



Guide Me

Indoor Navigation for the visually impaired

Kareem Emad El Din

Sherif Akram

Nouran Khaled

Shehab Mohsen

Supervised By
Dr. Ammar Mohamed & Eng. Haytham Metawie

Introduction



Motivation

- **Assistance** needed to help the visually impaired perform normal every day tasks might not be available.
- **Availability** of mobile phones for visual people only.
- The high **cost** of visually impaired electronic assistance.
- According to the latest survey provided by the World Health Organization, there are more than 2.2 million people with visual impairment in Egypt, 900,000 of which are totally blind.



Problem Statment



Navigation safely is one of the top issues faced by users with any type of impairment specially in new places as well as **find** their own objects and feeling secured while doing so without having the need to depend on others.

Solution



Mobile Application that:

- Acts as the user's eyes in the context of searching for objects and obstacles.
- Allows the user to search for his desired object and provide guidance to reach it
- Allows the user to freely roam the room warning him of any obstacle facing him.
- Allows the user to add his own personalized objects.

Safety
insurance

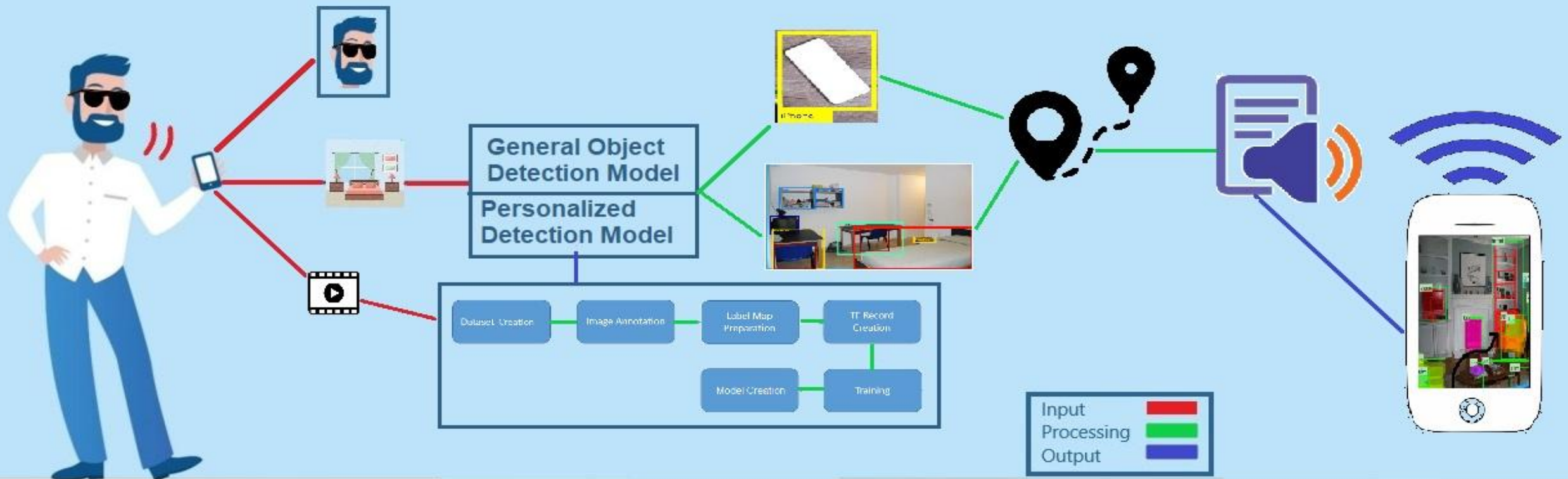


In case of sudden movements (mobile falls):

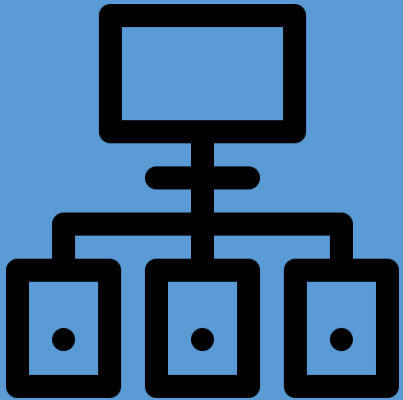
- Application calls the assistant.
- Send a message with the current location to the assistant.

System Overview

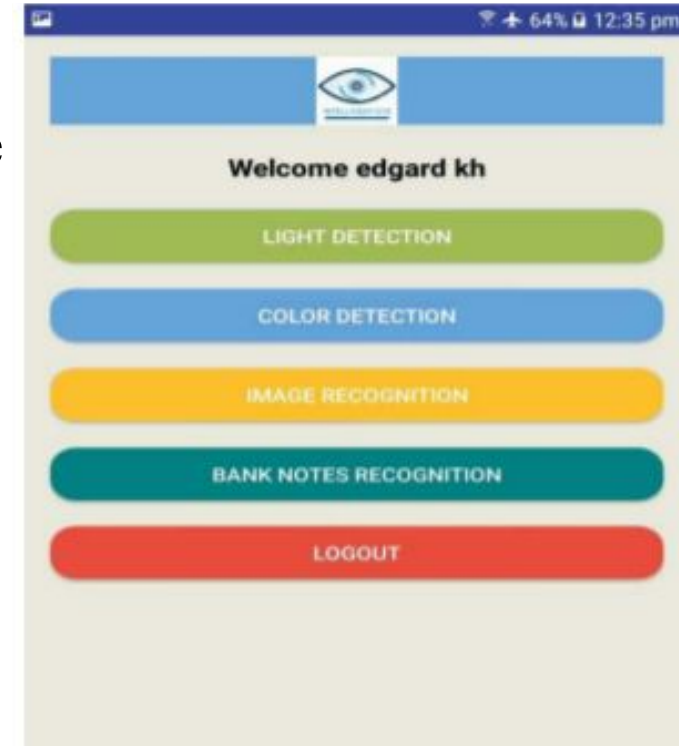
GUIDE ME SYSTEM ARCHITECTURE



Similar System

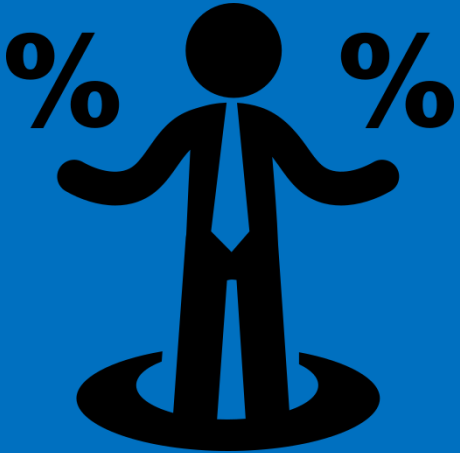


- ❑ Intelligent Eye: A Mobile Application for Assisting Blind People through four functions
- ❑ All of the previously mentioned functions are implemented to facilitate lives of visually impaired people and achieved using only mobile phone which is the same concept we are going to use in our system.



[1] Milios Awad, Tarek Mahmoud, “Intelligent eye: A mobile application for assisting blind people,”2018 9th IEEE Annual Ubiquitous Computing, Electronics Mobile Communication Conference(UEMCON), p. 6, 2018

Our Work



- **Face Authentication**
- **Customized object**
- **General Module**
- **Measure distance**
- **Navigation to targeted object**
- **Alert from obstacles**
- **In case of sudden fall place emergency call**

Datasets



• **Coco Dataset**



General Model

• **Customized Dataset**



Personalized Model

Backend Stack

The logo for Google Colab, featuring the word "colab" in a lowercase, rounded, orange font.The logo for LUXAND, featuring the word "LUXAND" in a bold, black, uppercase font. The letter "X" is replaced by a blue stylized robot head icon with a white dot for an eye.The TensorFlow logo, consisting of an orange stylized "TF" icon above the word "TensorFlow" in a dark blue, sans-serif font.The Firebase logo, featuring a stylized flame icon in shades of orange and yellow to the left of the word "Firebase" in a dark grey, sans-serif font. Below "Firebase" is the text "Realtime Database" in a smaller, lighter grey font.

Mobile Stack



Google Assistant

 TensorFlow Lite



 python



Achieved accuracies

- Distance Measurement Accuracy

Real Distance (inch)	Detected Distance	Error Ratio
100	95	0.05
50	46	0.08

- Custom Object Detection Accuracy

Objects	Class	No. Images	Input Size	Accuracy
Obj. 1	PowerBank	600	300*300	0.92
Obj. 2	Cover	600	300*300	0.87

Published Paper (IEEE)



2nd International Conference on Electrical, Communication and Computer Engineering – ICECCE 2020



2nd International Conference on
Electrical, Communication and Computer Engineering
12-13 JUNE 2020
ISTANBUL, TURKEY

22 Apr 2020

ACCEPTANCE LETTER

Dear Nouran Khaled, Shehab Mohsen, Kareem Emad, Sherif Akram, Haytham Motawea, Ammar Mohamed

Thank you for your submission to the ICECCE 2020 conference. We are pleased to inform you that your paper titled "ID- 415 In-Door Assistant Mobile Application Using CNN and TensorFlow" has been accepted as a full paper for an oral (remote) presentation by the conference committee of 2nd International Conference on Electrical, Communication and Computer Engineering – ICECCE 2020.

At least one author of an accepted paper must register (as a full participant) and attend ICECCE 2020 for the paper to be included in the proceedings. If you have not registered online (on-desk, credit card or bank transfer options), at least one author of each paper should register to the conference via the online registration page at <http://www.icecce.com/registration>. If you have already registered, please do not make another registration. Please also note that your registration becomes valid after your payment.

According to conference regulations, only the registration fee paid papers are considered for submission to IEEE Explorer. Please note that if you select on-desk payment and do not participate, your paper will be cancelled for sure.

Please make the corrections given by the referees. Otherwise, your paper may not be published on IEEEExplore. After corrections, submit the camera-ready version of your paper.

We would like to thank you for your contribution in ICECCE 2020 and we are looking forward to seeing you in ISTANBUL, where the continents meet.

Yours sincerely,

Dr. Yunus Uzun
Technical Chair of ICECCE
Tel: +90 532 6425237
E-mail: projenia.net@gmail.com

Dr. Shafqat Ullah Khan
Executive Chair of ICECCE
Tel: +92 333 9728487
E-mail: shafqatphy@yahoo.com



El-Watan News

- An Article has been published in El Watan News Journal Discussing our graduation project.

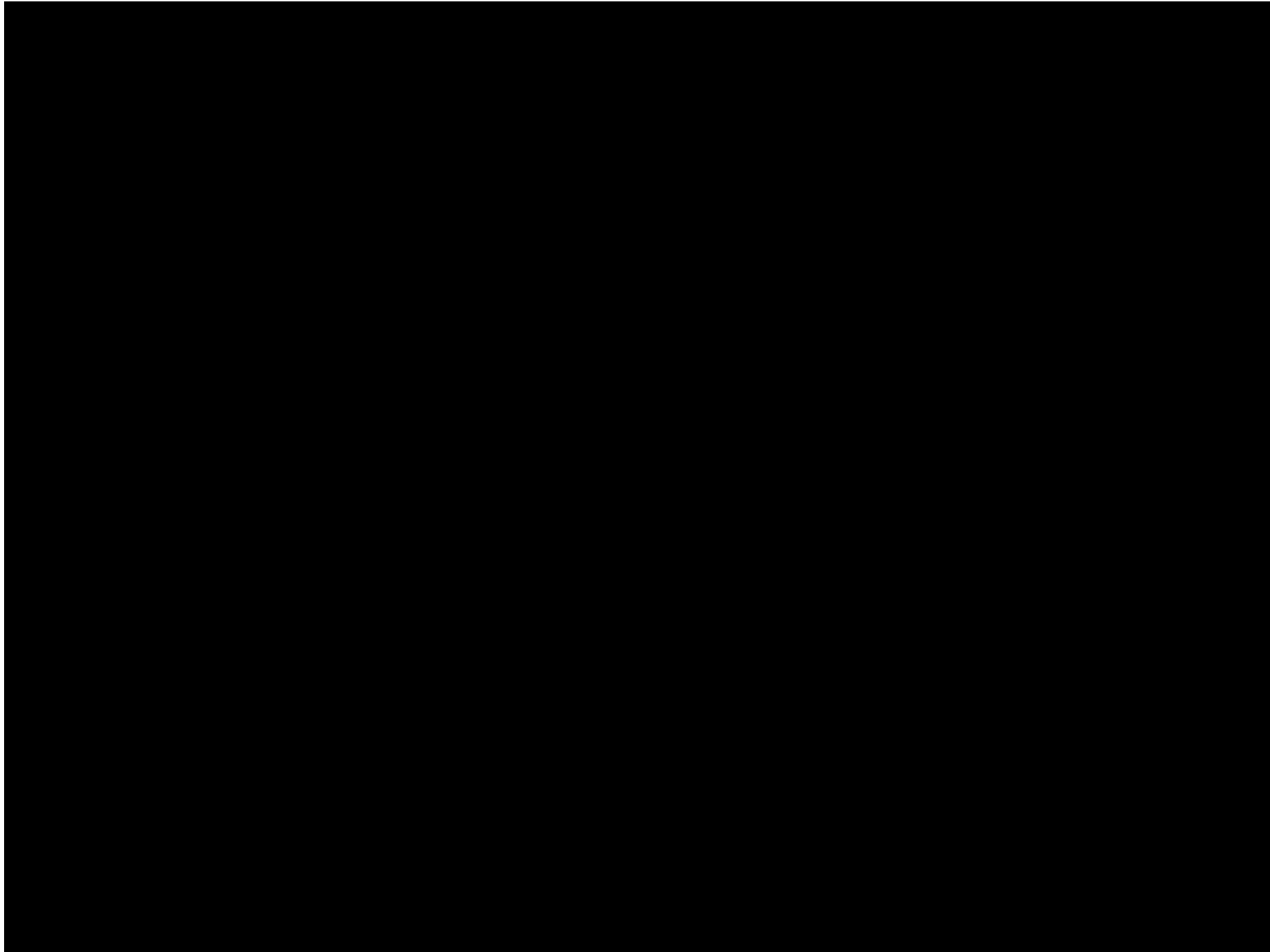


Market Collaboration

- Special thanks to Eng. Salama Mohamed because of all the great help and assistance he had provided and for giving us his time to test our system with someone with vision impairment and in guiding us toward tackling the most common issues for the visually impaired people.



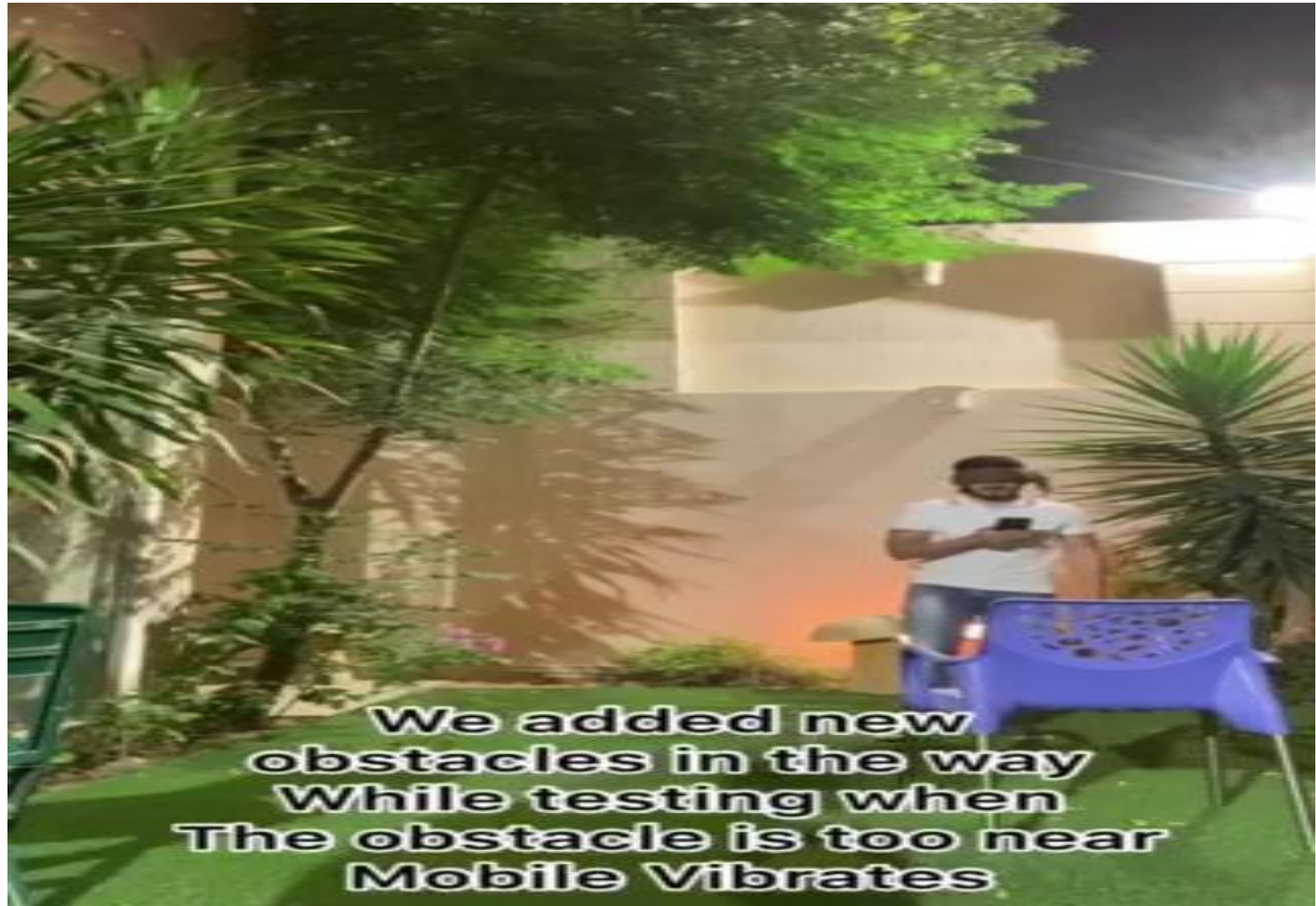
Market Collaboration



Limitations

- Room lighting can be troublesome for detection.
- Mobile must have internet connection.
- Maximum distance for object detection is 120 inches for larger objects.
- Mobile orientation is important for accurate distance measurement.
- Labelling and annotating custom objects is done manually.

Demo



**We added new
obstacles in the way
While testing when
The obstacle is too near
Mobile Vibrates**

Future Work

- Using parallel processing to accelerate detection process.
- Increase detection accuracy by increasing objects categories.
- Automate the labelling and annotation process for custom objects.
- Increase feature availability for offline mode.
- Cross-platform availability.
- More research should be done to evaluate room localization for saving navigation environment.

Thank You