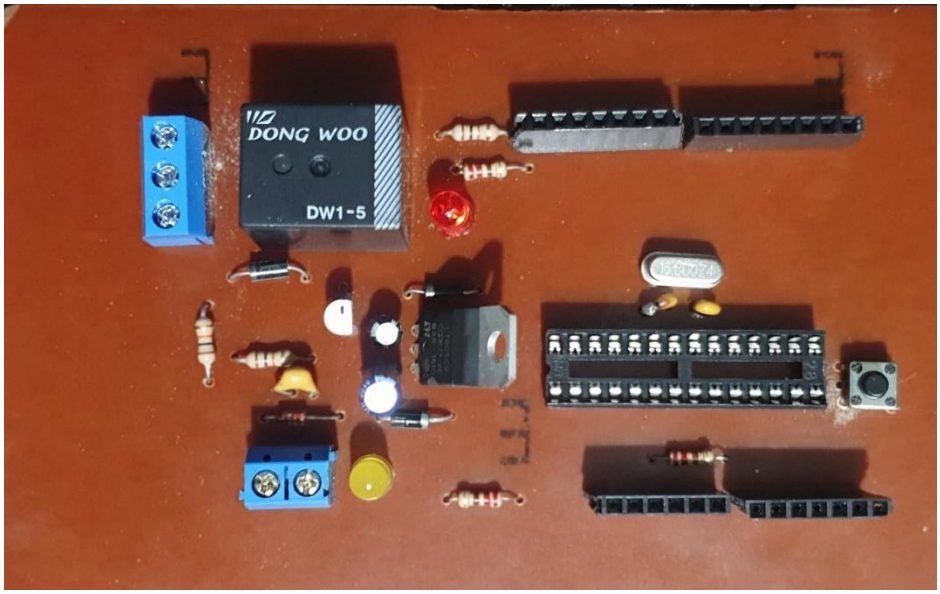


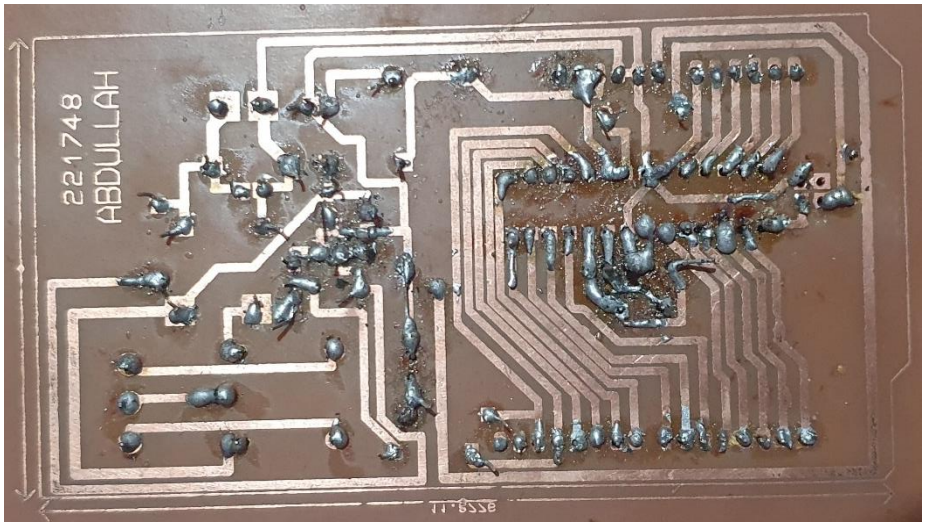
SOURCE CODE:

```
.ORG 0x0000 // Tells the next instruction to be written
RJMP main // State that the program begins at the main label
main:
LDI r16, 0xFF // Load the immedate value 0xFF (all bits 1) into register 16
OUT DDRB, r16 // Set Data Direction Register B to output for all pins
loop:
SBI PortB, 5 // Set the 5th bit in PortB. (i.e. turn on the LED)
RCALL delay_05
CBI PortB, 5 // Clear the 5th bit in PortB. (i.e. turn off the LED)
RCALL delay_05
RJMP loop // Loop again
// Everything beneath is part of the delay loop
delay_05:
LDI r16, 8
outer_loop:
LDI r24, low(3037)
LDI r25, high(3037)
delay_loop:
ADIW r24, 1
BRNE delay_loop
DEC r16
BRNE outer_loop
RET
```

VIDEO LINK : Media2.mp4

PCB HARDWARE:





CONCLUSION:

We got understanding about Arduino and how to deal with microcontrollers and microcontroller PCB's and how to deal with the ATmega328P Microcontroller IC.