



CONNECTED SMART COLLAR FOR PETS

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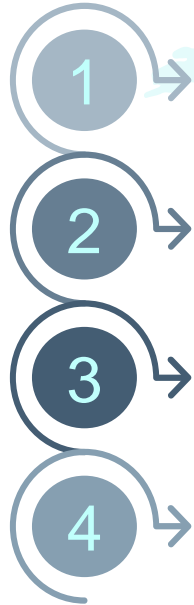


Advisor: Dr. Samir El-Nakla
Co-Advisor: Eng. Ahmed Abul-Hussain





OUTLINE



1 → Project Definition, Objectives and Specifications

2 → Background and Solution

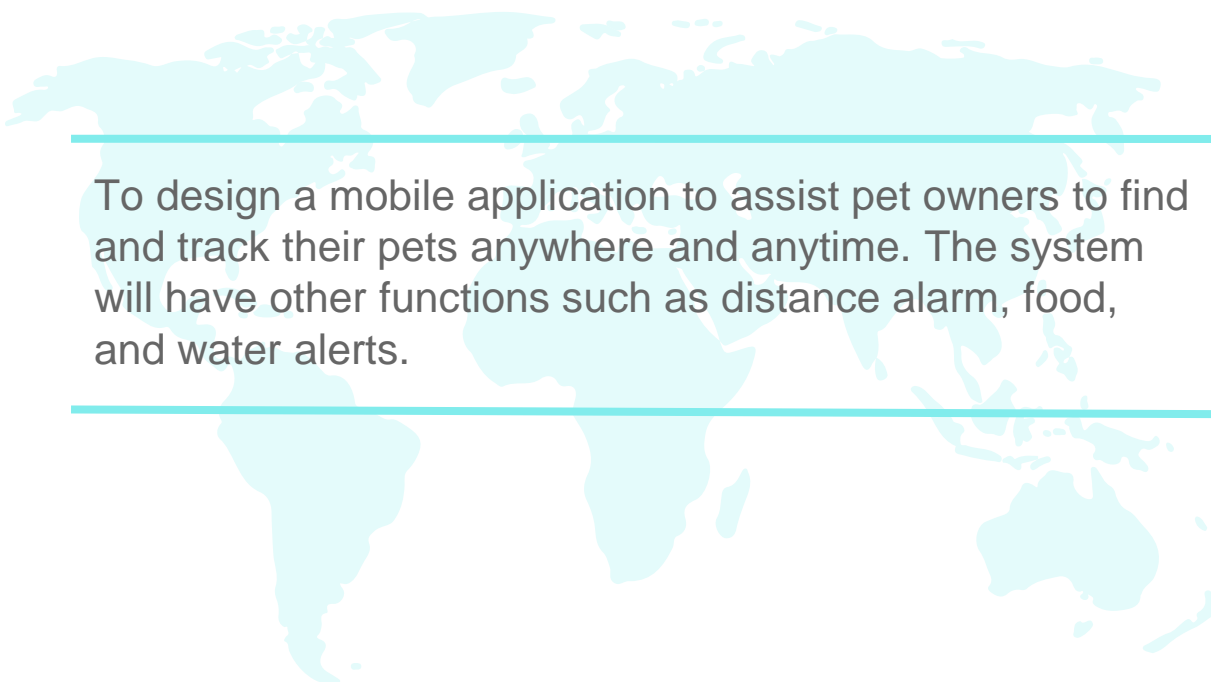
3 → Hardware and Software Implementation

4 → Summary, Planning, Risk Assessment & References





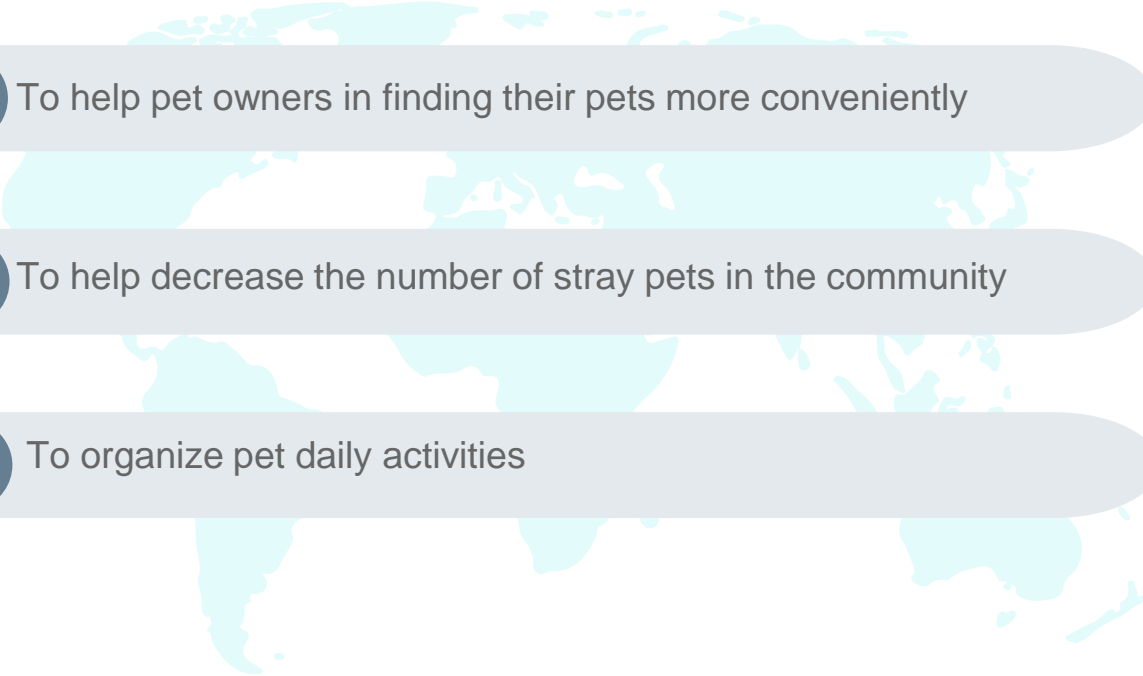
PROJECT DEFINITION

A light blue world map is centered in the background of the slide, showing the continents of North America, South America, Europe, Africa, Asia, and Australia.

To design a mobile application to assist pet owners to find and track their pets anywhere and anytime. The system will have other functions such as distance alarm, food, and water alerts.



PROJECT OBJECTIVES



1 To help pet owners in finding their pets more conveniently

2 To help decrease the number of stray pets in the community

3 To organize pet daily activities



PROJECT SPECIFICATIONS



1

Design smartphone application that has a user interface with control and monitoring functions.

2

Use GPS technology to detect and locate lost pet (GPS Module GY-NEO6MV2)

3

Adjustable collar to fit different pets

4

Food and water alerts as scheduled

5

Distance alarm



User



Smart
Phone



Database



LCD



CPU



Battery
Source



LED



GPS



Distance
Alarm



PROJECT ARCHITECTURE

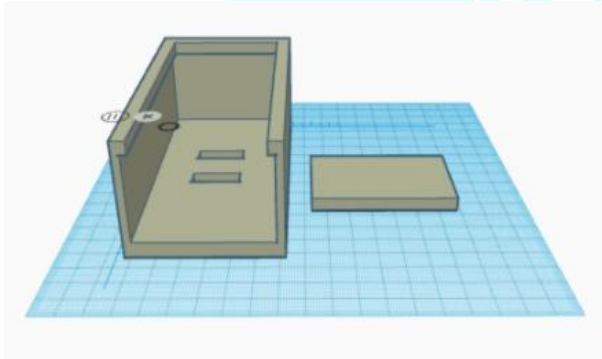
📍 PROJECT DESIGN 1



Leather pouch design. Weighs 236g.



FINAL DESIGN

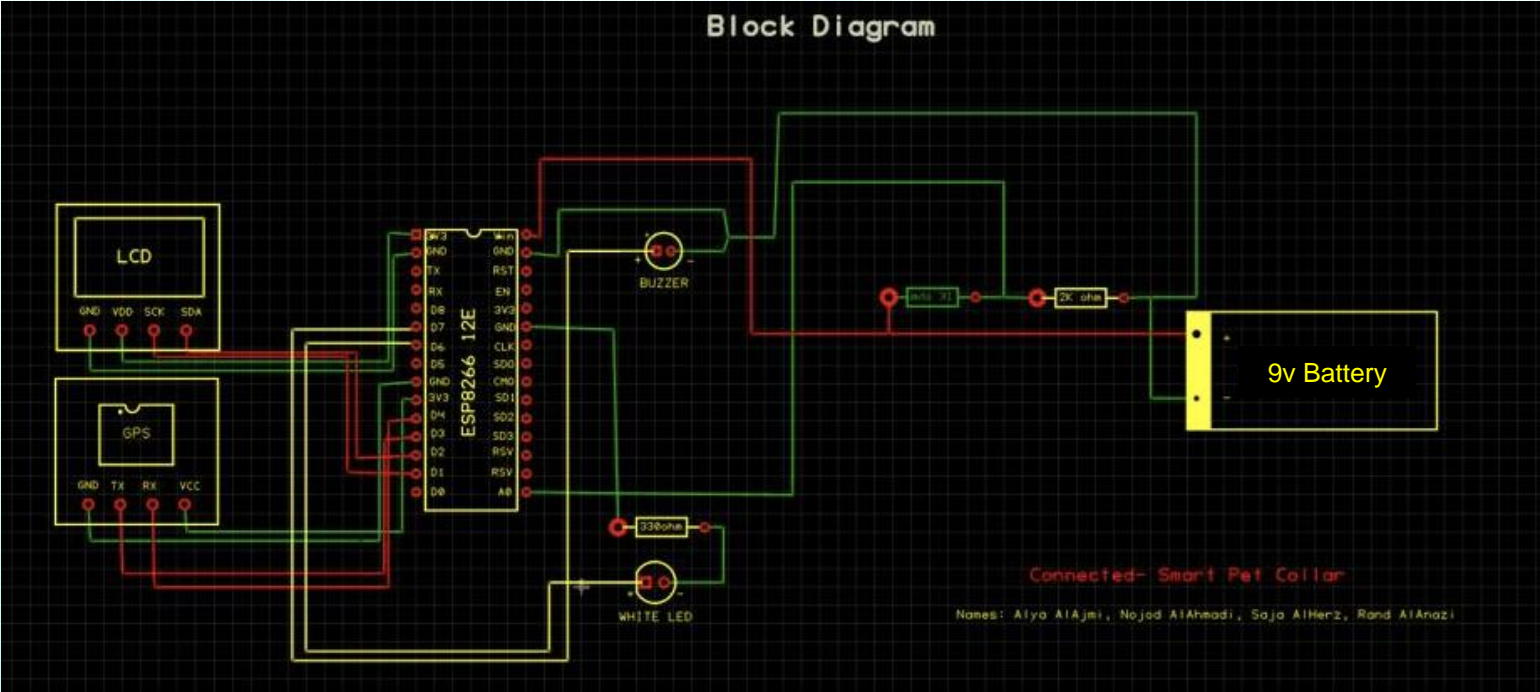


3D design



3D printed prototype. Weighs 156g.

Block Diagram

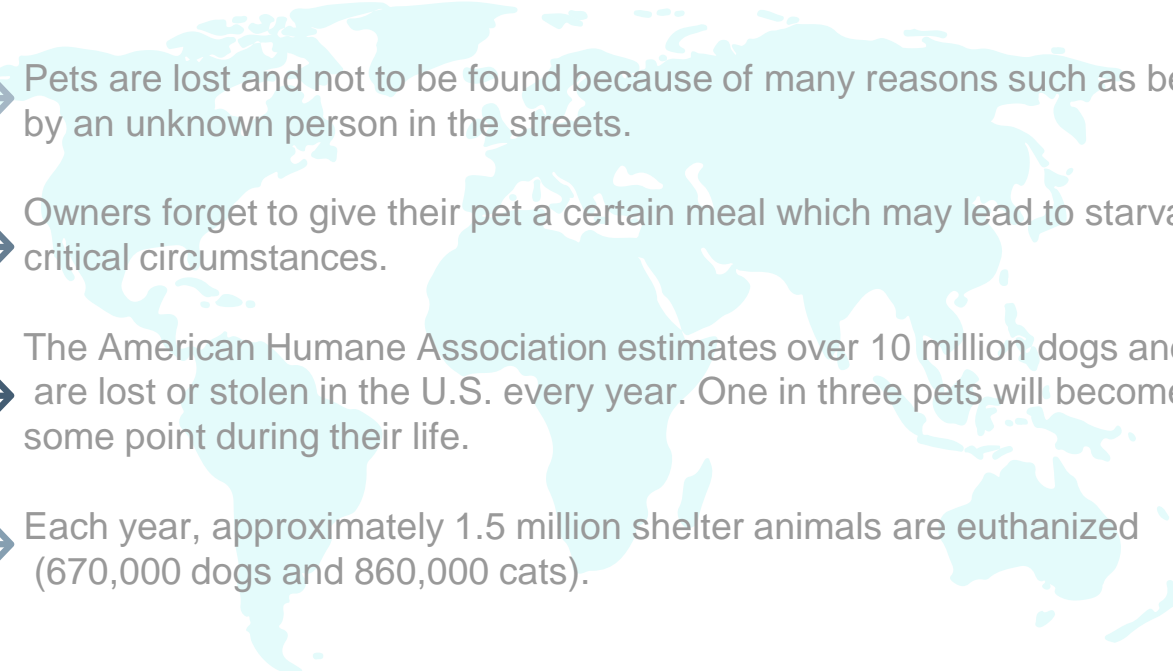


Connected-Smart Pet Collar

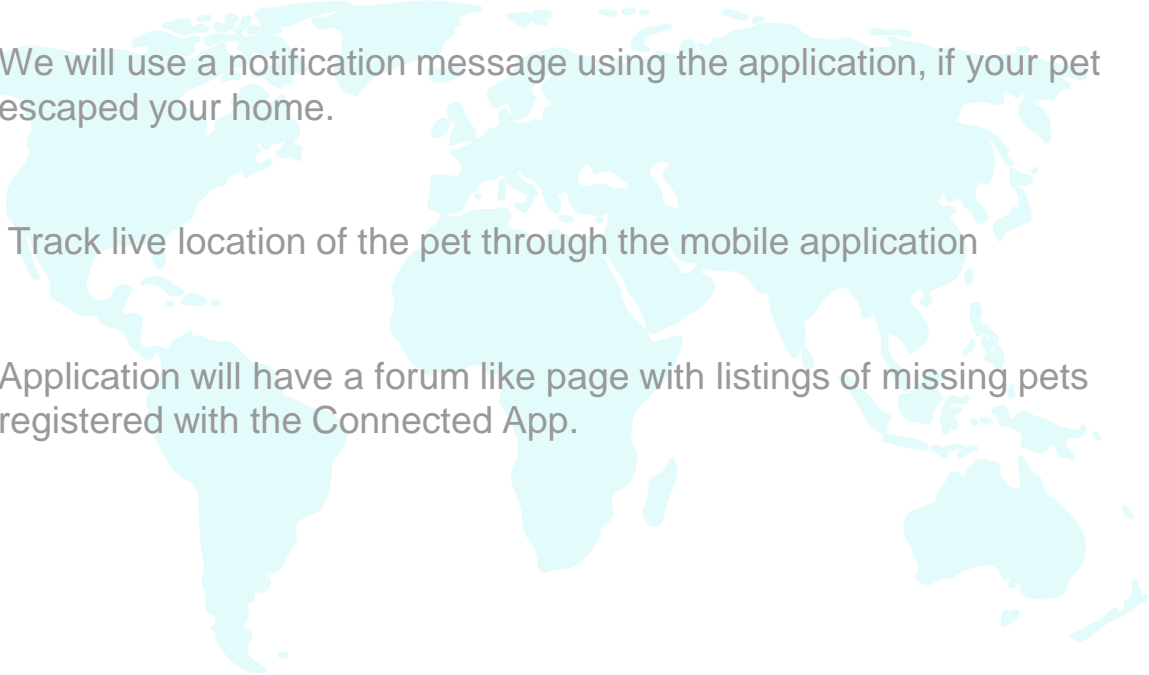
Names: Alya AlAjmi, Nojad AlAhmadi, Saja AlHerz, Rand AlArabi

PROJECT PCB (Professional Circuit Board)

BACKGROUND: PROBLEM

- 
- 1** → Pets are lost and not to be found because of many reasons such as being likely lifted by an unknown person in the streets.
 - 2** → Owners forget to give their pet a certain meal which may lead to starvation and critical circumstances.
 - 3** → The American Humane Association estimates over 10 million dogs and cats are lost or stolen in the U.S. every year. One in three pets will become lost at some point during their life.
 - 4** → Each year, approximately 1.5 million shelter animals are euthanized (670,000 dogs and 860,000 cats).

BACKGROUND: SOLUTIONS

- 
- 1** → We will use a notification message using the application, if your pet escaped your home.
 - 2** → Track live location of the pet through the mobile application
 - 3** → Application will have a forum like page with listings of missing pets registered with the Connected App.

PREVIOUS PROJECTS SUMMARY

Projects	1	2	3	4	Our Project
GPS	✓	✓	✓	✓	✓
Communication GSM, WiFi	GSM	GSM	GSM	GSM	Database + WiFi
LED	✗	✗	✗	✗	✓
Buzzer	✗	✗	✗	✗	✓
LCD	✗	✗	✗	✗	✓
Phone Application	✓	✗	✗	✗	✓



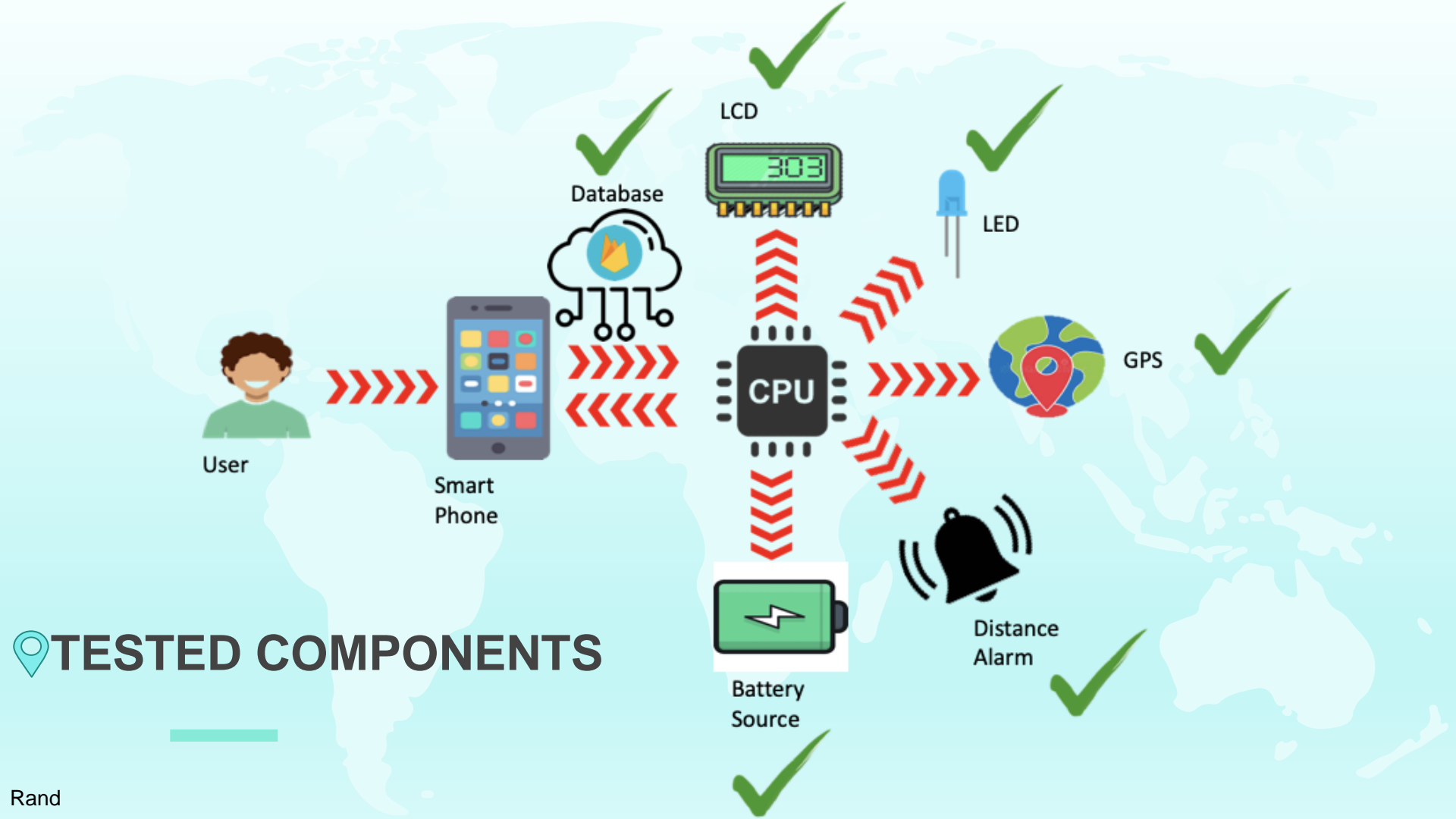
PLANNING

1

We successfully verified project feasibility. And we received the components that we ordered. And we completed all the hardware testing.

2

For Design (I) we planned to test all the hardware components, and for Design(II) we planned to implement the mobile application. And we successfully completed all the tasks.



TESTED COMPONENTS



Hardware Implementation

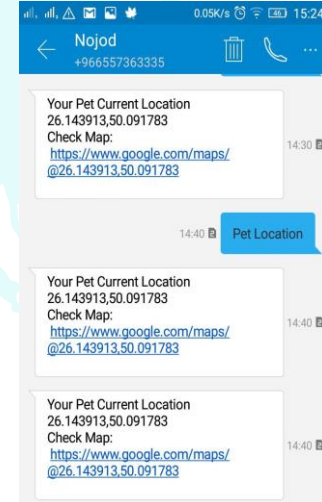
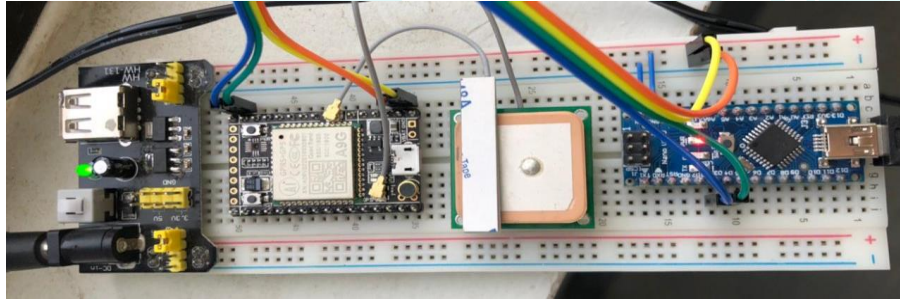
We decided to build two different hardware for testing

Hardware 1:



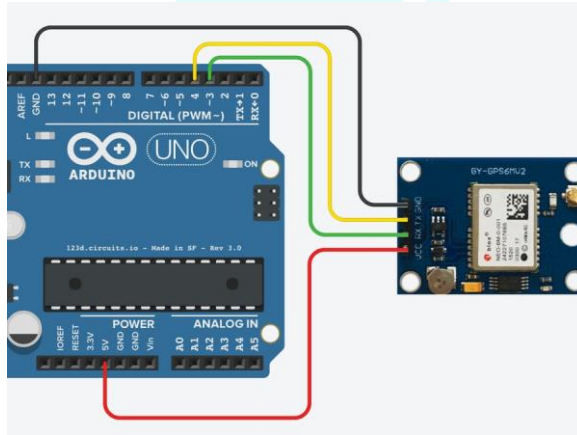
GSM Module

After testing and application was done with the A9G and Arduino Nano, everything was combined. When we text “Pet location” we get an SMS back with the exact coordinates and a link of google maps to open and view it.

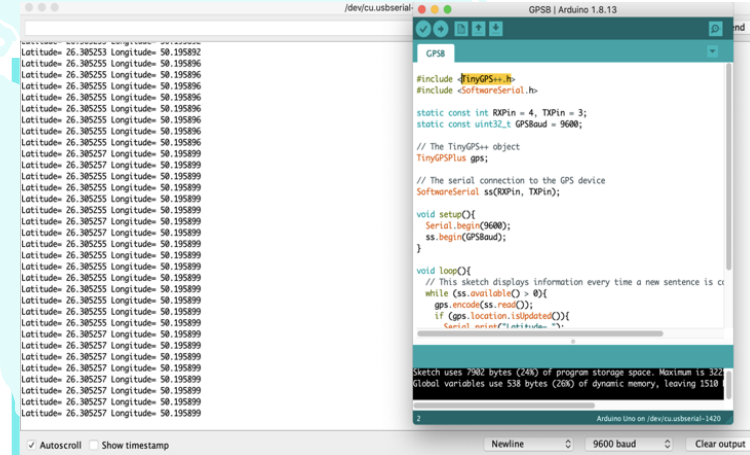


Hardware 2:

GPS



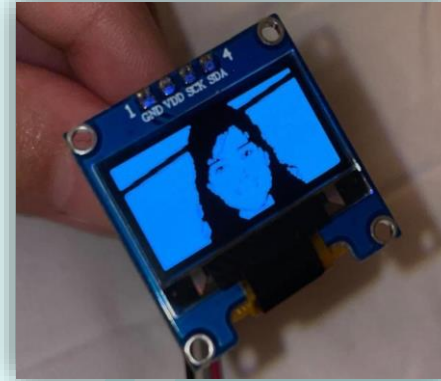
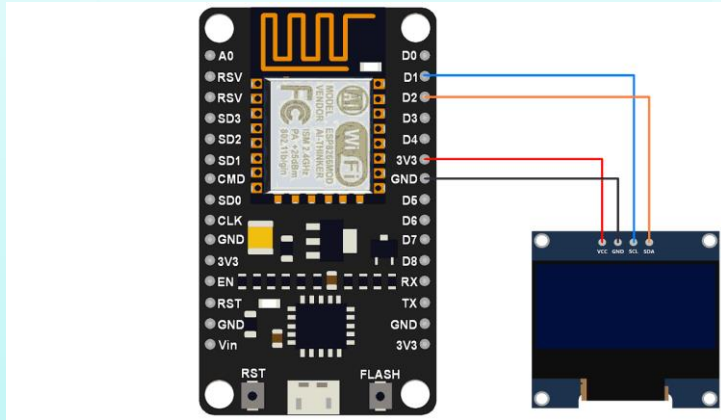
GPS module with Arduino Uno Connections.



GPS module output in serial monitor as Latitude and longitude



LCD



Output is Displayed in LCD



LCD with ESP8266 Connections.



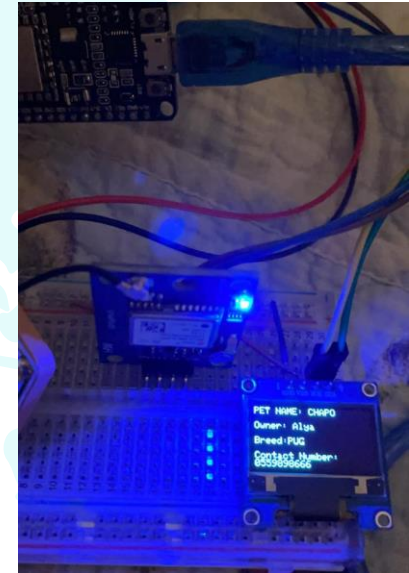
TESTING GPS WITH NODEMCU AND LCD

We tested the GPS with LCD by using NodeMCU and we combined the code we got the

Connections:

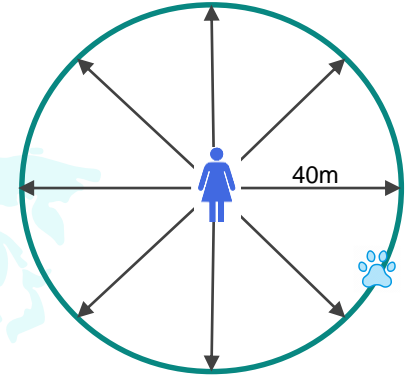
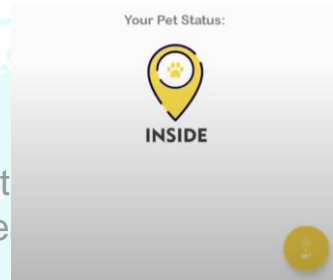
<u>GPS</u>		<u>NODEMCU</u>		<u>LCD</u>		<u>NODEMCU</u>
D7	→	TX		SDL	→	TX
D6	→	RX		SDK	→	RX
VCC	→	3V		VCC	→	3V
Ground	→	Ground		Ground	→	Ground

```
Latitude: 26.320353
Longitude: 50.159596
Altitude: 45.30
Date: 3/4/2021
Time: 17:32:11.00
```



📍 TESTING DISTANCE ALARM

We tested the distance alarm by using NodeMCU with GPS module and we got the output in the serial monitor. In the program we set fixed GPS and current GPS, the fixed is if you press set locat from the application, and if the pet is out of set are the alarm will be on.



Connections:

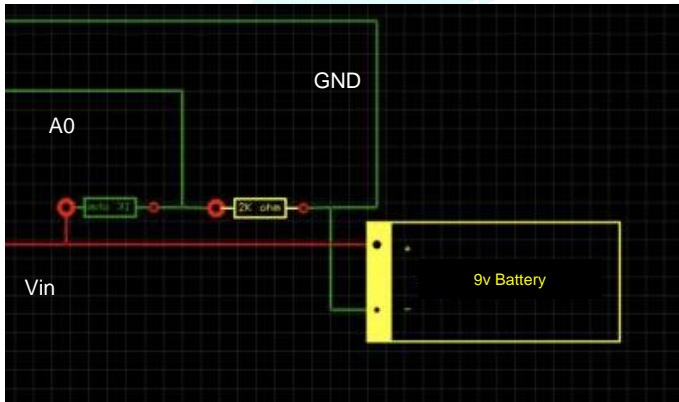
<u>GPS</u>		<u>NODEMCU</u>
RX	→	TX
TX	→	RX
VCC	→	3V
Ground	→	Ground

```
23:03:24.440 ->
23:03:24.440 -> Location: 26.32029,50.15958
23:03:24.440 -> Lat difference: 0.000044 Lng difference: 0.000074
23:03:24.440 -> Turning OFF the alarm
23:03:24.506 ->
23:03:24.506 ->
23:03:24.506 -> Location: 26.32029,50.15958
23:03:24.506 -> Lat difference: 0.000044 Lng difference: 0.000074
23:03:24.506 -> Turning OFF the alarm
23:03:24.573 ->
23:03:24.573 ->
23:03:24.573 -> Location: 26.32029,50.15958
23:03:24.573 -> Lat difference: 0.000044 Lng difference: 0.000074
23:03:24.573 -> Turning OFF the alarm
```

```
23:04:23.317 -> Location: 26.32035,50.15968
23:04:23.317 -> Lat difference: 2.999977 Lng difference: 6.999967
23:04:23.317 -> Device is out of provided location range. Turning ON the alarm
23:04:23.387 ->
23:04:23.387 ->
23:04:23.387 -> Location: 26.32035,50.15968
23:04:23.387 -> Lat difference: 2.999977 Lng difference: 6.999967
23:04:23.387 -> Device is out of provided location range. Turning ON the alarm
23:04:23.457 ->
23:04:23.457 ->
23:04:23.457 -> Location: 26.32035,50.15968
23:04:23.457 -> Lat difference: 2.999977 Lng difference: 6.999967
23:04:23.457 -> Device is out of provided location range. Turning ON the alarm
```

BATTERY LEVEL

We tested the construction of an Esp8266 based battery level indicator, with 9v by using voltage divider.



```
/dev/cu.usbserial-0001
02:05:27.955 -> 116%
02:05:28.160 -> 4.40 V
02:05:28.160 -> 116%
02:05:28.366 -> 4.41 V
02:05:28.366 -> 117%
02:05:28.567 -> 4.41 V
02:05:28.567 -> 117%
02:05:28.774 -> 4.40 V
02:05:28.774 -> 116%
02:05:28.946 -> 4.40 V
02:05:28.981 -> 116%
02:05:29.155 -> 4.40 V
02:05:29.155 -> 116%
02:05:29.360 -> 4.41 V
02:05:29.360 -> 117%
```

Autoscroll Show timestamp

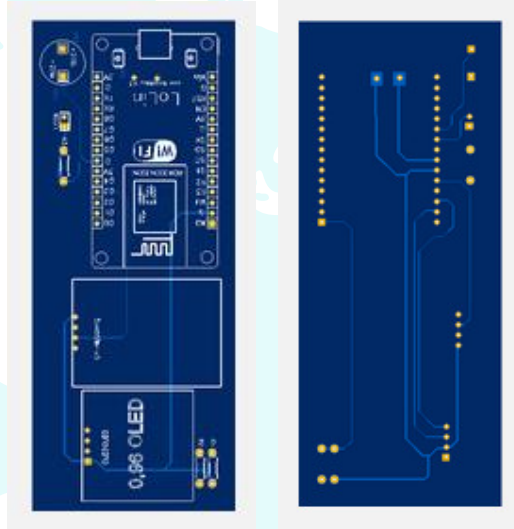
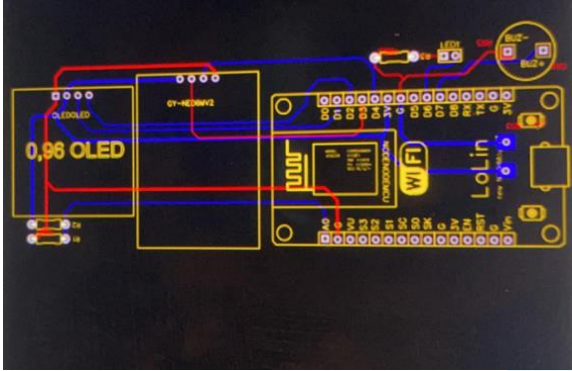


Block diagram of battery level



Battery Percentage output in Serial monitor

📍 PCB





Application Implementation

After testing we choose hardware 2 and we start implementing the connected application



Connected

Application icon

CONNECTED

Smart Collar for Pets





Technologies

Technology	Version	Rationale
Java	8	Programming Language
XML	1.0	UI Design



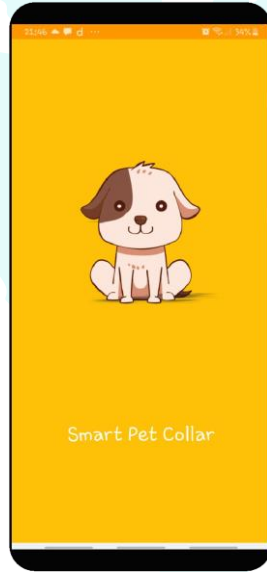
Device Compatibility

Platform	Android
Min SDK version	21
Target SDK version	30

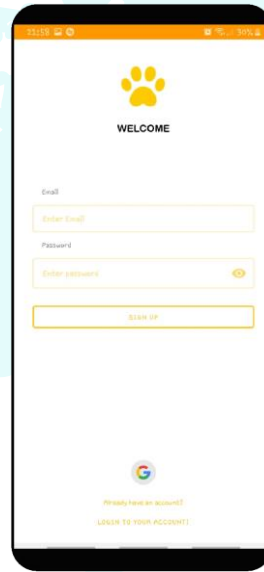


Screenshot

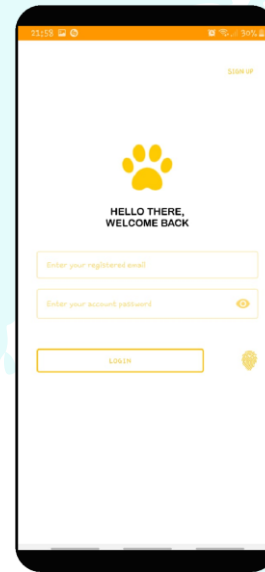
S



Splash Screen



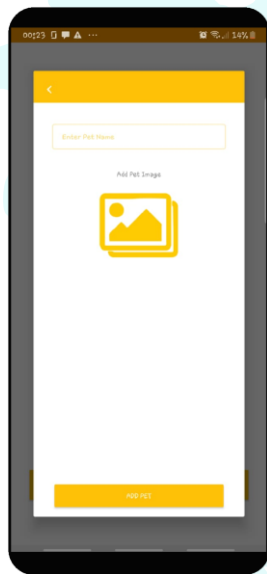
Sign Up Screen



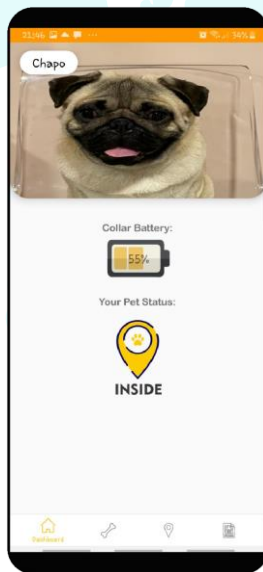
Login Screen



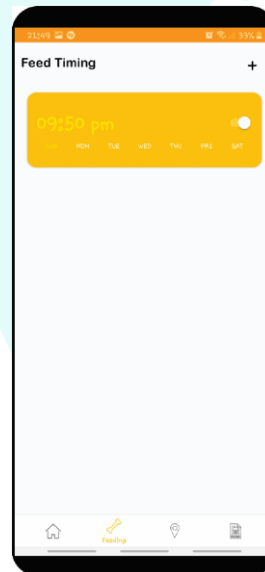
Screenshots (Cont.)



Add Pet Dialog



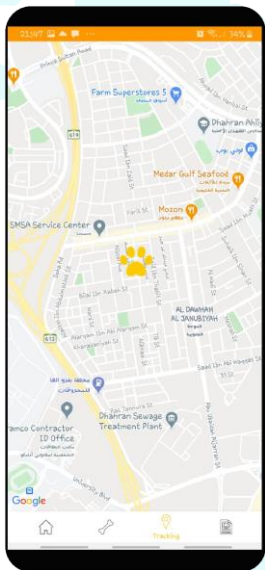
Dashboard Screen



Feeding Alarm Screen



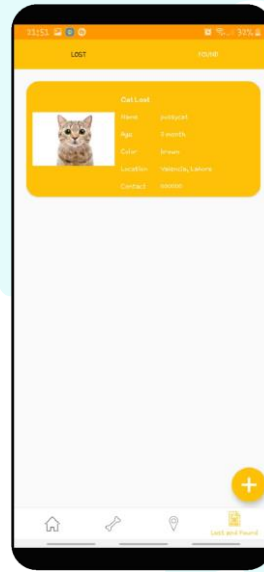
Screenshots (Cont.)



Tracking Screen



Lost Pets Screen

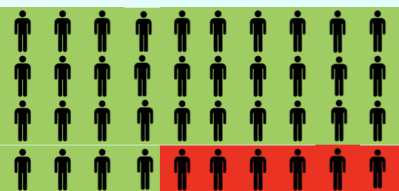


Found Pets Screen



Survey Responses

Do you own a pet?



Did you lose a pet?



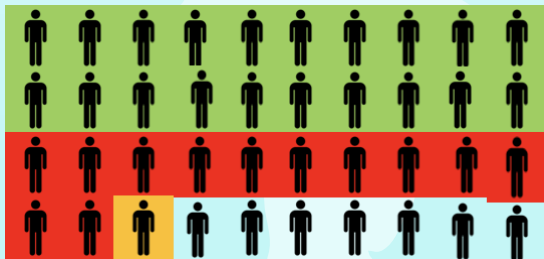
Yes



No



What kind of pet?



Cat



Dog



Others

Do you think that the smart collar will help to decrease the number of stray pets in the community?





BUDGET STATUS



<u>Item</u>	<u>Price</u>
OLED LCD I2C 0.9 inch 128*64 blue	80 SR
Active Buzzer Module	18 SR
Electret Condenser Microphone	6 SR
HC-05 BlueTooth Module	52 SR
SIM808 GSM and GPS Shield x2	265 SR
18650 Battery shield v3 booster and charger protection	45 SR
18650 Battery 3.7v Rechargeable 6800maH	46 SR
GPS module	66 SR
Mini NodeMCU ESP8266 WiFi	53.26 SR
A9G board with GPS and antenna	40.97 SR
STC SIM card postpaid	120 SR
ZAIN SIM card 200GB	200 SR
NodeMCU ESP8266 WiFi Lua Board, CP2102	104 SR
<u>Total:</u>	1,096.23 SR
<u>Shipping fees:</u>	116.07 SR
<u>VAT</u>	224.8 SR
<u>Total with VAT and Shipping fees:</u>	1,437.1 SR



RISK ASSESMENT/ MANAGEMENT & COVID

- Risk faced is water damage of device due to sprinkles/rain. First design had holes in which water could enter. Our NodeMCU was damaged and we replaced it immediately. We managed this risk by making a 3D model that's compact and water resistant, covering visible openings with plastic.
- COVID has not impacted our project in any way. Our components were small and we could find them locally.

REFERENCES

All projects are retrieved from IEEE Xplore
[https://login.library.pmu.edu.sa/login?url=
https://ieeexplore.ieee.org%2fXplore%
2fhome.jsp](https://login.library.pmu.edu.sa/login?url=https://ieeexplore.ieee.org%2fXplore%2fhome.jsp)

Thanks!

Does anyone have any questions?