A MINI PROJECT ON

"laser targeting using arduino "

Submitted in partial fulfillment of requirement in

"MECHANICAL MEASUREMENTS AND CONTROLS"

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GUIDED BY

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DEPARTMENT OF MECHANICAL ENGINEERING

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"We have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and web research. We would like to extend my sincere thanks to all of them.

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Ours thanks and appreciations also go to my colleague in developing the project and people who have willingly helped me out with their abilities."

YADAVRAO TASGAONKAR COLLEGE OF

ENGINEERING AND MANAGEMENT

CERTIFICATE

This is to certify that this report entitled

"laser targeting using arduino"

Submitted by the following students of

"Mechanical Engineering"

Towards the partial fulfillment in the requirements in

"MECHANICAL MEASUREMENTS AND CONTROLS"

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Throughout their tenure of completion of task they have been guided and assessed by me, I am satisfied that their contribution was proportionate, they were satisfactory progressive and their task is up to standard envisaged by University of Mumbai.

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INTRODUCTION

Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices.

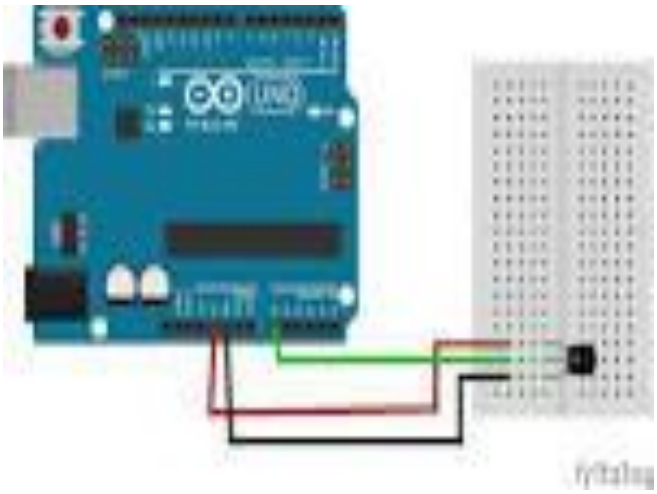

Figure 01: Arduino Development Module

The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++.

The first Arduino was introduced in 2005, aiming to provide a low cost, easy way for novices and professionals to create devices that interact with their intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

HARDWARE

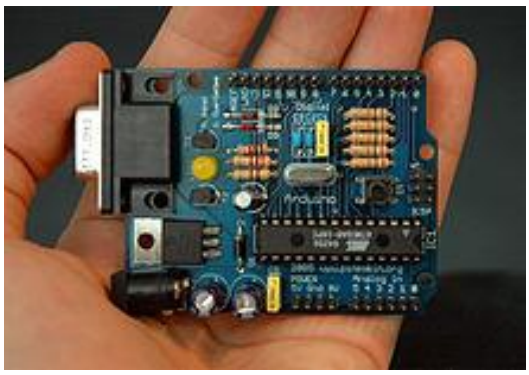

Fig.02: An early Arduino board[4] with an RS-232

An Arduino board consists of an Atmel 8-, 16- or 32-bit AVR microcontroller (although since 2015 other makers' microcontrollers have been used) with complementary components that facilitate programming and incorporation into other circuits. An important aspect of the Arduino is its standard connectors, which let users connect the CPU board to a variety of interchangeable add-on modules termed shields. Some shields communicate with the Arduino board directly over various pins, but many shields are individually addressable via an I^2C serial bus—so many shields can be stacked and used in parallel. Before 2015, Official Arduinos had used the Atmel megaAVR series of chips, specifically the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560. In 2015, units by other producers were added. A handful of other processors have also been used by Arduino compatible devices. Most boards include a 5 V linear regulator and a 16 MHz crystal oscillator (or ceramic resonator in some variants), although some designs such as the LilyPad run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions. An Arduino's microcontroller is also pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory, compared with other devices that typically need an external chip programmer. This makes using an Arduino more straightforward by allowing the use of an ordinary computer as the programmer. Currently, optiboot bootloader is the default bootloader installed on Arduino UNO.

At a conceptual level, when using the Arduino integrated development environment, all boards are programmed over a serial connection. Its

implementation varies with the hardware version. Some serial Arduino boards contain a level shifter circuit to convert between RS-232 logic levels and transistor–transistor logic (TTL) level signals. Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable via its own ICSP header. Other variants, such as the Arduino Mini and the unofficial Boarduino, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods, when used with traditional microcontroller tools instead of the Arduino IDE, standard AVR in-system programming (ISP) programming is used.

Example Arduino boards

Fig.03 Arduino Diecimila in Stoicheia

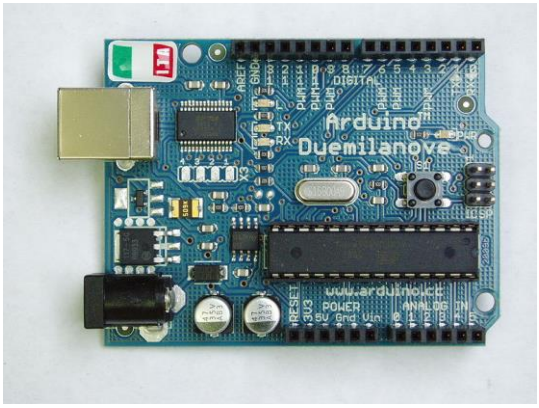

Fig.04 Arduino Duemilanove (rev 2009b)

Fig.05 Arduino UNO

CONSTRUCTION

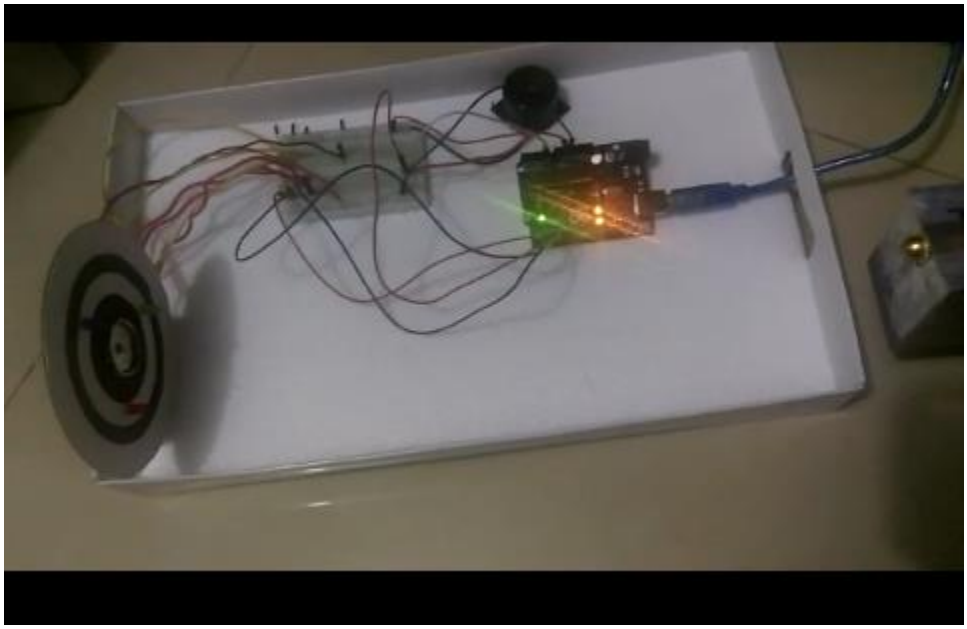

Fig.06 laser targeting model

The following will show you how to construct a basic interactive laser-sensitive target, great for those just getting started with Arduino. This could easily be used as a platform for a laser tag system, or just something fun to play with! It might also drive your cat insane. Here's what you'll need to build it:

- an Arduino board (I used UNO)

  Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices.

Fig.08

- red LEDs, green LEDs, blue LED

A **light-emitting diode** (**LED**) is a two-leadsemiconductorlight source. It is a p–n junctiondiode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons.

fig.09 LEDs

- 1 Photosensitive Resistor

A **photoresistor** (or **light-dependent resistor**, **LDR**, or **photocell**) is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity

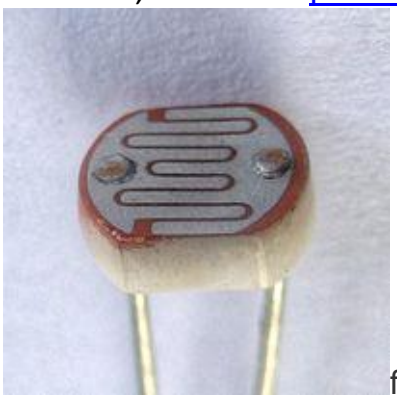

fig.10 photo resistor

- **wires (obviously)**

- **A solderless breadboard or Maker Shield**

A **breadboard** is a construction base for prototyping of electronics. Originally it was literally a bread board, a polished piece of wood used for slicing bread.

LCD

fig.11 lcd display

liquid-crystal display (**LCD**) is a flat-panel display or other electronic visual display that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly.[1] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and 7-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

LCDs are used in a wide range of applications including computer monitors,televisions, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smartphones. LCD screens are also used on consumer electronicsproducts such as DVD players, video game devices and clocks. LCD screens have replaced heavy, bulky cathode ray tube (CRT) displays in nearly all applications. LCD screens are available in a wider range of screen sizes than CRT and plasma displays, with LCD screens available in sizes ranging from tiny digital watches to huge, big-screen television set.

PROGRAM AND WORKING

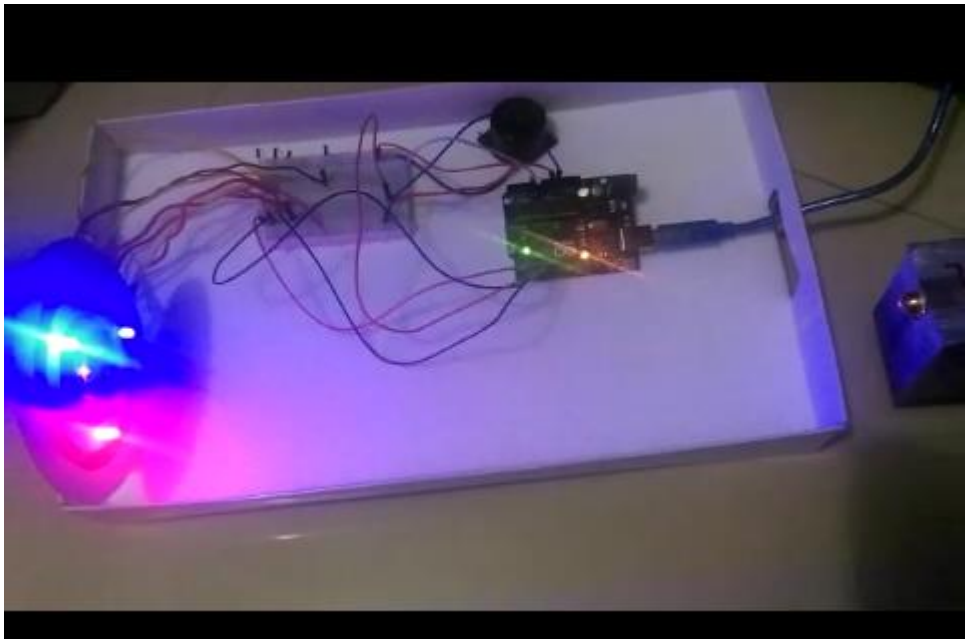

Fig.12

Programing is done in Computer using Arduino Software. It should be done in latest version of Arduino for better results. Once you have the program loaded onto the Arduino, the four red lights should blink on and off in sequence.

Now get a standard 5mw red laser pointer and try pointing it at the photo-resistor! The blue light should turn on and the three green lights should blink on as well. If nothing happens, try adjusting the potentiometer to increase or decrease sensitivity.

Software

Arduino Software IDE

The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in the programming language Java. It originated from the IDE for the languages Processing and Wiring. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and provides simple one-click mechanism to compile and load programs to an Arduino board. A program written with the IDE for Arduino is called a "sketch".

The Arduino IDE supports the languages C and C++ using special rules to organize code. The Arduino IDE supplies a software library called Wiring from the Wiring project, which provides many common input and output procedures. A typical Arduino C/C++ sketch consist of two functions that are compiled and linked with a program stub main() into an executable cyclic executive program:

setup(): a function that runs once at the start of a program and that can initialize settings.

loop(): a function called repeatedly until the board powers off.

After compiling and linking with the GNU toolchain, also included with the IDE distribution, the Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal coding that is loaded into the Arduino board by a loader program in the board's firmware.

Arduino programs may be written in any programming language with a compiler that produces binary machine code. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio, which can be used for programming Arduino.[16][17]

Arduino can be controlled using C/C++ interpreter Ch without the binary code. Two textbooks “Learning Arduino with Ch Programming for the Absolute Beginner” and “Learning Arduino with C Programming” are freely available.

Sample program

The bare minimum code[19] to start a sketch program consists of two functions setup()[20] and loop().

```
void setup() {

  // put your setup code here, to run once at startup

}

void loop() {

  // put your main code here, to run repeatedly

}
```

Most Arduino boards contain an LED and a load resistor connected between pin 13 and ground which is a convenient feature for many tests.[22]

A typical program for a beginning Arduino programmer blinks a light-emitting diode (LED) on and off. This program is usually loaded in the Arduino board by the manufacturer. In the Arduino environment, a user might write such a program as shown:

Development

```
int LDR = 0;     //analog pin to which LDR is connected, here we set it to 0 so it means A0

intLDRValue = 0;      //that's a variable to store LDR values

intlight_sensitivity = 600;    //This is the approx value of light surrounding your LDR


void setup()

{

Serial.begin(9600);          //start the serial monitor with 9600 buad

pinMode(5, OUTPUT);     //we mostly use 13 because there is already a built in yellow LED in arduino which shows output when 13 pin is enabled

pinMode(2, OUTPUT);

pinMode(3, OUTPUT);

pinMode(4, OUTPUT);

}

void loop()

{

LDRValue = analogRead(LDR);      //reads the ldr's value through LDR

Serial.println(LDRValue);       //prints the LDR values to serial monitor

delay(50);        //This is the speed by which LDR sends value to arduino


  if (LDRValue>light_sensitivity)

  {

digitalWrite(5, HIGH);

digitalWrite(2, HIGH);
```

```
digitalWrite(3, HIGH);
digitalWrite(4, HIGH);
  }
  else
  {
digitalWrite(5, LOW);
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
  }
}
```

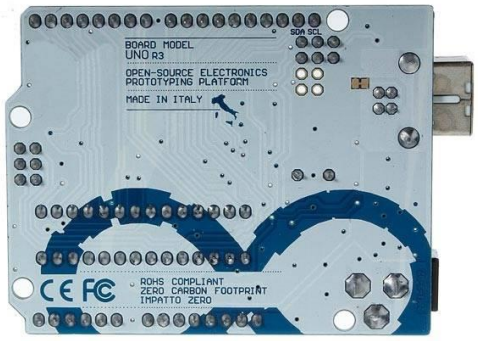

Fig.13 Arduino-compatible R3 UNO board

Program for lcd

```
int LDR = 0;     //analog pin to which LDR is connected, here we set it to 0 so it means A0
int LDRValue = 0;      //that's a variable to store LDR values
int light_sensitivity = 600;    //This is the approx value of light surrounding your LDR

void setup()
{
 Serial.begin(9600);         //start the serial monitor with 9600 buad

 pinMode(4, OUTPUT);
}
void loop()
{
 LDRValue = analogRead(LDR);      //reads the ldr's value through LDR
 Serial.println(LDRValue);       //prints the LDR values to serial monitor
 delay(50);       //This is the speed by which LDR sends value to arduino

 if (LDRValue > light_sensitivity)
{
digitalWrite(7, HIGH);
digitalWrite(8, HIGH);
digitalWrite(9, HIGH);
digitalWrite(10, HIGH);
digitalWrite(4, HIGH);
 }
 else
 {

digitalWrite(4, LOW);
digitalWrite(7, LOW);
```

```
  digitalWrite(8, LOW);
  digitalWrite(9, LOW);
  digitalWrite(10, LOW);
 }
}
```

History

Colombian student Hernando Barragán created the development platform Wiring as his Master's thesis project in 2004 at the Interaction Design Institute Ivrea (IDII) in Ivrea, Italy. Massimo Banzi and Casey Reas (known for his work on Processing) were supervisors for his thesis. The goal was to create low cost, simple tools for non-engineers to create digital projects. The Wiring platform consisted of a hardware PCB with an ATmega168 microcontroller, an IDE based on Processing and library functions to easily program the microcontroller.

In 2005, Massimo Banzi, with David Mellis (then an IDII student) and David Cuartielles, added support for the cheaper ATmega8 microcontroller to Wiring. But instead of continuing the work on Wiring, they forked (or copied) the Wiring source code and started running it as a separate project, called Arduino.

The Arduino's initial core team consisted of Massimo Banzi, David Cuartielles, Tom Igoe, Gianluca Martino, and David Mellis.[36]

The name Arduino comes from a bar in Ivrea, where some of the founders of the project used to meet. The bar was named after Arduin of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.[37]

Following the completion of the Wiring platform, its lighter, lower cost versions[38] were created and made available to the open-source community. Associated researchers, including David Cuartielles, promoted the idea.

Applications

- Xoscillo, an open-source oscilloscope[26]
- Scientific equipment[27] such as the Chemduino[28]
- Arduinome, a MIDI controller device that mimics the Monome
- OBDuino, a trip computer that uses the on-board diagnostics interface found in most modern cars
- Ardupilot, drone software and hardware
- ArduinoPhone, a do-it-yourself cellphone[29][30]
- GertDuino, an Arduino mate for the Raspberry Pi[31]
- Water quality testing platform[32]
- Homemade CNC using Arduino and DC motors with close loop control by Homofaciens[33]
- DC motor control using Arduino and H-Bridge

CONCLUSION

Thus we have designed a laser targeting device by using arduino UNO board and laser light, which is portable, handy and highly effective.

Such type of devices are used in automation industries and sometime used for security purposes.

REFERENCE

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