

BME 2232: BIOMEDICAL INSTRUMENTATION

COURSE ENDING PROJECT SHOWCASING

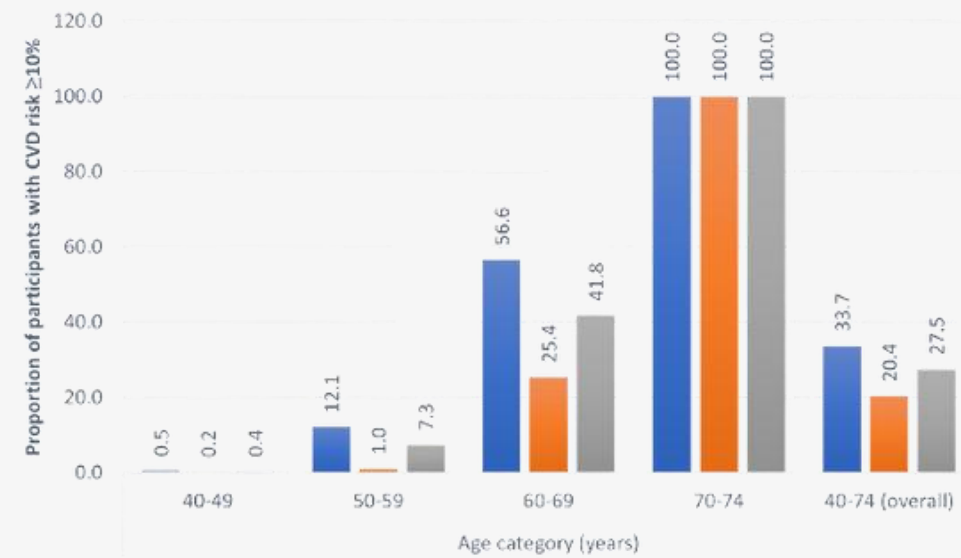
HEART RATE MEASUREMENT CIRCUIT



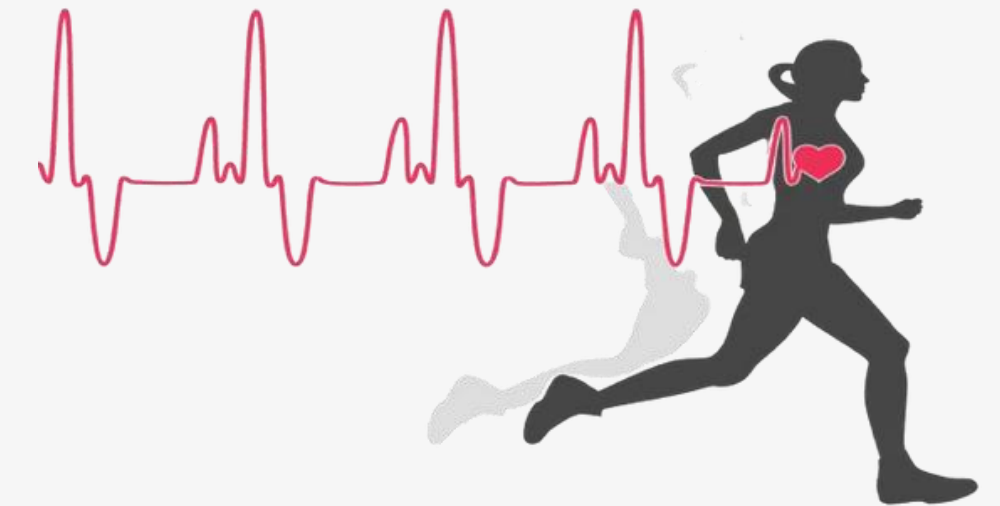


MOTIVATION

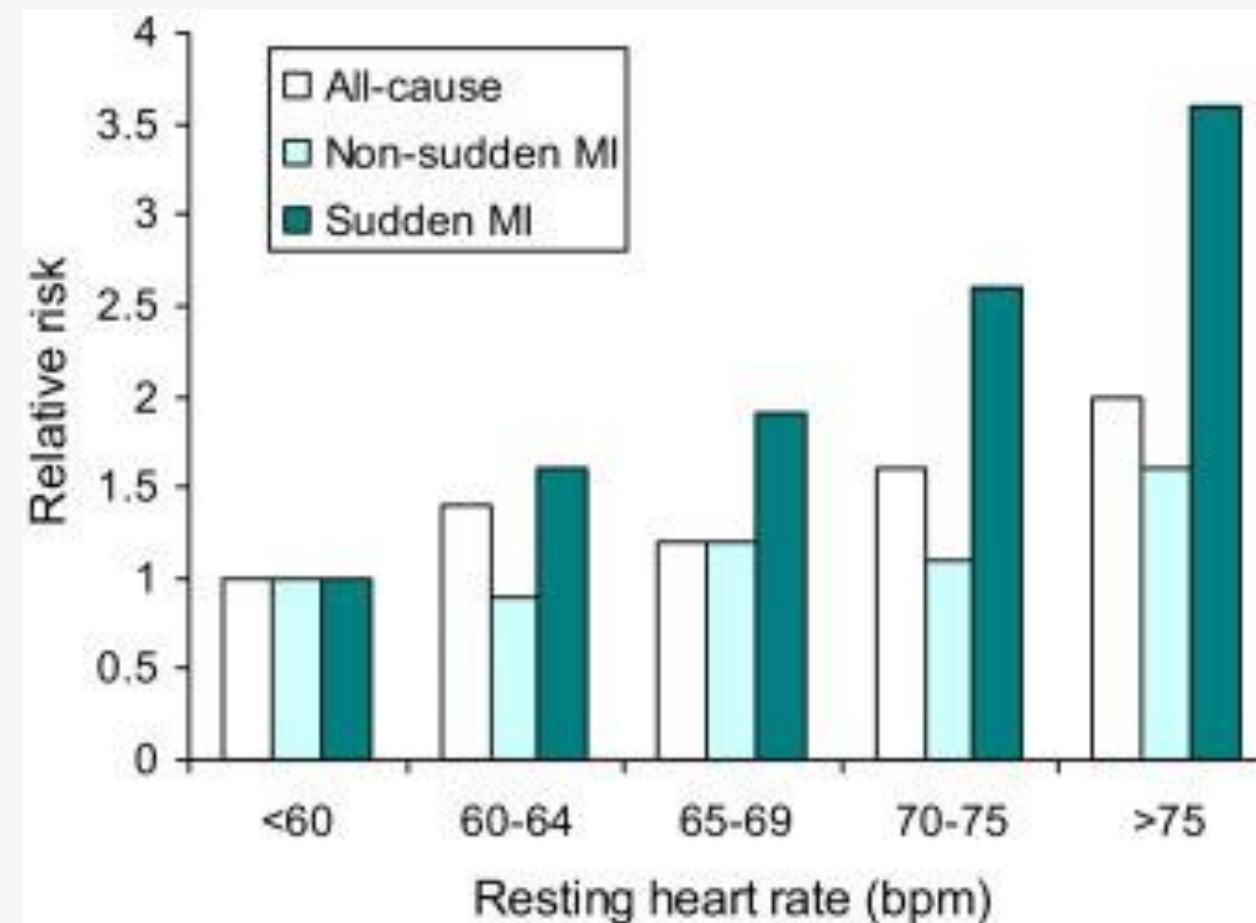
BME 2232



HIGH RISK OF CVD IN BD

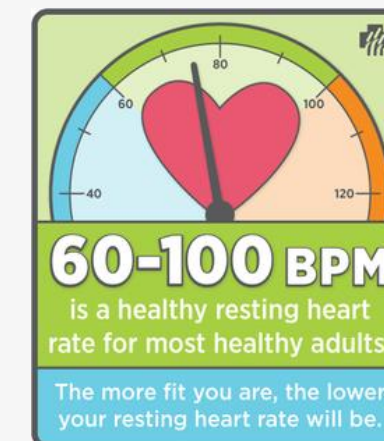
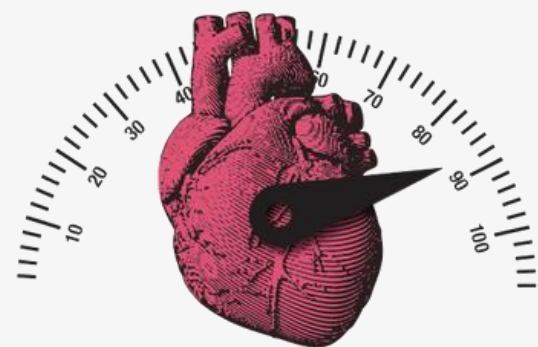


**HEART RATE INDICATES
CONDITION OF HEART**





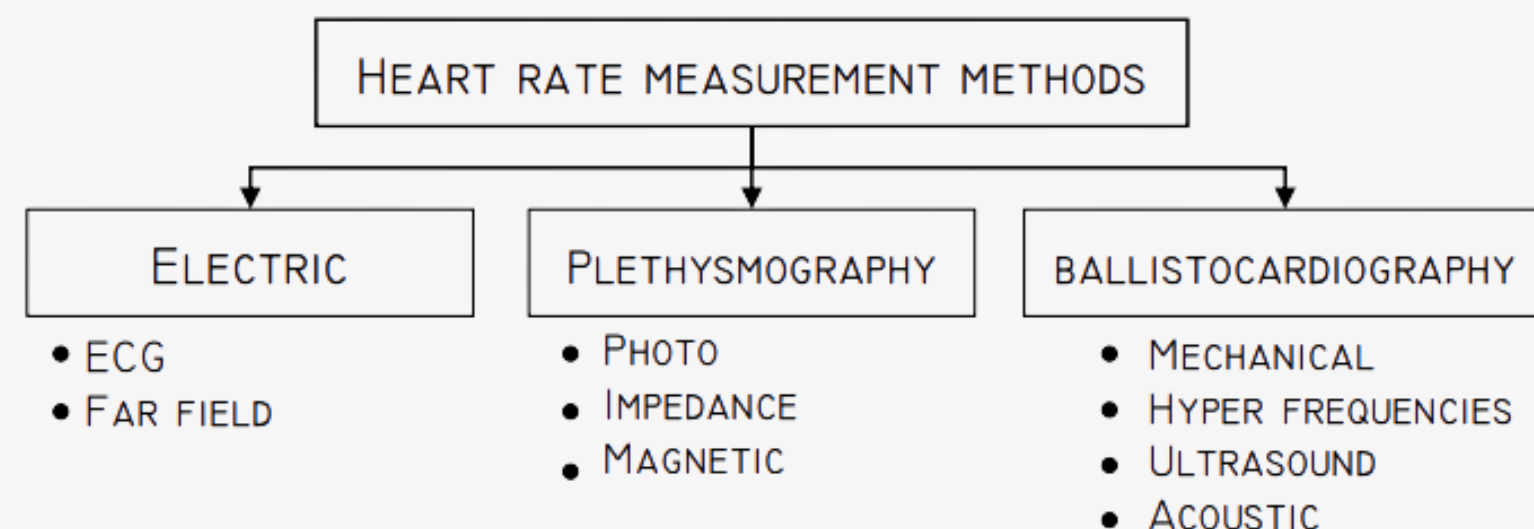
BACKGROUND STUDY



NUMBER OF HEART BEAT/MIN

NORMAL PEOPLE :60-100 BM

WHY PHOTO PLETHYSMOGRAPHY??



NON
INVASIVE



94.6% ACCURACY
WITHIN 100MS



Painless



BASIC PRINCIPLE



**VARIATION OF THE BLOOD VOLUME
INSIDE A FINGER ARTERY, CAUSED BY
THE PUMPING ACTION OF THE HEART.**

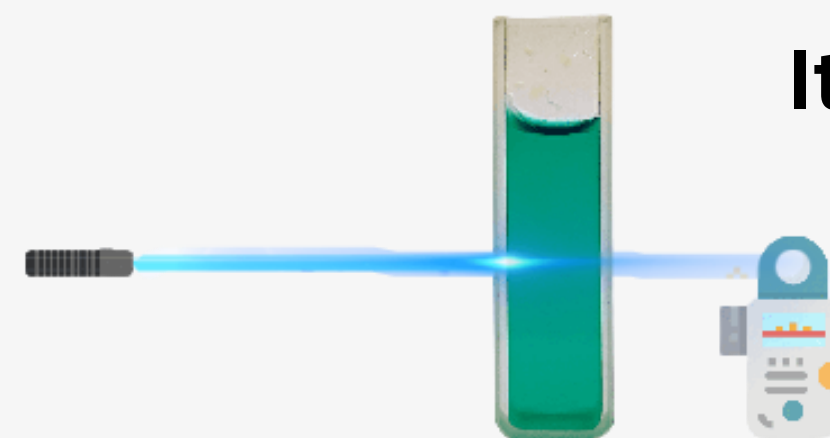


**THICKNESS AND EASY ACCESS , THE
INDEX FINGER (AS CONTROL OVER INDEX
FINGER IS GOOD ,LESSER CHANCES FOR
DETACHMENT**

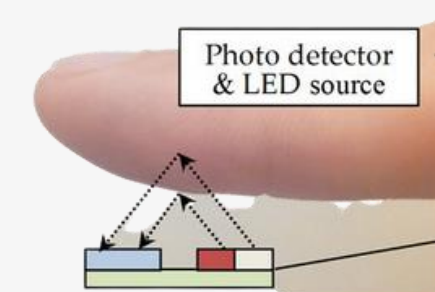
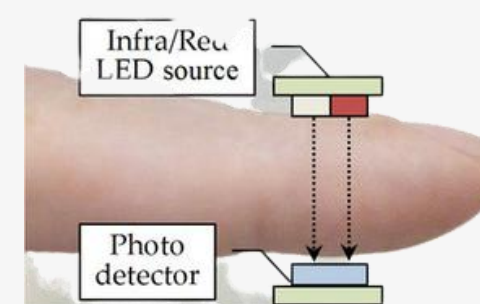


$$A = \epsilon \ell c$$

absorbance molar absorptivity path length concentration



**Its the basic science of
the mechanism**

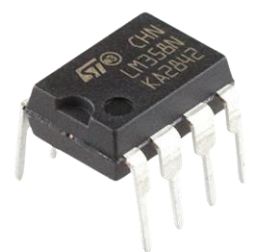


**TWO WAYS : TRANSMISSIVE AND
REFLECTIVE**



BME 2232

COMPONENT WE NEED



LM358

10 TAKA



IR LED



PHOTO DIODE



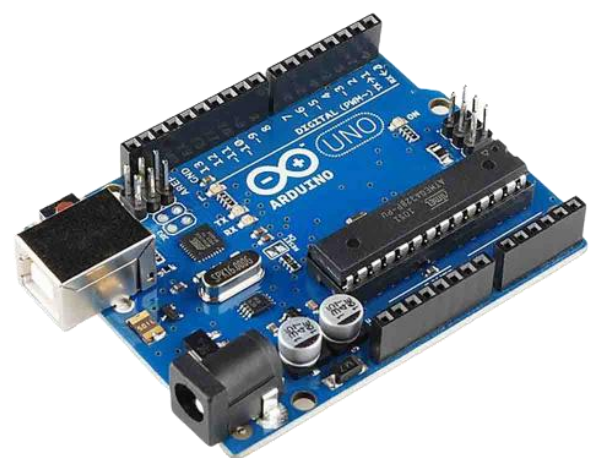
LED



RESISTOR



CAPACITOR



ARDUINO UNO



LCD DISPLAY



BUZZER





CIRCUIT PRINCIPLE



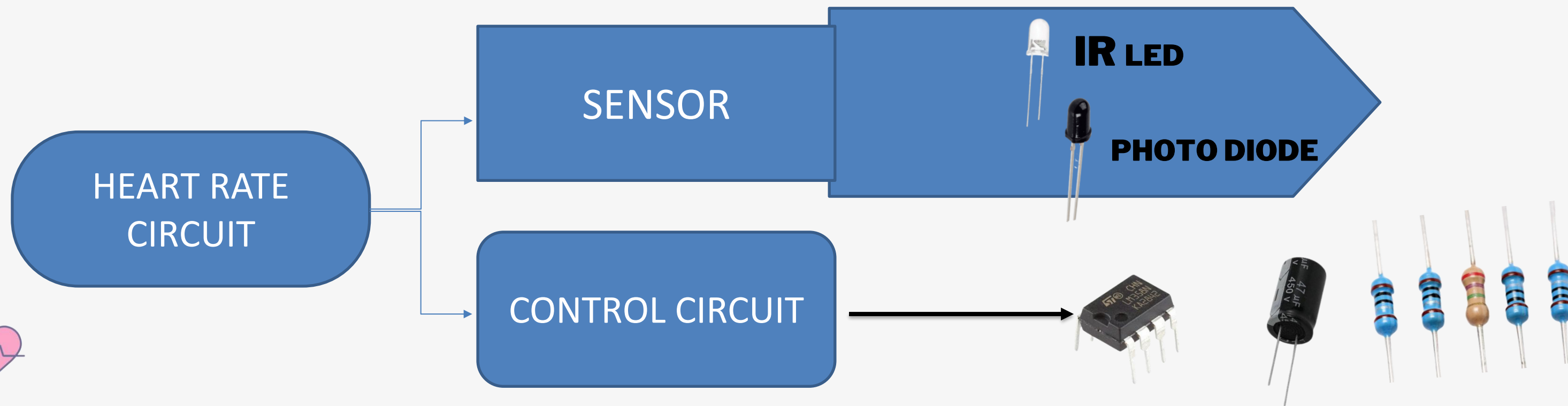
IR LED
Source



PHOTO DIODE
Detector

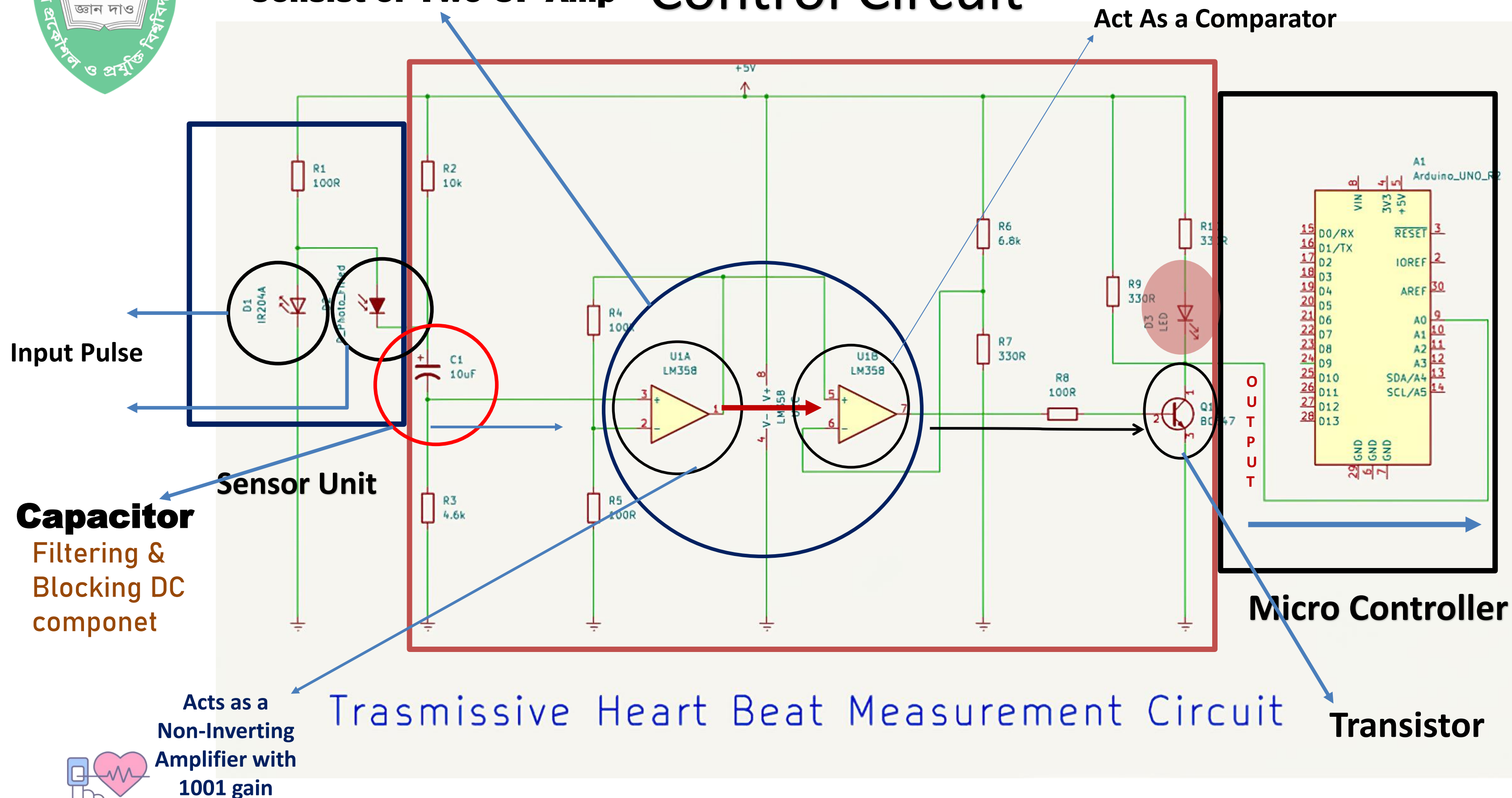


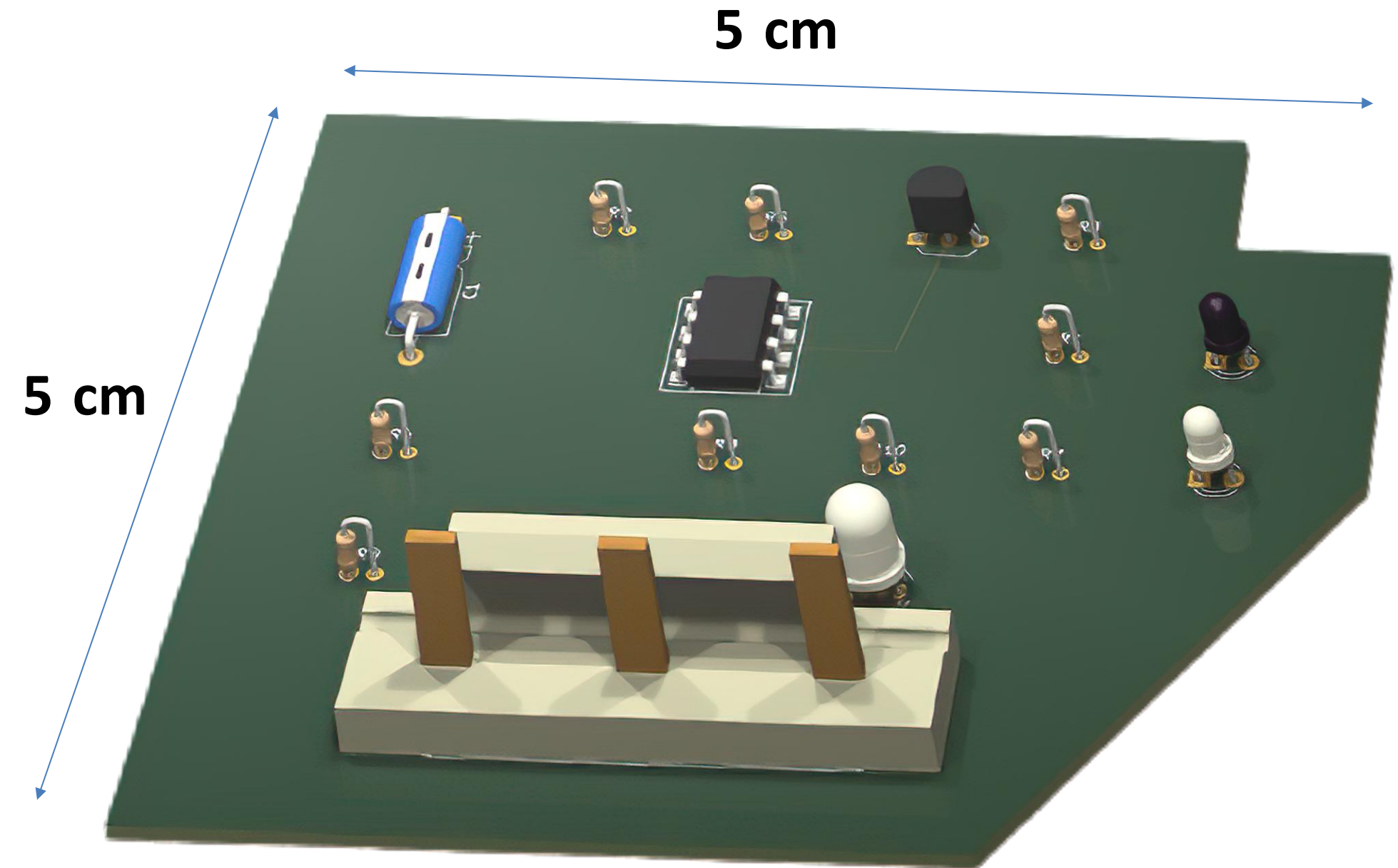
TRANSMISSIVE
MECHANISM





LM 358 Consist of Two OP-Amp Control Circuit





3D PCB BOARD
USING KICAD

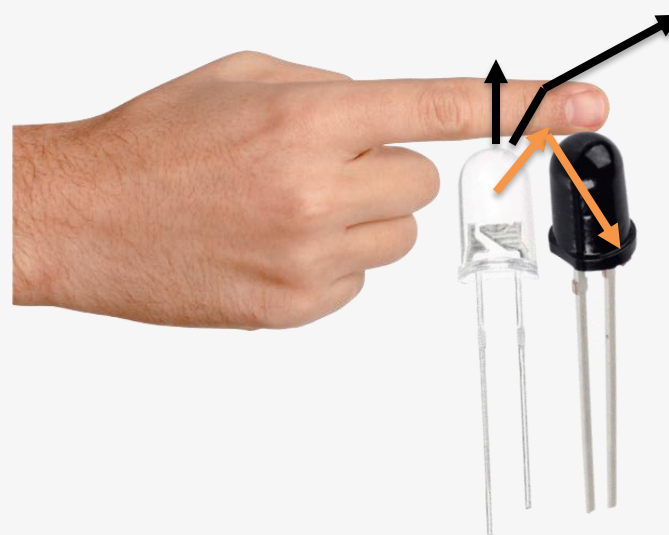




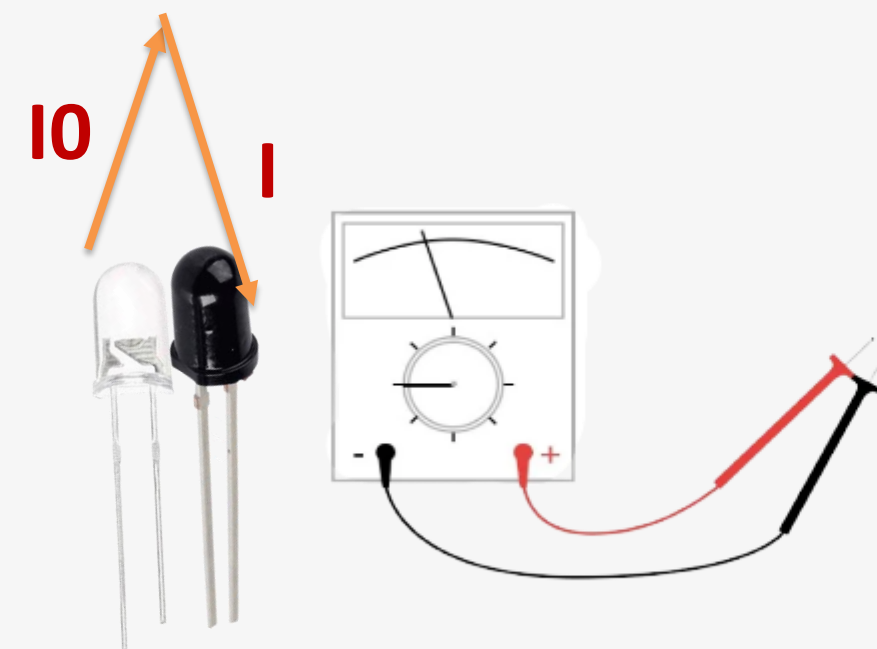
CIRCUIT PRINCIPLE (Reflectance)



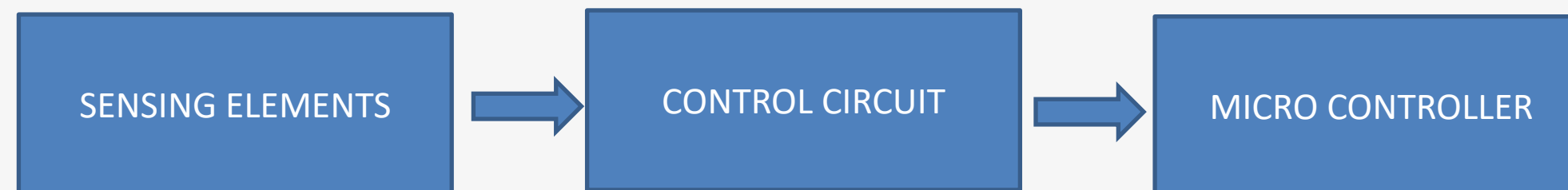
SAME SIDE OF THE BODY



THREE THINGS HAPPENED:
ABSORPTION,
REFRACTION, REFLECTION

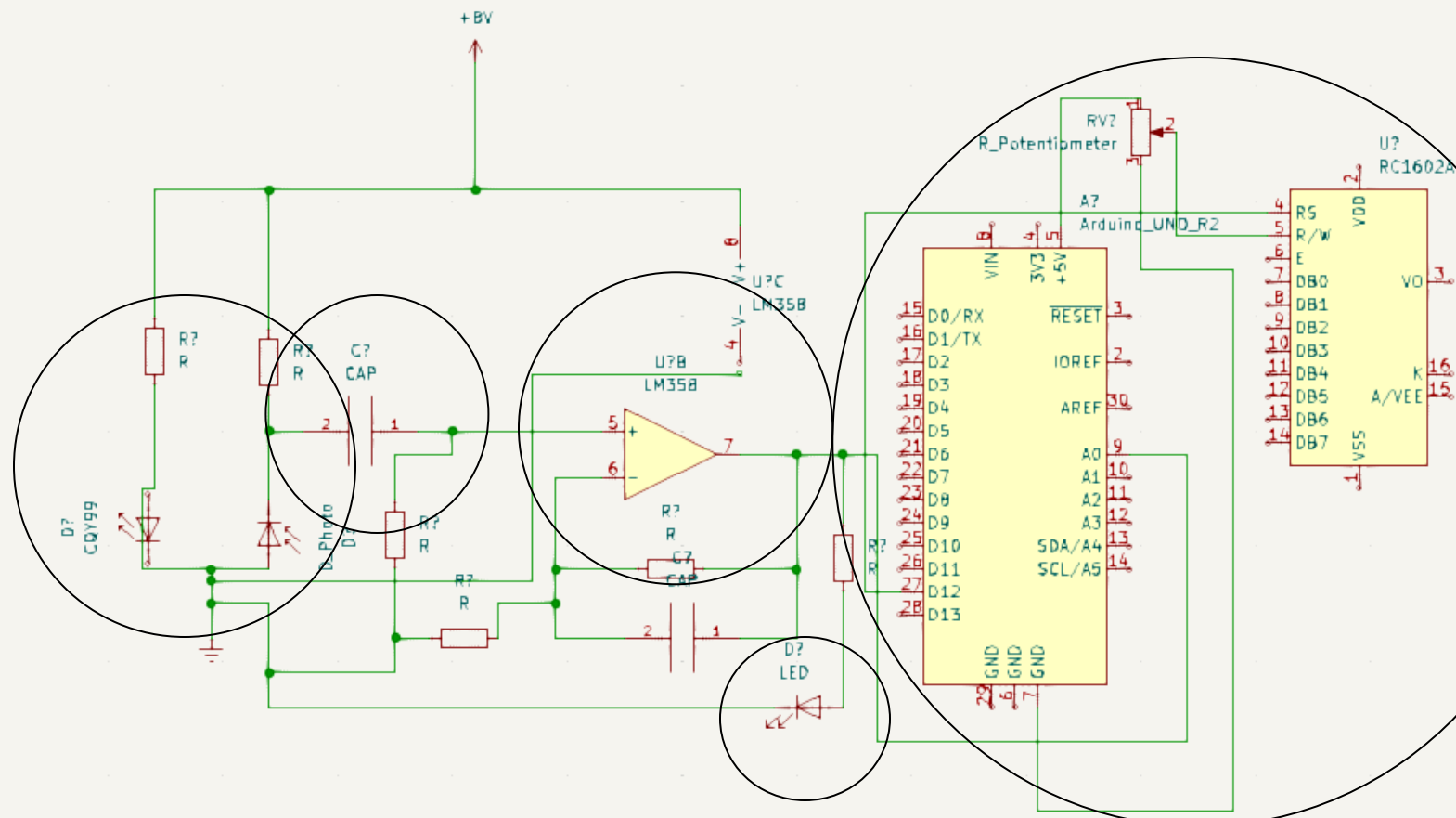


This Intensity change provide
voltage in output



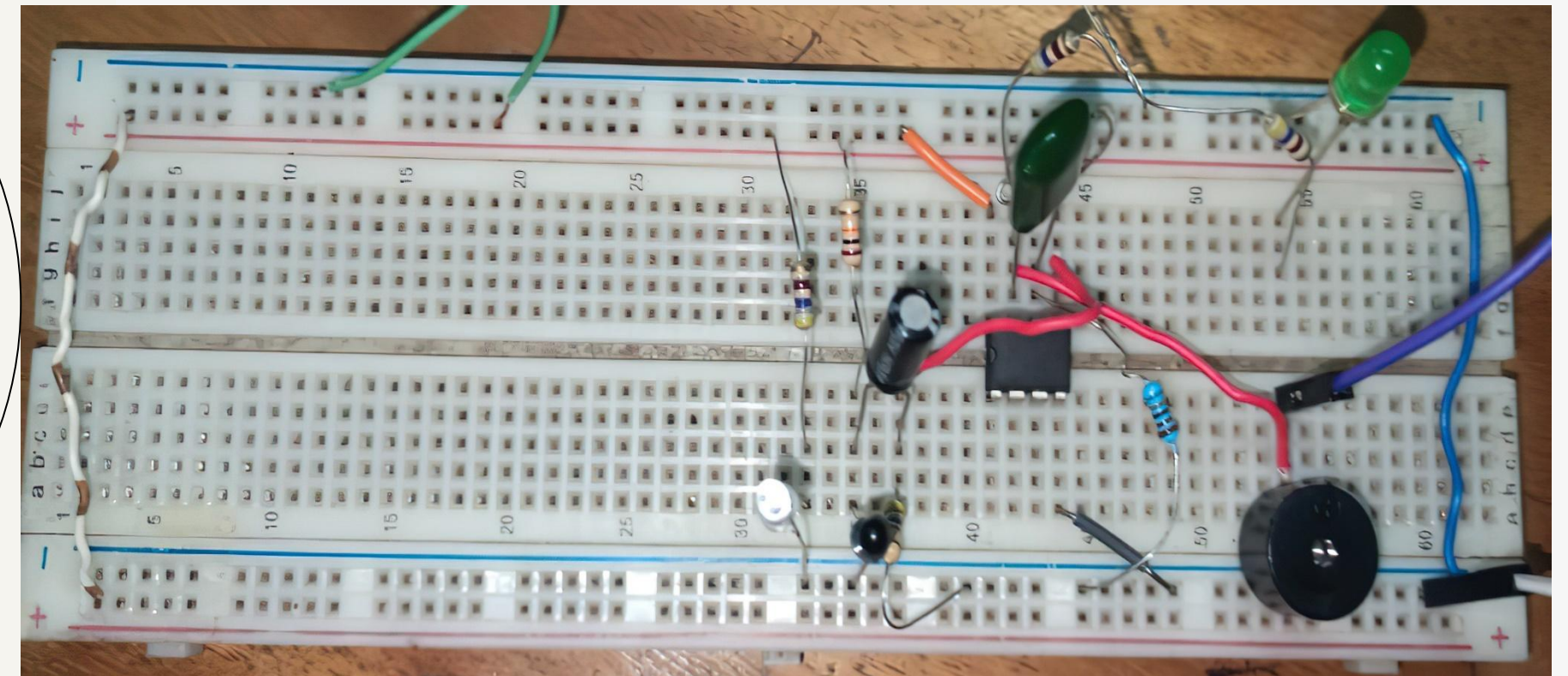


CIRCUIT DIAGRAM (Reflectance)



REFLECTIVE HEART MEASUREMENT CIRCUIT

PROPOSED SCHEMATIC DIAGRAM



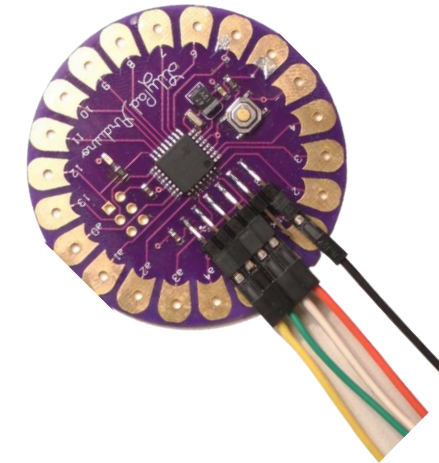
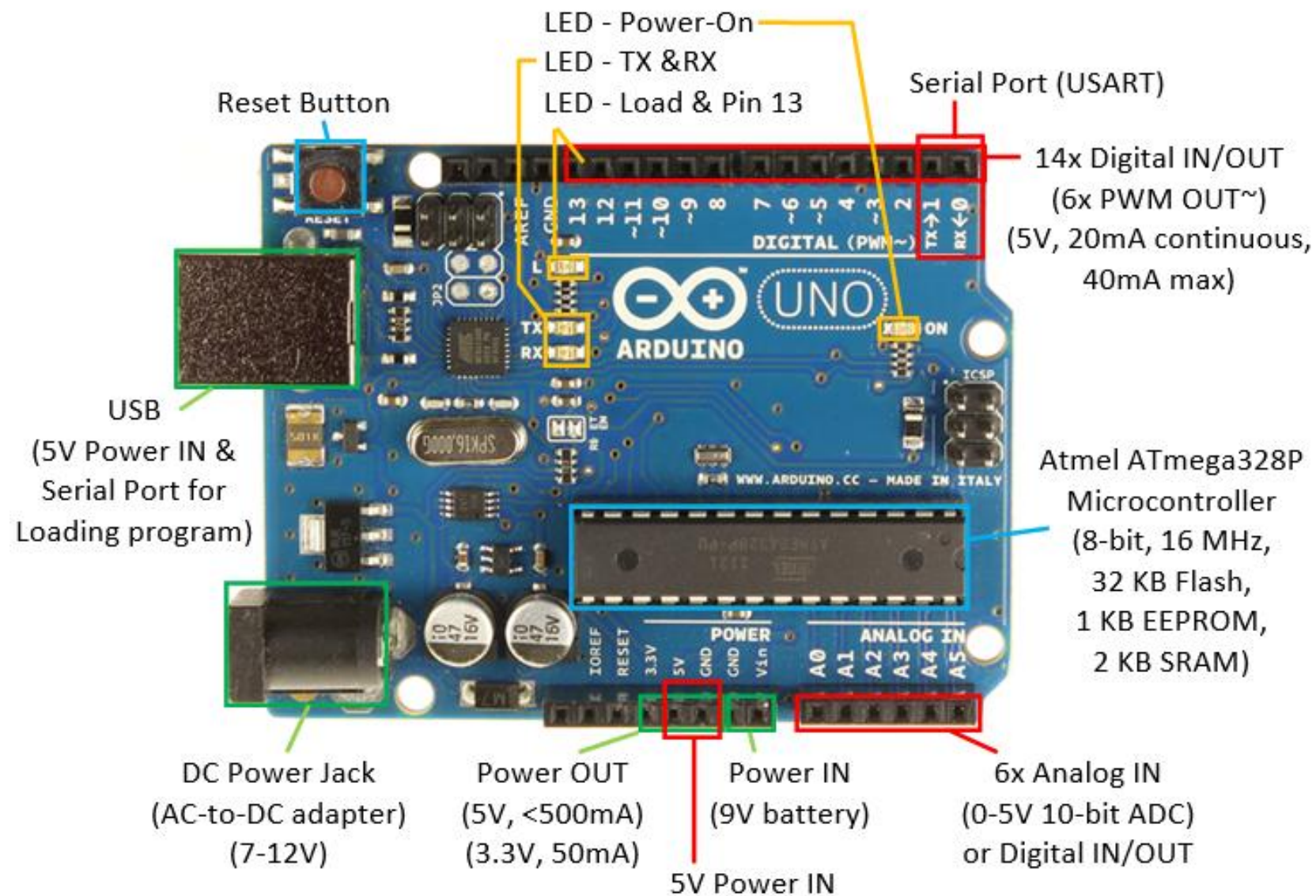
IMPLEMENTED CIRCUIT ON BREAD BOARD

IMPLEMENTATION SUCCESSION = 99.976%

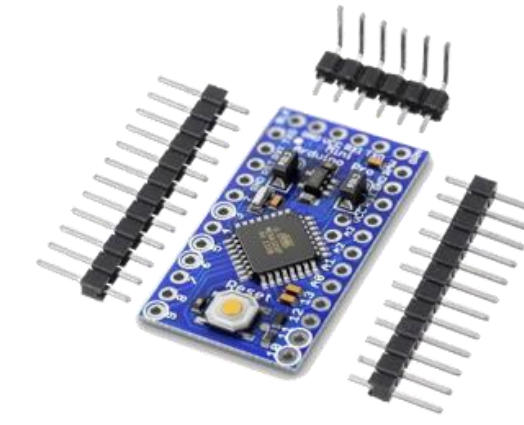




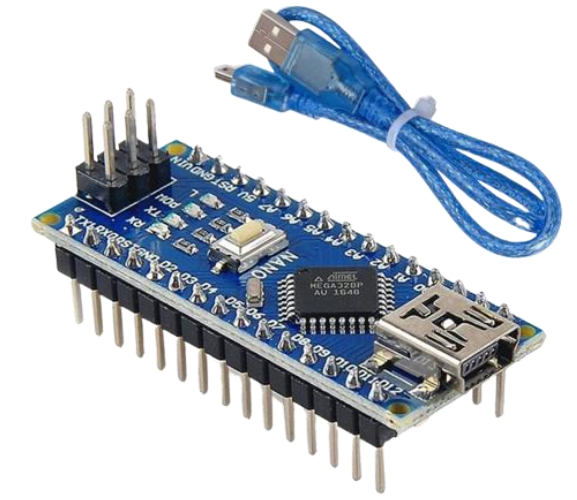
CIRCUIT DIAGRAM (DISPLAY AND PROCESSING)



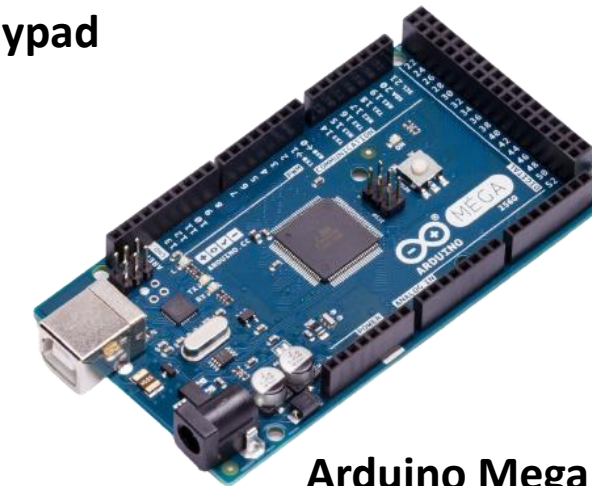
Arduino lilypad



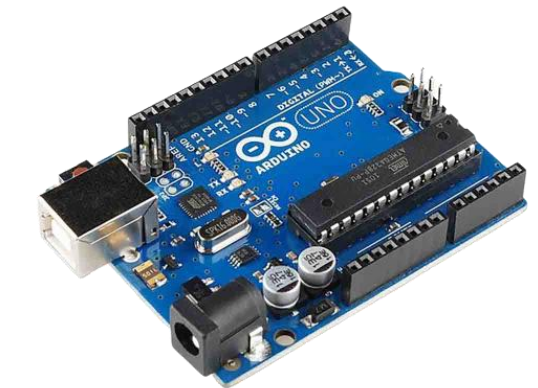
Arduino mini



Arduino Nano



Arduino Mega



Arduino Uno



compared to other existing microcontrollers it has minimum power consumption and an easily programmable interface

