SMART MONITORING FOR SPINE

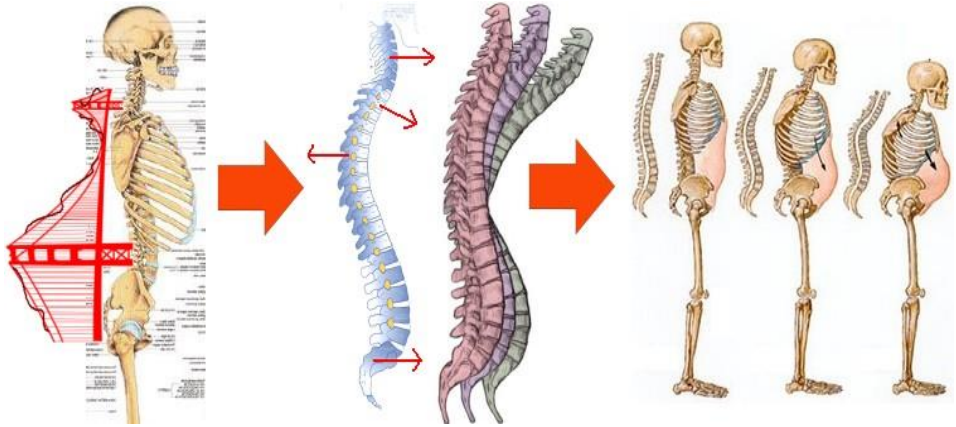
POSTURE AND FALL DETECTION

Project supervisor:
Professor Radovan Stojanović, PhD

Viktor Vuković
Andrej Radović

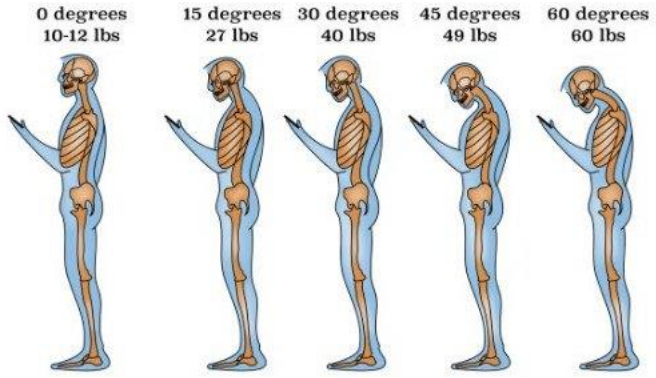
INTRODUCTION / PROBLEM

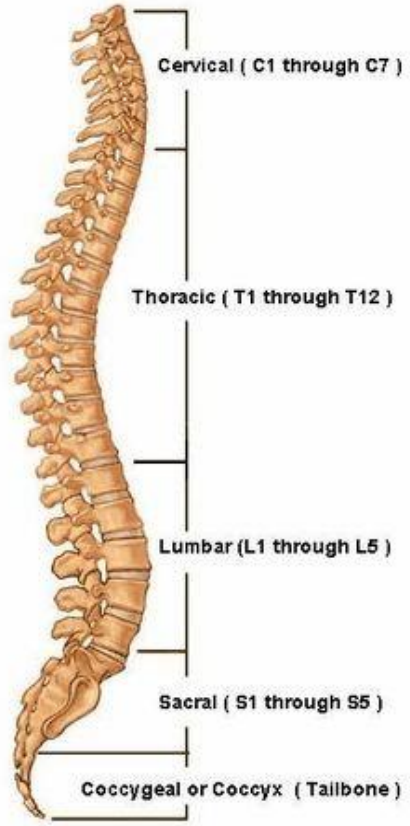
- POSTURE PROBLEMS IN MODERN LIFESTYLE
- FALLS AMONG ELDERLY POPULATION
- CONSEQUENCES
- GROWING INTEREST IN WEARABLE MONITORING SYSTEMS



SPINE POSTURE: ENGINEERING PERSPECTIVE

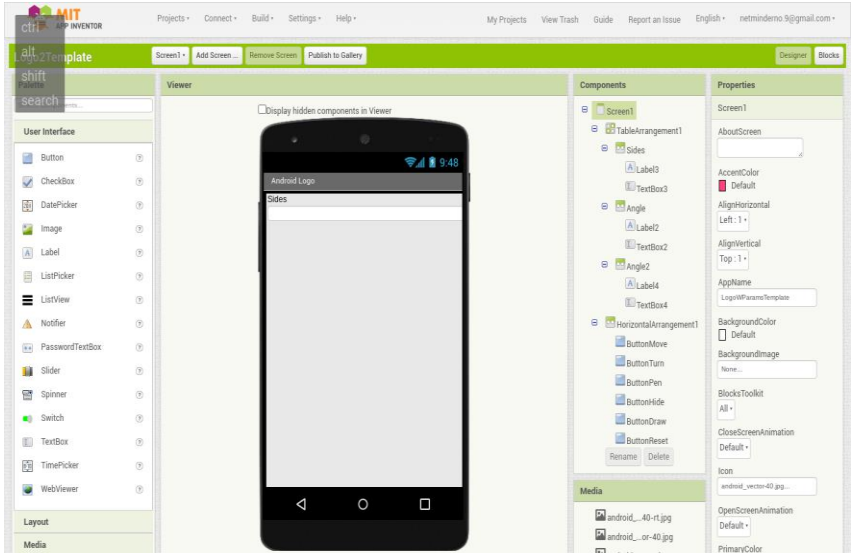
- MUSCOSCELETAL HEALTH
- KEY ANGLES: CERVICAL, THORACIC AND LUMBAR REGIONS
- ANGLES OF TILT, ROTATION AND ACCELERATION
- USER-SPECIFIC ADAPTATION (PERSONALIZATION)

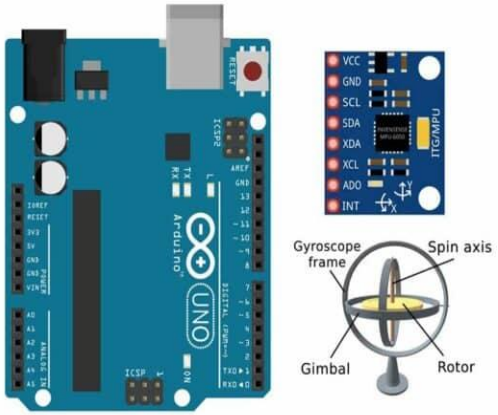


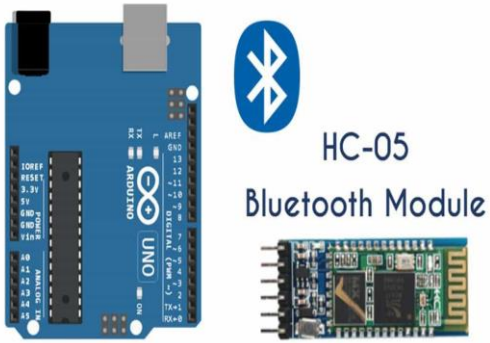


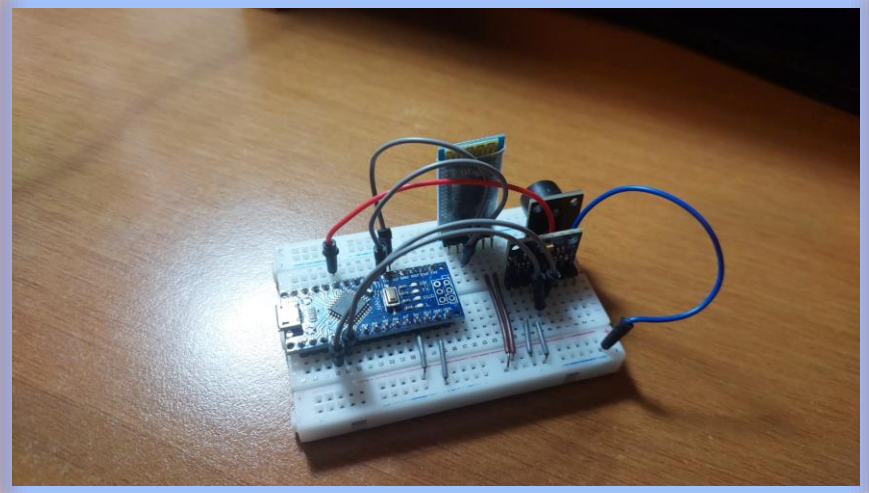
GETTING STARTED

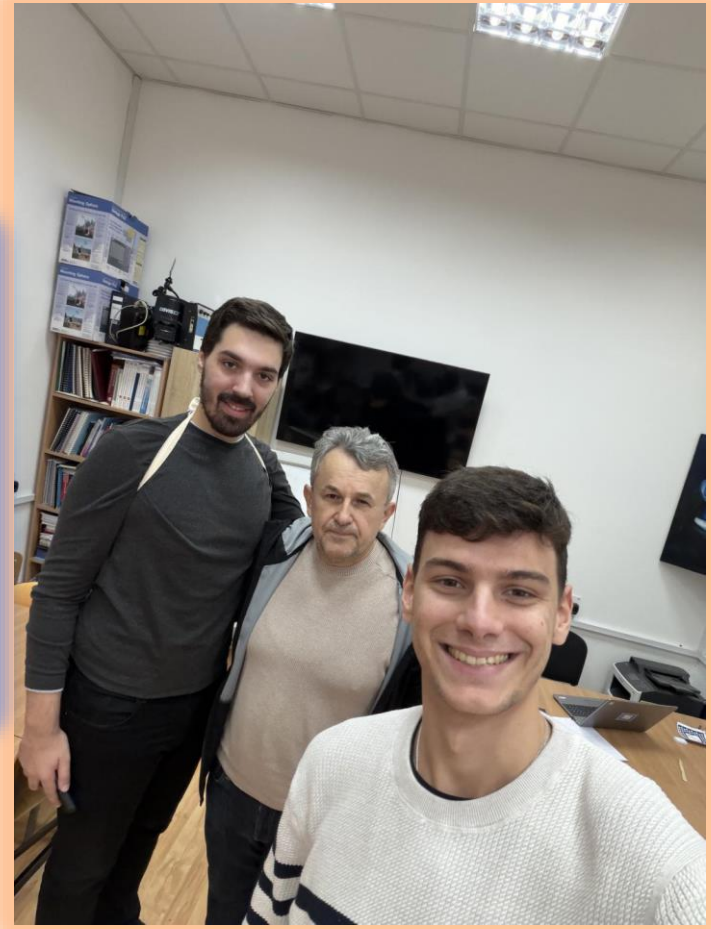
- REQUIREMENTS
- COMPONENT SELECTION
- SOFTWARE PLANING
- PROTOTYPE OBJECTIVES





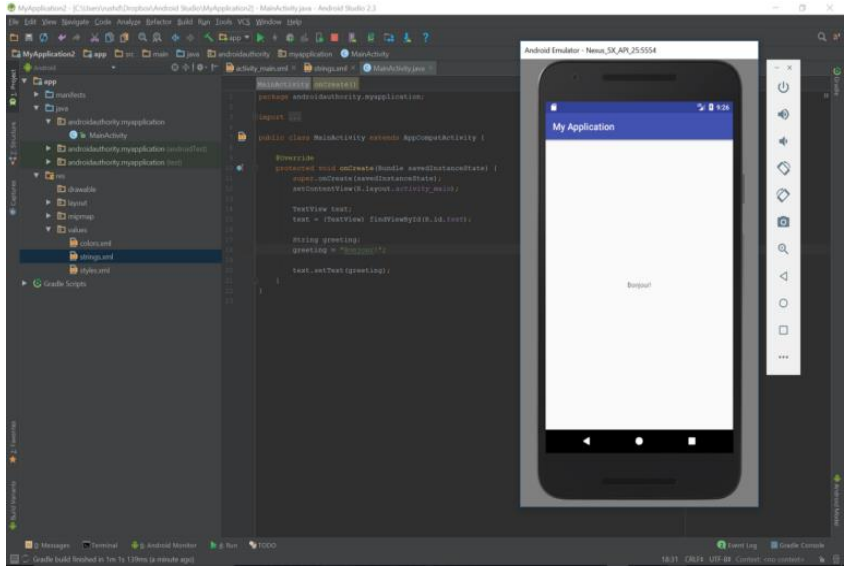


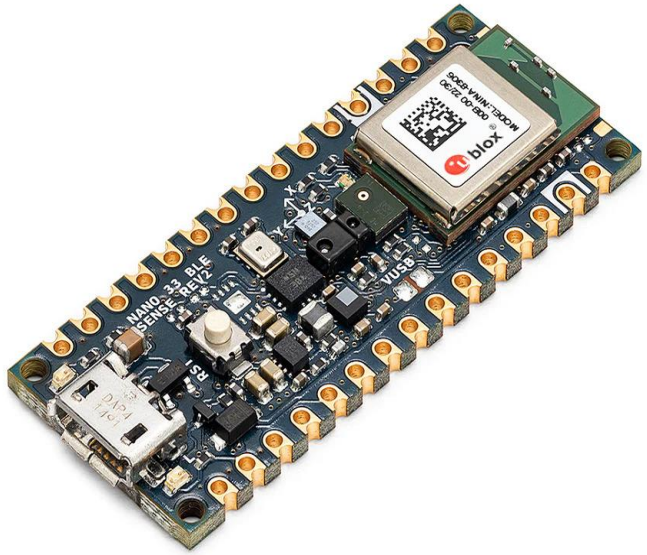


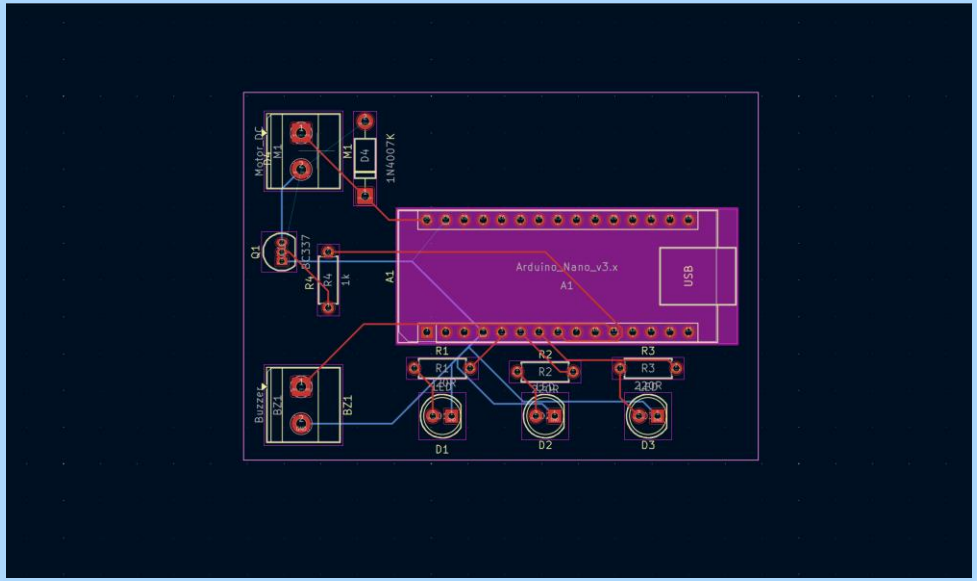


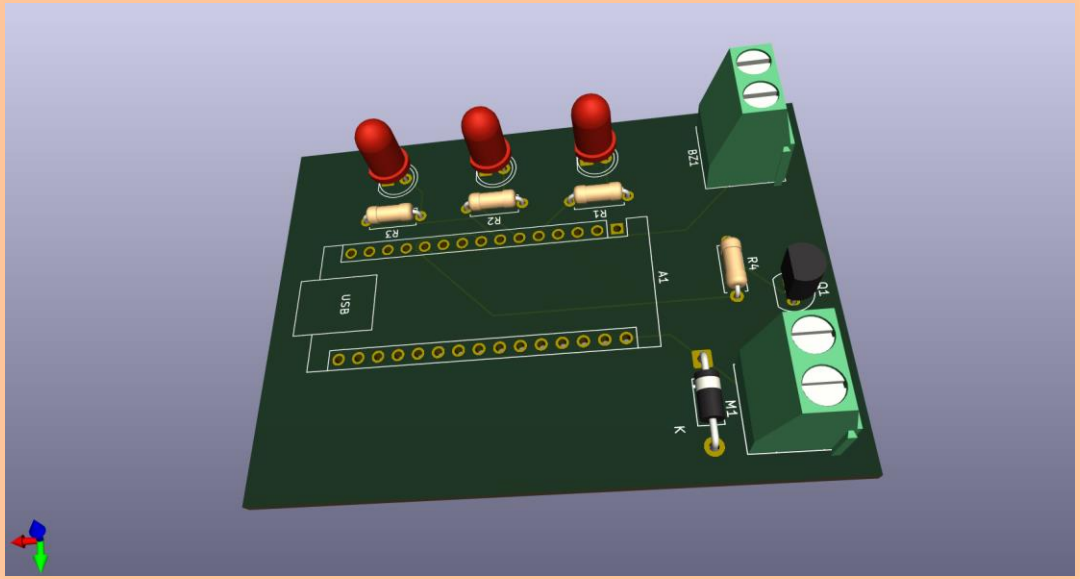
FURTHER DEVELOPMENT

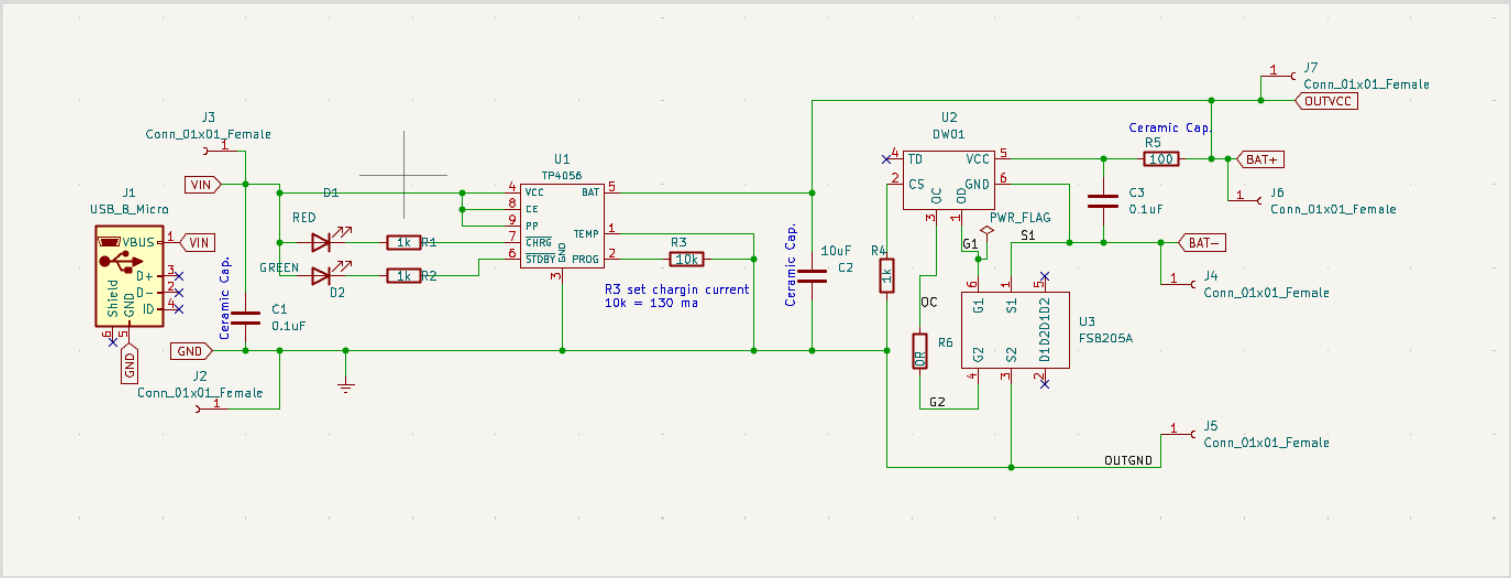
- TRANSITION FROM BREADBOARD PROTOTYPE TO CUSTOM PCB DESIGN
- BATTERY POWERD SUPPLY SYSTEM
- DEVELOPMENT OF AN APP USING ANDROID STUDIO
- NANO 33 BLE SENSE REV2

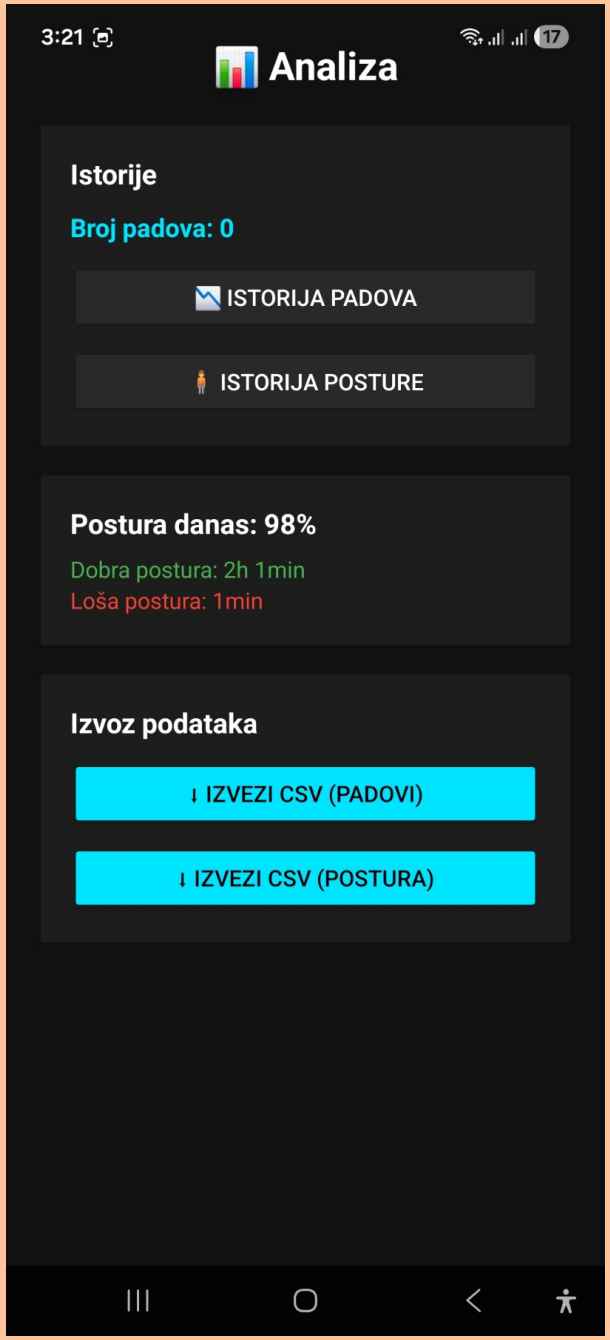


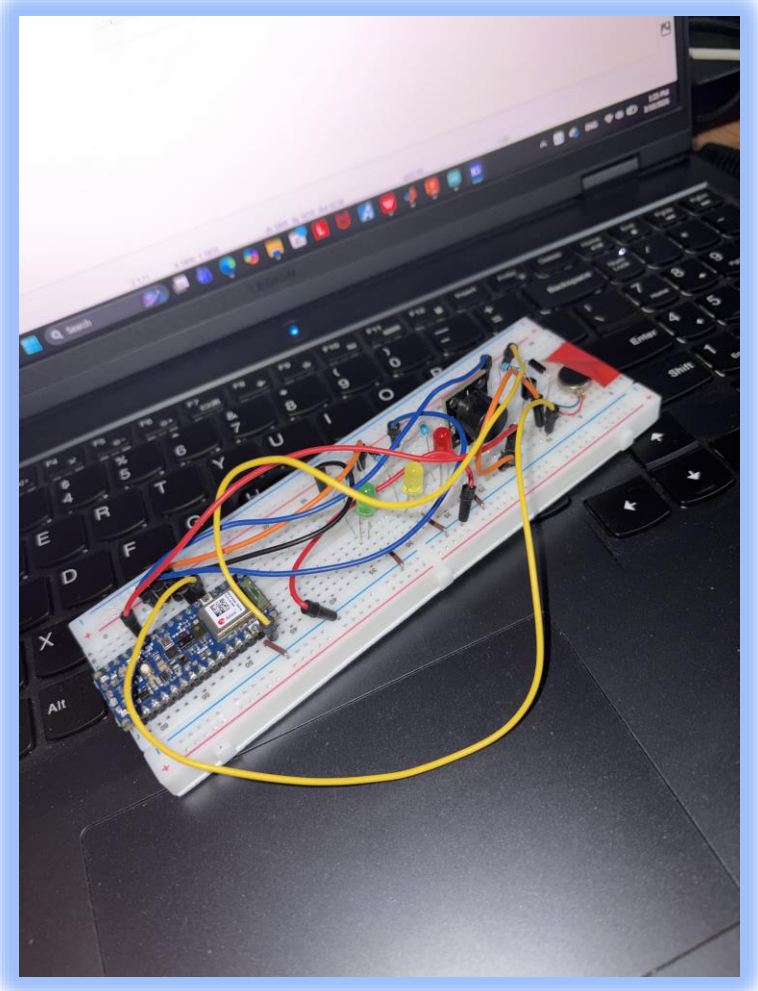


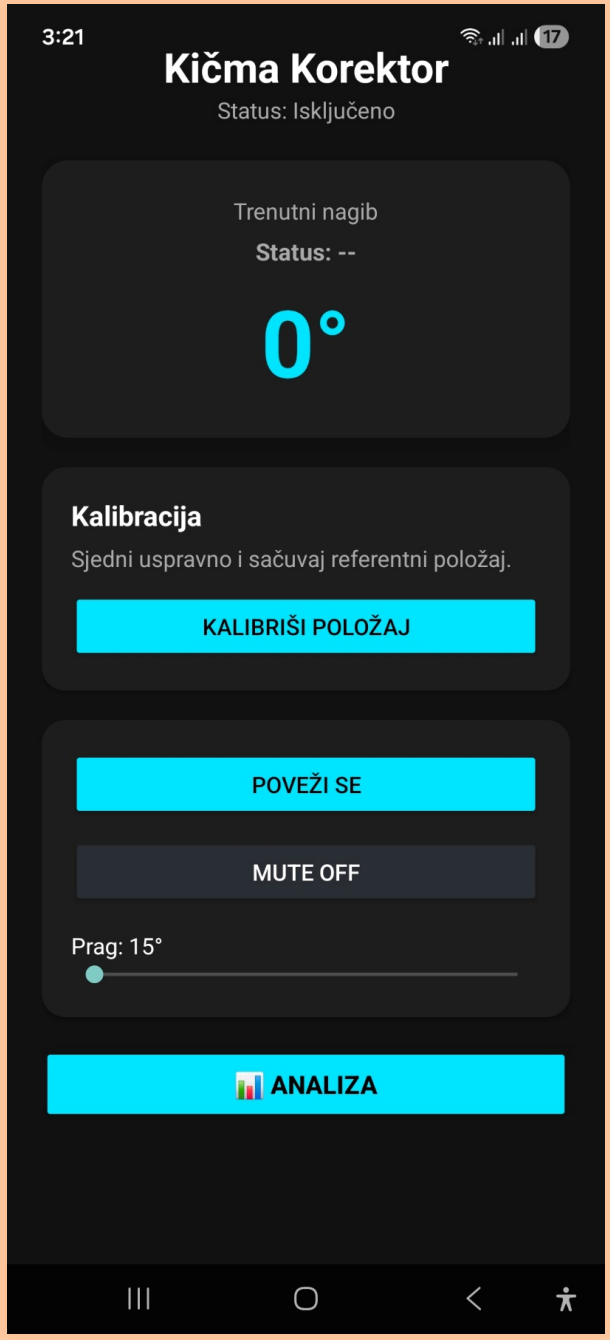

Motor DC
M1
D4
1N4007K
Q1
BC337
R4
1k
A1
Arduino_Nano_v3.x
A1
USB
R1
R2
R3
220R
330R
220R
Buzzer
BZ1
BZ1
D1
D2
D3


BZ1
R1
R2
R3
A1
USB
R4
Q1
M1
K


J3
Conn_01x01_Female
VIN
J1
USB_B_Micro
VBUS
D+
D-
ID
GND
Shield
Ceramic Cap.
C1
0.1uF
GND
J2
Conn_01x01_Female
D1
RED
GREEN
D2
1k
R1
1k
R2
U1
TP4056
VCC
CE
PP
CHRG
STDBY
BAT
TEMP
PROG
GND
R3
10k
R3 set chargin current
10k = 130 ma
Ceramic Cap.
10uF
C2
R4
1k
U2
DW01
TD
CS
VCC
GND
OC
OD
PWR_FLAG
G1
S1
OC
R6
DR
G2
U3
FSB205A
G1
S1
G2
S2
D1D2D1D2
Ceramic Cap.
R5
100
C3
0.1uF
J7
Conn_01x01_Female
OUTVCC
BAT+
J6
Conn_01x01_Female
BAT-
J4
Conn_01x01_Female
J5
Conn_01x01_Female
OUTGND


3:21
Analiza
Istorije
Broj padova: 0
ISTORIJA PADOVA
ISTORIJA POSTURE
Postura danas: 98%
Dobra postura: 2h 1min
Loša postura: 1min
Izvoz podataka
↓ IZVEZI CSV (PADOVI)
↓ IZVEZI CSV (POSTURA)




3:21
Kičma Korektor
Status: Isključeno
Trenutni nagib
Status: --
0°
Kalibracija
Sjedni uspravno i sačuvaj referentni položaj.
KALIBRIŠI POLOŽAJ
POVEŽI SE
MUTE OFF
Prag: 15°
ANALIZA

FUTURE WORK

- MODERN SMARTPHONES CONTAIN:
- ACCELEROMETERS AND GYROSCOPES
- SIGNIFICANT POWER AND CONNECTIVITY
- POTENTIAL FOR WIDER ADOPTION

- DEVELOPMENT OF FULLY SMARTPHONE BASED SYSTEM
- USE OF MACHINE LEARNING TO IMPROVE DETECTION ACCURACY
- IMPLEMENTATION OF ALGORITHMS USING SMARTPHONE SENSORS

QUESTIONS AND COMMENTS

THANK YOU FOR YOUR ATTENTION