Department of Computer Science and Engineering
St. Thomas College of Engineering and Technology
Mattannur

Ergonomic Virtual Keyboard

Author:

ABHISHEK UK (STM21CS006)
ALBIN BINU (STM21CS015)
AYISHA ZOOMI (STM21CS022)
NASLA SAFIYA K (STM21CS045)

Supervisor:

Dr. SHINU MATHEW JOHN

Academic Year
2024-25
October 21, 2024

OUTLINE

INTRODUCTION

In this project,

- Development of an innovative Virtual Keyboard leveraging computer vision and advanced machine learning techniques.
- Unlike traditional physical or on-screen keyboards, it doesn't rely on single-hand gestures and limited finger interaction.
- The Virtual Keyboard uses a camera or sensor to capture both hands and all finger movements, translating them into text input seamlessly.
- By detecting both hands and tracking the fingertips' trajectories and patterns, the system predicts intended keystrokes with high precision.
- Users interact with this virtual keyboard by mimicking typing motions for a seamless typing experience.

PROBLEM DEFINITION

- The system will use an on-screen keyboard where the current letters will be entered based on hand movements.
- When the index and middle fingers meet on a virtual key, a click is generated, and the desired text is displayed in the corresponding text box.
- Very slow to interact with Computer (Document Typing, Coding, etc.)
- Waste of usable screen area.
- Inconvenient to type in public places.

LITERATURE SURVEY

Virtual Hands: Real Time Keyboard, Desktop & Application Navigation using Gestures

- A contactless Virtual Keyboard and navigation system using a webcam and computer vision.
- Mediapipe's Blaze Palm Detector & Hand Landmark Model detect hand and fingertip positions.
- Supports all essential keys, including alphabet, numbers, and symbols.
- Full Windows and Desktop Navigation using hand gestures.

LITERATURE SURVEY

Voice Guided, Gesture Controlled Virtual Mouse

- A Virtual Mouse developed using hand gestures and voice.
- Reduces dependency on physical peripherals, to avoid contact during the pandemic.
- Calculates Euclidean distance between the point to determine the ratio and finger state.
- The distance between the fingers determines the function to be performed.

EXISTING SYSTEM

Gesture Controlled Virtual Mouse and Keyboard using OpenCV

- Development of a hybrid gesture control system integrating hand, voice, and eye for enhanced computer interaction.
- Utilizes Convolutional Neural Networks (CNN) with MediaPipe for accurate gesture recognition and Pyttsx3 for voice feedback, all operated through a webcam.
- Combines multiple input methods like hand, voice, and eye to improve user flexibility and interaction.
- It is an onscreen keyboard and a single hand is used to access the keys.

PROPOSED SYSTEM

- Uses a Camera or Sensors to detect our finger movements and predict which key is typing.
- By detecting both hands and tracking the fingertip's trajectories and patterns, the system predicts intended keystrokes with high precision, users interact with this virtual keyboard by mimicking typing motions.
- It is convenient to use anywhere.
- Easy to type as Touch typing.
- Can also be used in Mixed Reality applications.
- Can be paired with both small and large devices.

ARCHITECTURE DIAGRAM

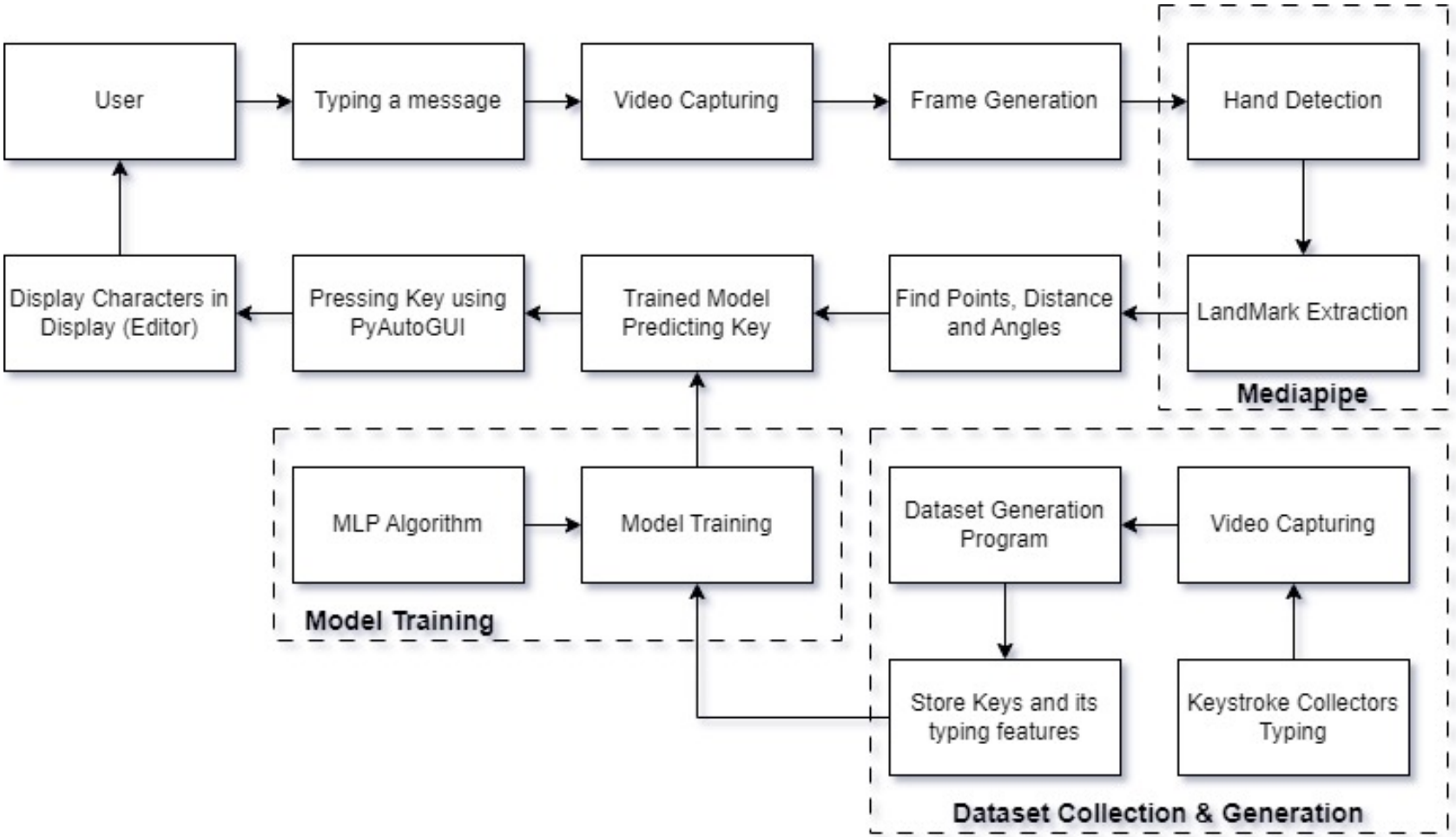

Figure: Architecture Diagram

USECASE DIAGRAM

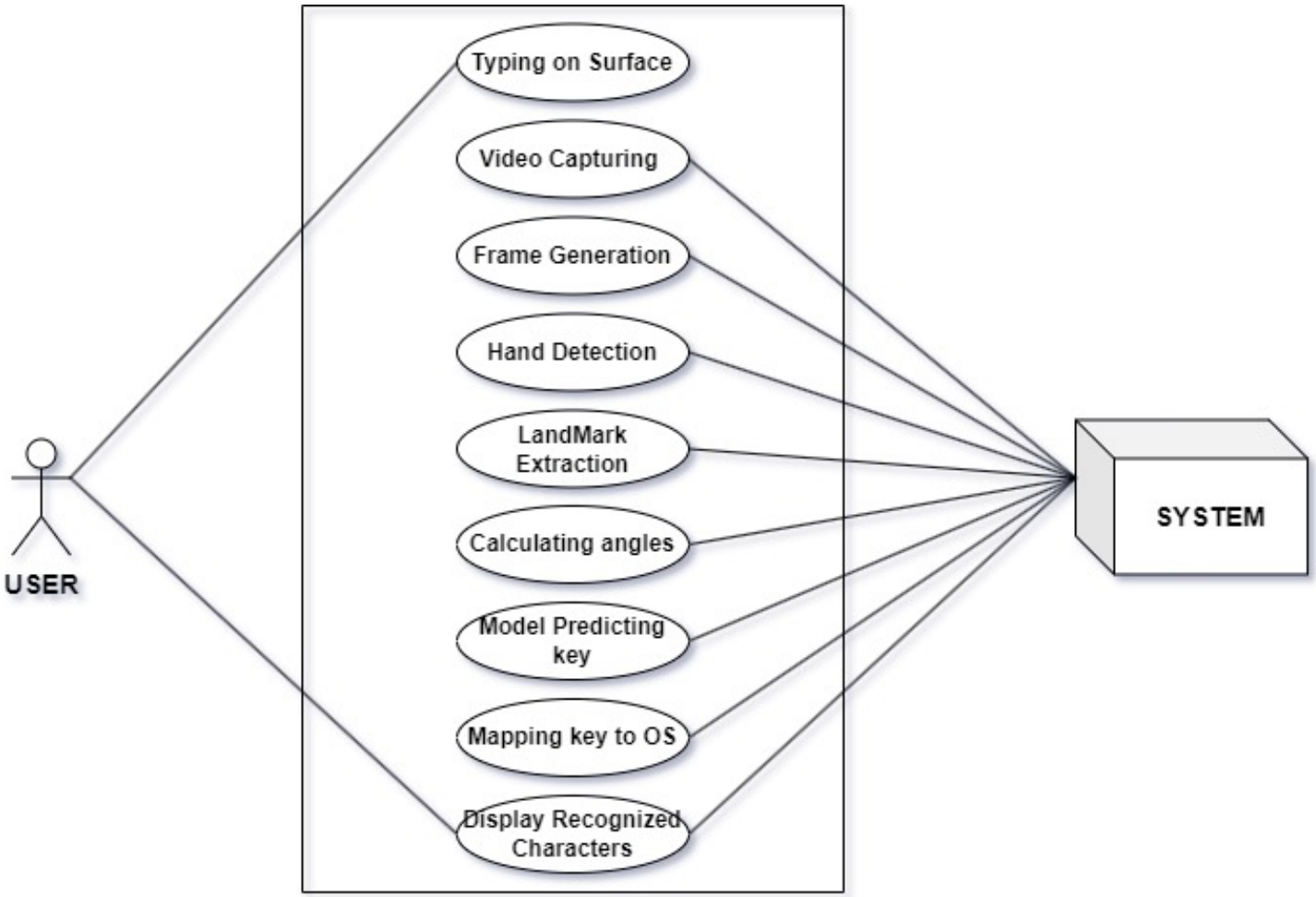

Figure: Usecase Diagram

GANTT CHART

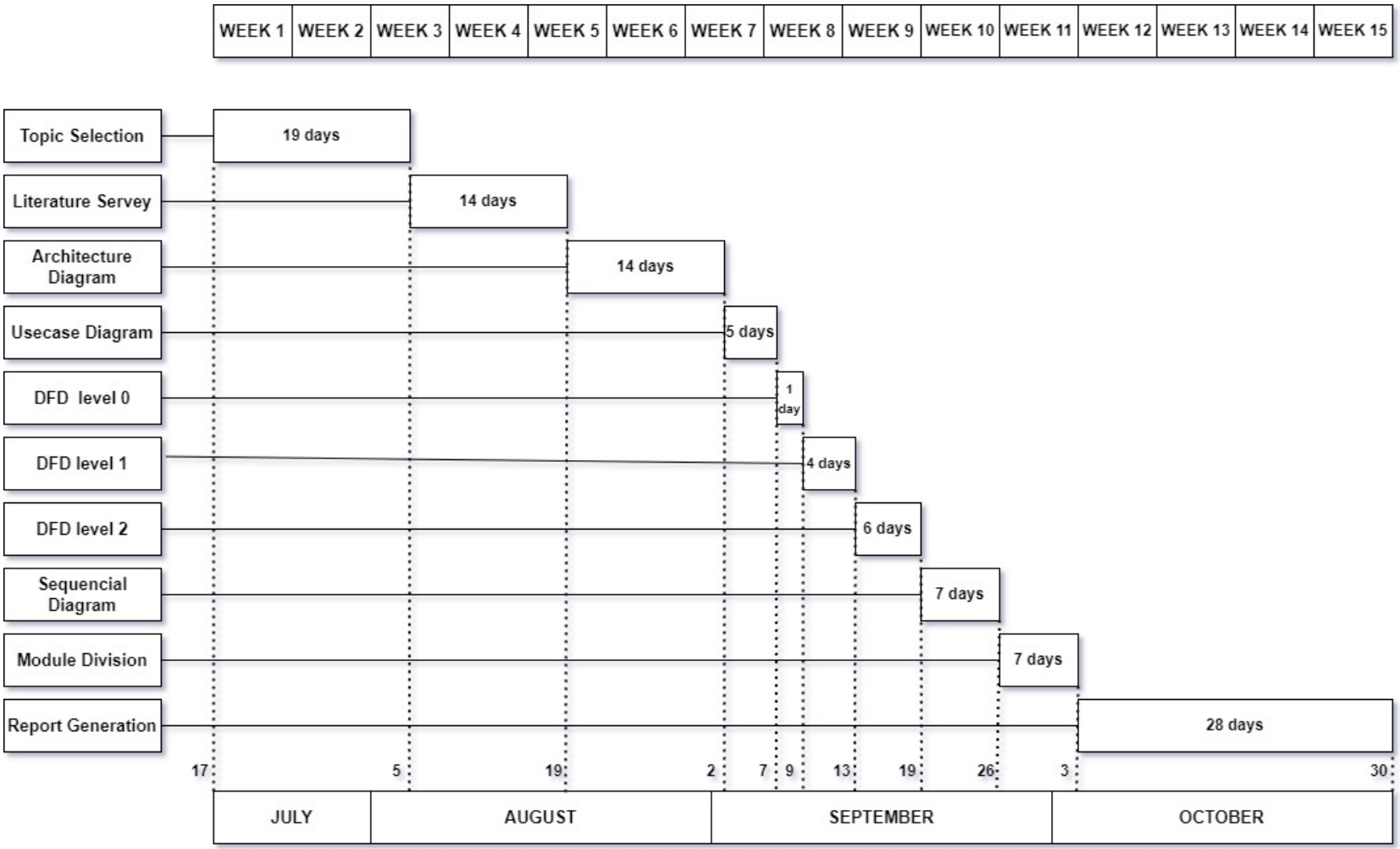

Figure: Gantt Chart

DFD LEVEL 0

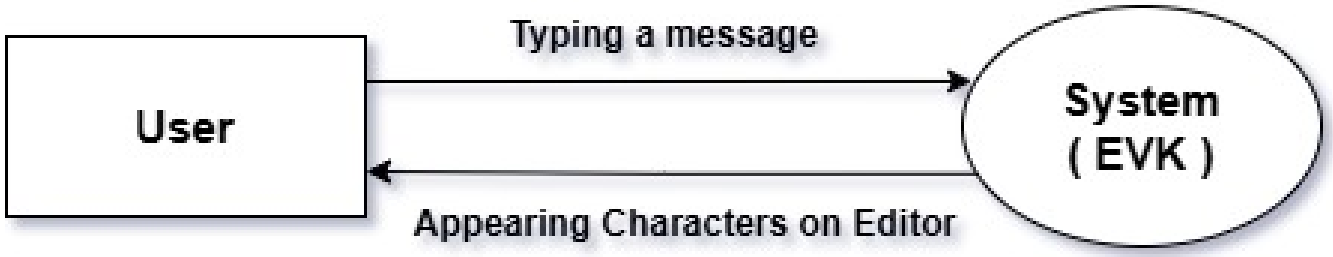

Figure: DFD Level 0

DFD LEVEL 1

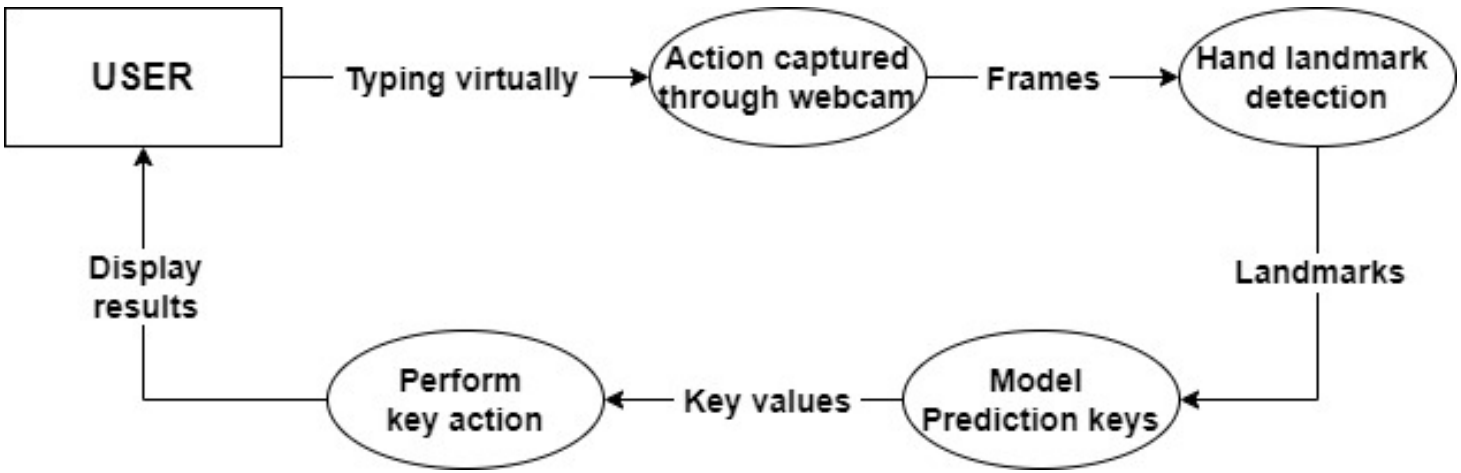

Figure: DFD Level 1

DFD LEVEL 2

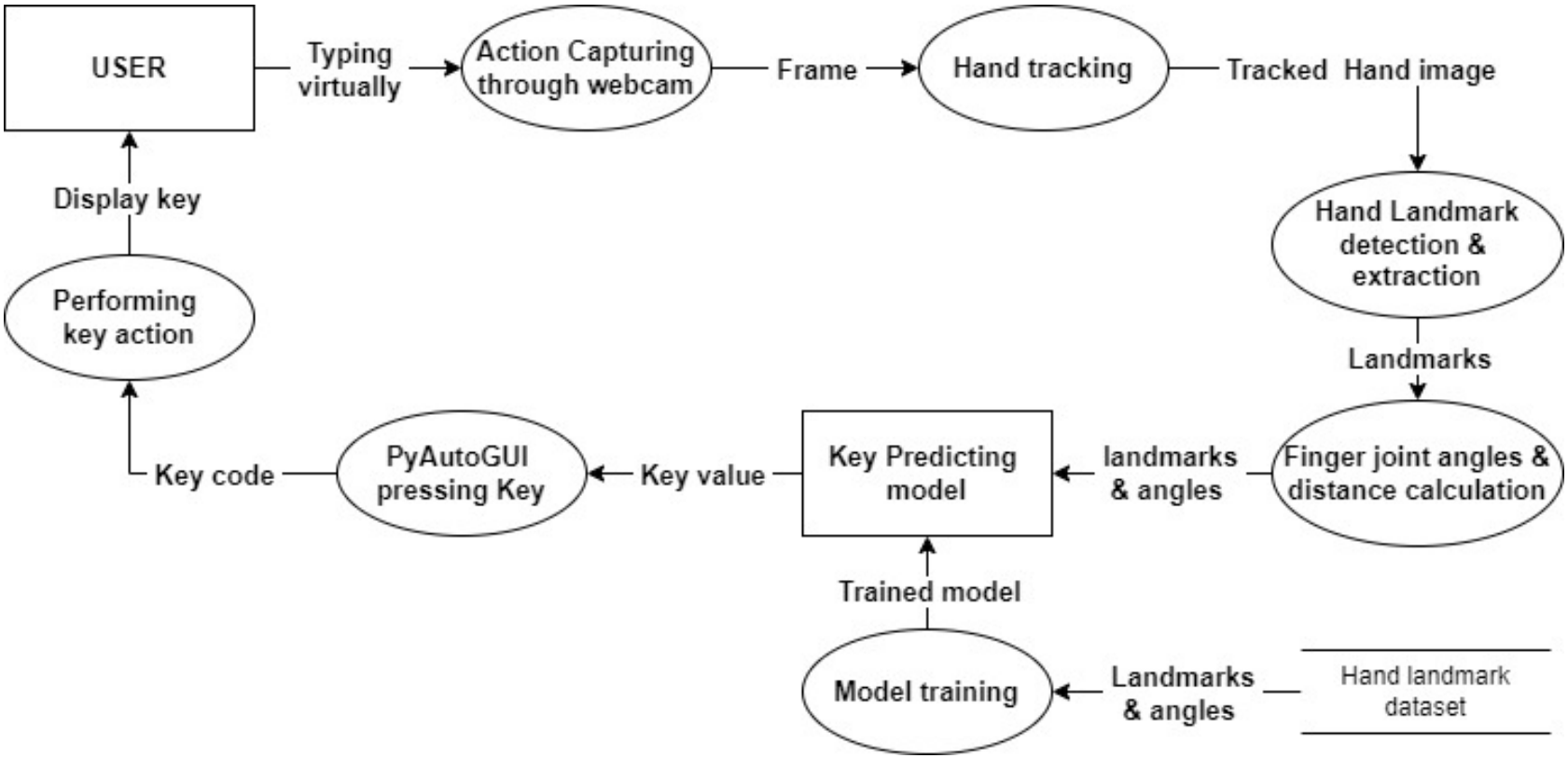

Figure: DFD Level 2

MODULE DIVISION

- Dataset collection and Features Expansion : **Ayisha Zoomi**
- Algorithm Implementation and Training : **Abhishek U K**
- Testing, Evaluation, and Quality Assurance Research : **Nasla Safiya K**
- Interface Implementation and Validation : **Albin Binu**

CONCLUSION

- The research focuses on developing a model for gesture-controlled computing that integrates with hand gestures.
- This model aims to enhance user interaction with computers by leveraging advanced technologies such as MediaPipe and MLP.
- The primary objective is to create a versatile and efficient control system with significant applications in typing and coding environments.

REFERENCES

Dr. Mohd Nazeer, Shri Akshita G, *"Gesture Controlled Virtual Mouse and Keyboard using OpenCV"*, 2023 International Conference on Emerging Techniques in Computational Intelligence (ICETCI), pp. 199–206, 2023, doi: 10.1109/ICETCI58599.2023.10330954

Harshit Sharma, Richa Saxena, Satendra Kumar, *"Virtual Hands: Real Time Keyboard, Desktop & Application Navigation using Gestures"*, 2022 International Conference on Fourth Industrial Revolution Based Technology and Practices (ICFIRTP), pp. 202–267, 2023, doi: 10.1109/ICFIRTP56122.2022.10059450

Rajat Dudhapachare, Mayur Awatade, Pushpak Kakde, *"Voice Guided, Gesture Controlled Virtual Mouse"*, 2023 4th International Conference for Emerging Technology (INCET), pp. 1-6, 2023, doi: 10.1109/INCET57972.2023.10170317.