



SDAIA
الهيئة السعودية للبيانات
والذكاء الاصطناعي
Saudi Data & AI Authority



أكاديمية طويق
TUWAIQ ACADEMY



AI & Data Science bootcamp T5

OUR VOICE

صوتنا

SSLR

(Saudi Sign Language Recognition)

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PROBLEM AND SOLUTION

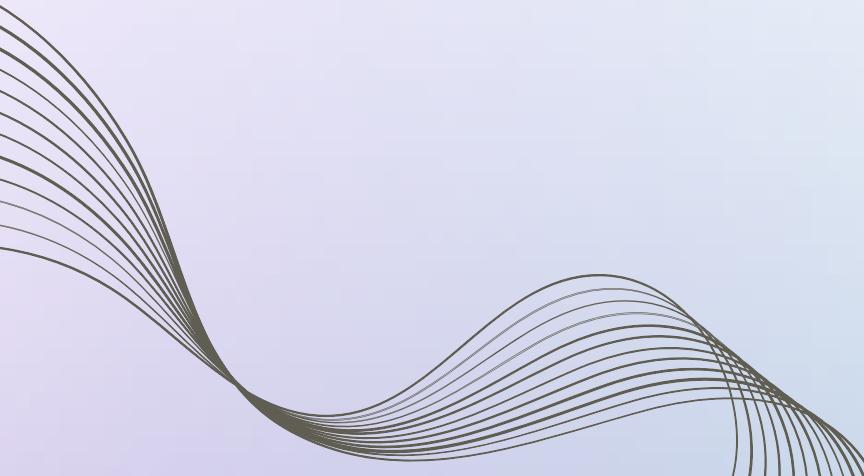
Problem: People with Hearing Disabilities (PWHD) face significant communication challenges in healthcare due to limitations in spoken and written methods.

Solution: Developing an AI model that translates sign language into words aims to bridge the communication gap between People with Hearing Disabilities (PWHD) and medical staff.



IMPACT ON SAUDI 2030 VISION

- The Ministry of Health has initiated the "We Are With You" campaign to support people with hearing disabilities.
- Our AI model empowers those with hearing disabilities, contributing to this campaign. Join us in advancing technology for a better, inclusive future.

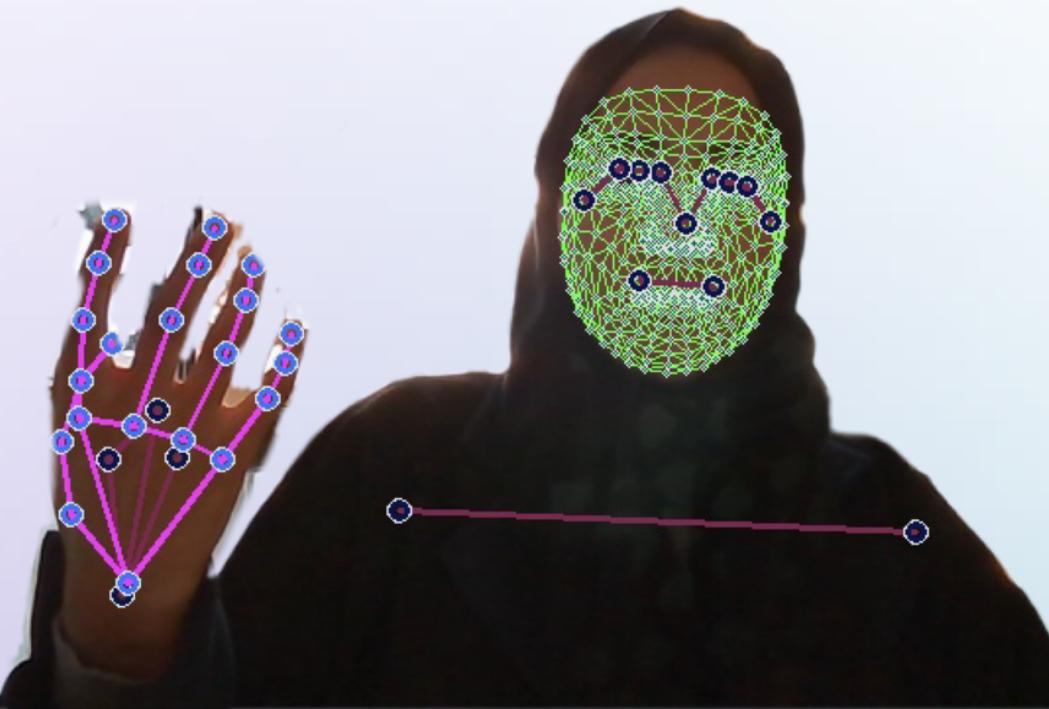


DATA

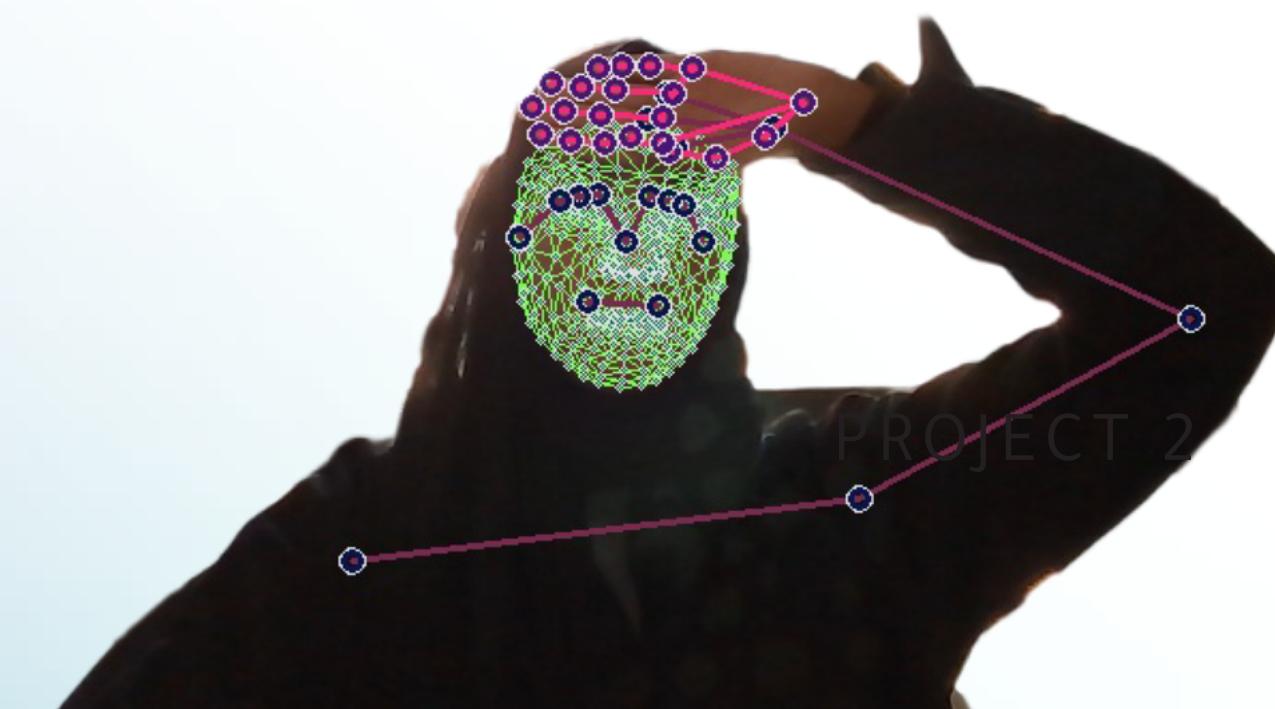
- **Data collection :**

- We recorded the dataset ourselves.
- Each word is recorded 30 times to capture variations.
- Videos of the recorded words consisted of 30 frames.
- Each member of the group participated in the words recording.

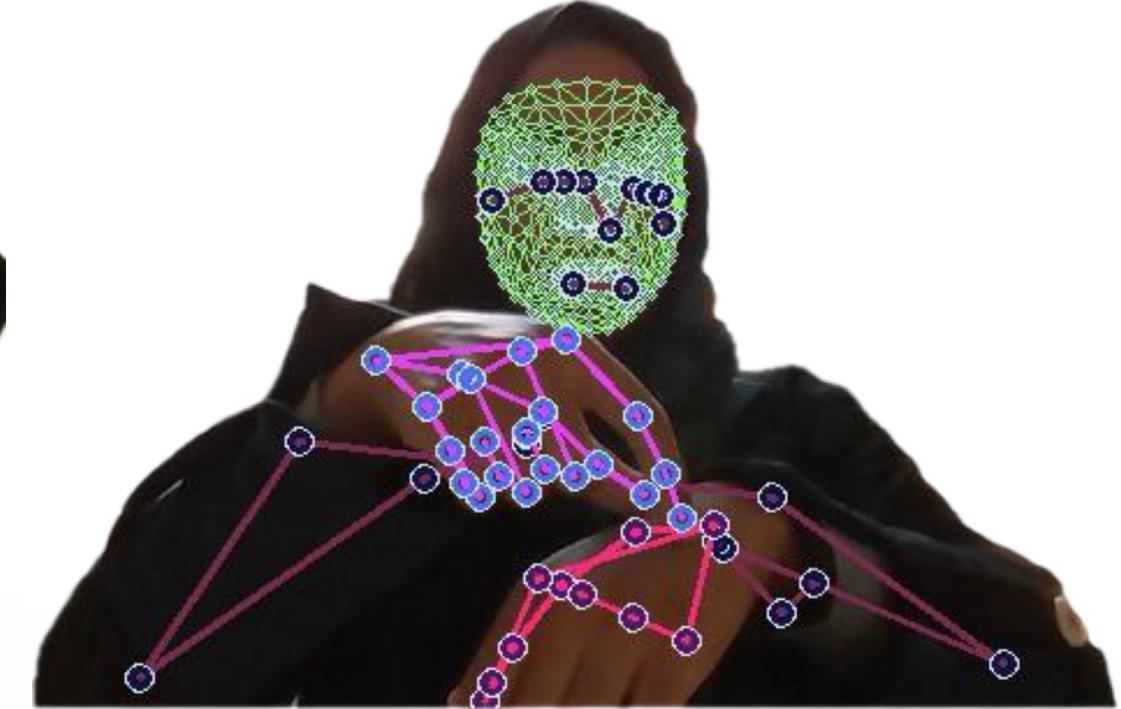
SIGN:PAIN



SIGN:FEAVER



SIGN:DOCTOR



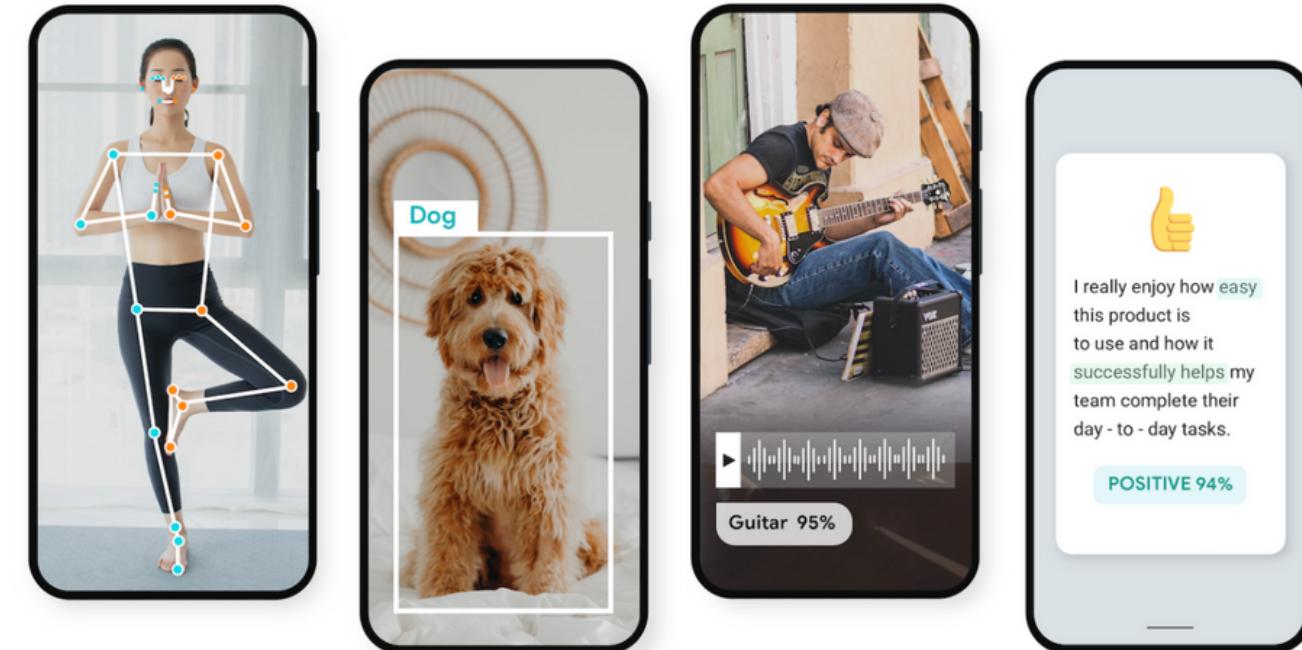
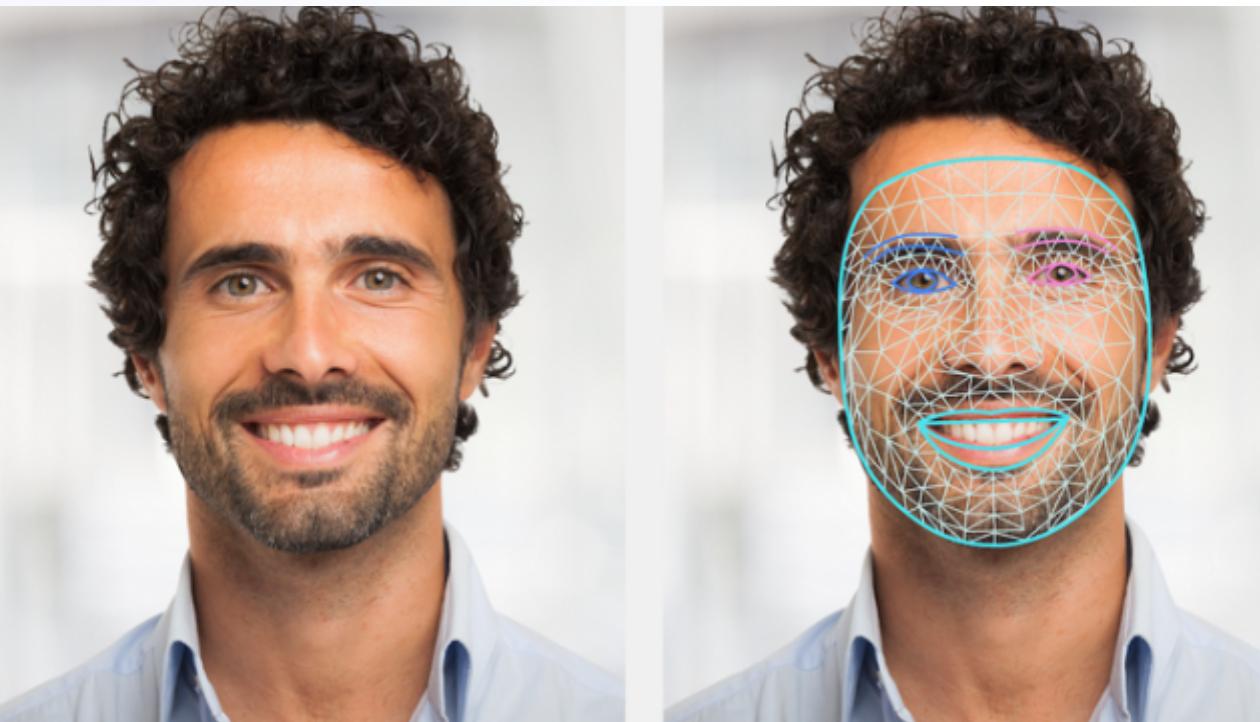
DATA

- **Data preprocessing & and features extracting:**

- Used The Mediapipe model to extract features from frames for both left and right hands, pose, and face.
- Each frame is saved as a numpy array, a data structure used for scientific computing.
- Numpy arrays allow efficient storage and manipulation of multi-dimensional data.
- By saving frames as numpy arrays, it becomes easier to perform further analysis and processing on the extracted features.

MEDIPIPE

- Versatile framework for computer vision and machine learning tasks.
- Contains pre-built models and algorithms for various multimedia analysis tasks.
- Some tasks include: pose landmark detection, image segmentation, face detection, and object detection.



INITIAL PROTOTYPES

- **First Prototype:**

- Dataset: Videos recorded by team members.
- Preprocessing: Videos split into frames.
- Challenge: Varying number of frames in each video.
- Accuracy: Weak performance (0.05%) due to varying frame lengths.
- Model: RNN architecture with fixed input shape.

- **Second Prototype:**

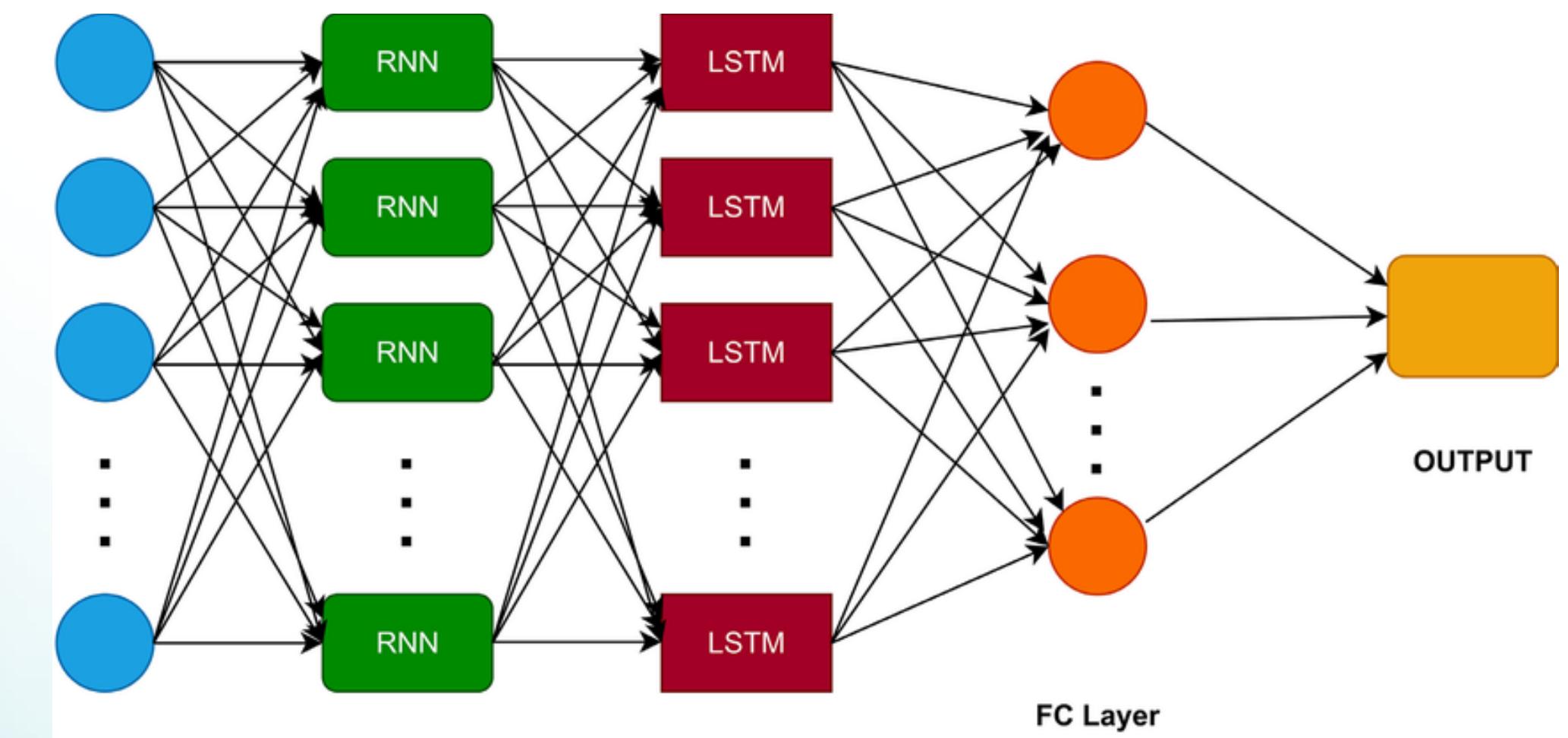
- Dataset: Videos recorded by team members.
- Preprocessing: Videos split into frames and extracted features using Mediapipe model.
- Training Model: GRU-RNN architecture with fixed input shape.
- Accuracy: Weak performance (0.53%).

FINAL MODEL: RNN(LSTM) MODEL

- Dataset: Videos recorded by team members.
- Preprocessing: Videos split into frames and extracted features using Mediapipe model.
- Training Model: LSTM-RNN architecture with fixed input shape.

RESULTS:

- TRAINING ACCURACY 0.81
- TESTING ACCURACY 0.73



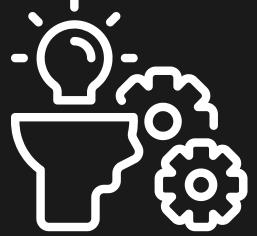
CHALLENGES



DATA AVAILABILITY

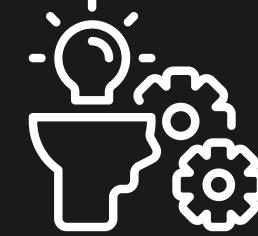
The only available datasets for sign language were in image format.

Creating a custom dataset and refining the optimal data format for model training was time-consuming and required significant effort.



DATA LIMITATION

Employing video classification yielded suboptimal model accuracy due to the data limitation video classification model provided poor accuracy.



TIME LIMITATION

Despite time constraints, we acknowledge the insufficient dataset. We're actively exploring solutions to enhance data collection for future projects

REAL LIFE APPLICATION



- In education, Saudi Sign Language Recognition (SSLR) can support PWHD students by providing real-time translation of sign language into written or spoken language.

- During emergency situations, SSLR can assist first responders in communicating with individuals who are PWHD



- SSLR enhances customer services, businesses by providing real-time translation for PWHD individuals.

FUTURE WORK

- Improving accuracy through advanced machine learning models.
- Enhancing real-time performance.
- building a wider dataset library including all sign language vocabularies
- Discussing potential integrations with emerging technologies or user feedback mechanisms for continuous improvement.(i.g.

Tawakkalna, My Health)



توكنا
Tawakkalna



DEMO



REFERENCES

- 01** AVAILABLE AT: HTTPS://SSHI.SA/. (NO DATE)
. (ACCESSED: 30 NOVEMBER 2023)

- 02** MEDIAPIPE | GOOGLE FOR DEVELOPERS (NO DATE) GOOGLE.
AVAILABLE AT: HTTPS://DEVELOPERS.GOOGLE.COM/MEDIAPIPE
(ACCESSED: 26 NOVEMBER 2023).

- 03** VIDEO CLASSIFICATION WITH A CNN-RNN ARCHITECTURE: HUMAN ACTIVITY RECOGNITION (2022) YOUTUBE. AVAILABLE AT:
HTTPS://YOUTU.BE/EZJNYSXQDTO?SI=WFPR9MMFETKTRXJI (ACCESSED:
28 NOVEMBER 2023).

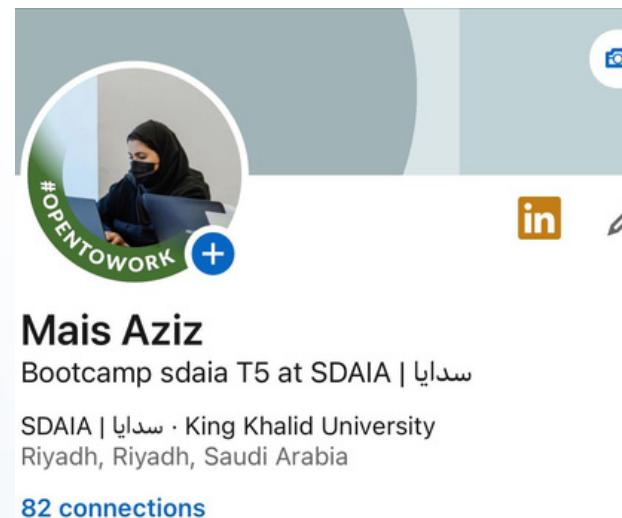
OUR TEAM

scan QR code to view Linkedin and GitHub

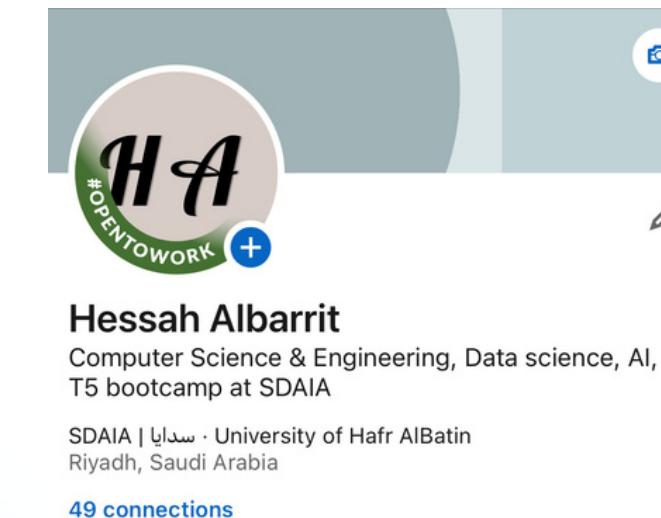
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member 5



THANK YOU