UTM

UNIVERSITI TEKNOLOGI MALAYSIA

SECP1513

TECHNOLOGY AND INFORMATION SYSTEM

DESIGN THINKING:

EQUICONNECT

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1.0 ABSTRACT

This report outlines the development of the "UTM Equestrian App," a mobile application developed to enhance user engagement and experience within the UTM Equestrian Club. Using Artificial Intelligence (AI) technology, this application is able to identify the emotional state of a horse based on the observation of the small movements and facial expressions of the horse. All the steps of Design Thinking, which include empathy, define, ideate, prototype, and test we have undergone. This application increases the participation of students in this sport and enhances equine well-being by bridging the gap between humans and horses.

2.0 INTRODUCTION

Our project, EquiConnect, is a mobile platform that makes use of AI technology to analyze the emotion of horses. To develop an emotion-reading tool that can analyze the small movements of the horses, their faces, and their postures to live-track the emotion of the horses are our goals. By interpreting the non-verbal cues of the horses in the form of understandable human languages, we bring the communication between horses and human to reality, whether the human is the owner, the trainer, or the veterinarian of the horses.

3.0 PROBLEM BACKGROUND

At UTM Equine Park,equestrian has been facing many challenges,on the aspect of concerning the fan exprience and athlete development and the community engagement.In order to troubleshoot these challenges ,enliven the equestrian activities and expose more students to the interesting things behind the equestrian sport,we had come out with a solution called EquiConnect.

First of all,we cannot deny that there are poor student engagement and awareness among students.In general terms,equestrian sport is not well understood by many students as most of them do not know much about the rules and safety measures associated with the sport.In addition,restrictive is an ordinary impression of equestrian sport to the students.Most of them find this sport far away from them.They just looked at the competition happening on the arena,but hard to comprehend what is going on beyond that.By making subtle language of horses understandable,EquiConnect can reveal the interesting things behind equestrian and therefore create more engaged fans from the passive observers.

Other than that,one of the challenges is limited fan experience.For students who are interested in equestrian and attend the event,they are not able to see the horse and athlete partnership because they overlook the athleticism and trust displayed between horse and rider. By being able to see the emotional levels of horses in real time,students are able to see the confidence of the horse as it jumps or even notice signs of nervousness at the starting line in a competition. Additionally,students can be able to pick their favorite horse to show support based on the personality and emotional responeses of the horse. By having such feelings of connection and empathy,even those who are just watching can be transformed into being supporters who understand that horses also have complex feelings that need to be appreciated.

Moreover,we faced critical need for enhanced rider horse relationship.Poor performance,safety risks and equine distress were usually caused by miscommunication.Currently,the only way that horse owners can understand their horses is through intuition and experience,where they may miss subtle signs of discomfort from their horse. Thus, a clearer feedback mechanism is critical because it enables them to understand what their horse dislikes,what they should avoid doing to the horse,as well as being able to build a strong bond with the horse. By being able to see the analytics of the horse's emotional state during training and care, riders can build a stronger and more harmonious bond with the horse.

4.0 PROPOSED SOLUTION

In this project,we came up with is utilizing technology named Equine Facial Action Coding System (EquiFACS) that presents nowadays.EquiFACS is an anatomically based system for identifying the facial movements or expressions of horses to detect their emotions and states, which include baseline, positive anticipation, frustration, and disappointment. Inside it,there are many codes that identify the contraction of a specific facial muscle and the resulted movement.Each code is called an Action Unit (AU).

Firstly,to identify the emotion of the horses, we need to record the horses' live motions and their faces in video form, in which the system will automatically detect and analyzes the faces of the horses. The horses will then be observed from different perspectives, such as their pain situation, stress level, and social isolation. Other than that, by making use of the detailed coding system in EquiFACS, AI is able to do analysis of the video footage frame by frame, in which the presence of Action Descriptors (ADs) or Ear Action Descriptors(EADs) will be detected. Through analyzing the frequency,duration and combination of facial actions, we can determine the associated emotional valence and arousal levels. Moreover, the interpretation of the emotion will take place and results will come out. By referring to the pattern of the AU inside EquiFACS, AI can determine the particular emotion of the horses. For an instance, when the neck of the horses is in a higher position with more half-blinks and mouth movements, it shows that the horses are in a state of positive anticipation. We believe that the use of the above-mentioned technology can bring more interest to the equestrian sport among the UTM students.

5.0 PROJECT GOALS

The goals of the EquiConnect project are clear and we hope to achieve them after people can understand the feelings of the horse easily.

- For the horses: the feelings of the horse can be detected early, so that the horse will be happier and healthier.
- For the riders and caregivers: they will use this tool to improve their performance, develop a deep connection with the horse and learn about the horse behaviour.
- For the fans and the UTM community: after seeing the emotions of the horse during the events, the fans will enjoy the equestrian sports, and more students will be attracted to this sport.

6.0 TASK ASSIGNMENT

Teamwork is an essential part of our assignment, as it helps us finish our project efficiently. So, we will have a fair division of tasks for each teammate. The table below shows the tasks completed by each member.

Name	Task
MUHAMMAD NAJMI SHAHMI BIN MOHD LAPTI	-Report writing -Presentation
HING QI WEI	-Main in-charge of doing prototype -Check report writing -Presentation
NG KAI CHUN	-Report writing -Draft Brainstorming and Prototype -Do journal -Presentation
WONG JING JIE	-Video making -Taking Evidence Pictures -Help in doing prototype -Presentation
LING YU AN	-Video making -Taking Evidence Pictures -Help in doing prototype -Presentation

7.0 LOG JOURNAL

Week	Description
1	Our lecturer gave briefing on the design thinking project.We agreed that our project theme is “Digital Solutions for the Sports Community” which uses AI-driven analytics to enhance community engagement,athlete development and fan experience.
2	We started the empathy phase by creating a Google Form and collected the responses from the students.Questions are related to what are the problems they facing and their needs.We also conducted interview with an equestrian enthusiast to get his feedback on the questions we prepared.
3	We did analysis on the data from the conducted survey.From the result,we concluded the problems now students were facing.
4	Based on the result,we define the user needs corresponding to each problem.We started searching related questions on the Internet and finding solutions that align with user needs.
5	From all the information we access,we started brainstorming process to think a few ideas that are applicable on solving problems.Then,we proceed to team dicsussion and pick the best idea among all those ideas.
6	We started to develop the prototype by designing interfaces.Then,we started to make the basic flow and features of our prototype.
7	We present and test our prototype during the class.We gathered the feedbacks from users to determine the strengths and weaknesses of our product.This gave us insights for further improvement of our prototype.

8.0 DESIGN THINKING PROCESS

8.1 Empathy Mode

1. **Observation**
   - From our observation,we had found out three key issues at UTM Equine Park. First, student attendance is very low, indicating that students are not interested and not engaged in equestrian activities. Furthermore, most students are not aware of basic information, including any event or even place regarding equestrian activities. Besides, casual riding students always complain that it is difficult for them to manage horses because they are not aware if their horse is stressed or simply not willing to be ride.
2. **Engage**
   - To better understand what users are concerned about, we conducted a Google Form and interviewed one student who found interested in equestrian activities. We had prepared a few questions to ask him, and he had expressed his anxiety and problems encountered on his riding journey at UTM. From the results obtained from Google Form, we found out that only a small number of students took part in UTM equestrian activities. Besides, for those who are horse riders, they get frustrated because it is difficult for them to handle the horse and cannot understand the reason behind it.

8.1.1 List of Questions and Summarized Answers (Google Form)

Questions	Summarized Answers
Are you aware that UTM has an equestrian center or regularly hosts equestrian-related events?	18.2% - Yes,I have heard of it,but don't know the details 27.3% - Not sure 54.5% - No,I had no idea
How many times have you participated in or attended a UTM equestrian event in the past time?	63.6% - 0 time 36.4% - 1-2 times
What is the main reason that you have not participated?	72.7% - Do not know about those events 36.4% - I am not interested in equestrian 27.3% - Events are not attracting to me 54.5% - Schedulling conflict / No enough time
Do you have any horse riding experience?	36.4% - Yes, I have experience 63.6% - No, I do not have experience
What is the biggest challenge you face when riding?	54.5% - Understanding the horse's emotional state 63.6% - Predicting or controlling the horse's behaviour 63.6% - Building trust with the horse 72.7% - Safety concerns
If a mobile app could use your camera to analyze a horse's body language in real time and tell you its emotional state,how would it helpful for your riding journey?	9.1% - Slightly helpful 18.2% - Moderately helpful 27.3% - Extremely helpful 45.5% - Quite helpful
When watching an equestrian performance, which is your primary feeling?	9.1% - It is exciting, I can appreciate the harmony between horse and rider 45.5% - It is visually impressive, but I do not really what to look for or do not fully understand the rules 45.5% - It is difficult to feel an emotional connection to the horse or riders
If a tool could let you see the emotional changes of the horses in real time during a competition,how would that change your viewing experience?	9.1% - It would not change much for me 27.3% - It would help me better understand the competition and rider strategy 54.5% - It would make me feel more empathy and connection to the horses 90.9% - It would make it more interesting and engaging
What are the features of an app would you want to have to boost your participation/enhance your sense of involvement/improve riding experiences in equestrian activities?	• Safety warning system when the horse is angry • Use AI to analyse the emotion of horses, and followed by translating the emotion into human language. • AI-powered feature that provides real-time analysis of the horse's stress and fatigue levels through wearable sensors.

Below is the result we obtained from Google form:

1) Are you aware that UTM has an equestrian center or regularly hosts equestrian-related events?

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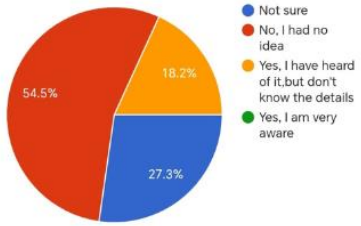
11 responses



2) How many times have you participated in or attended a UTM equestrian event in the past time?

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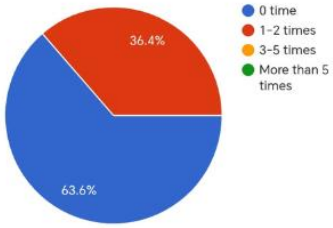
11 responses



3) What is the main reason that you have not participated? (Select all that apply)

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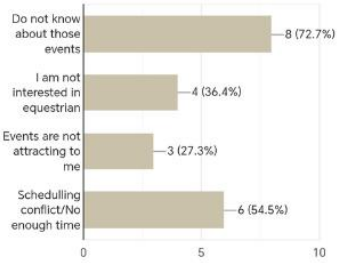
11 responses



4) Do you have any horse riding experience?

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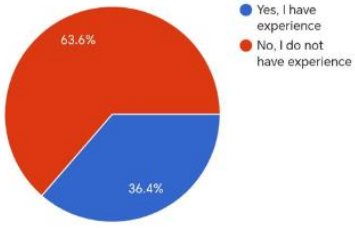
11 responses



5)What is the biggest challenge you face when riding?(Select all that apply)

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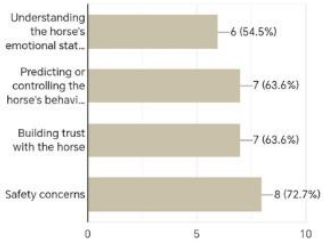
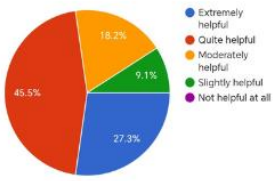
11 responses



6)If a mobile app could use your camera to analyze a horse's body language in real time and tell you its emotional state,how would it helpful for your riding journey?

Copy chart

11 responses



7)When watching an equestrian performance,which is your primary feeling?

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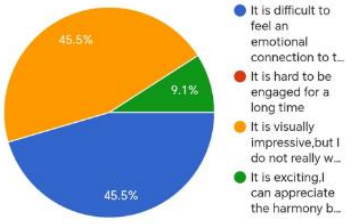
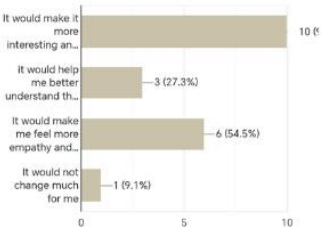
11 responses



8)If a tool could let you see the emotional changes of the horses in real time during a competition,how would that change your viewing experience? (Select all that apply)

Copy chart

11 responses



9)What are the features of an app would you want to have to boost your participation/enhance your sense of involvement/improve riding experiences in equestrian activities?(e.g. real-time AI analysis of horse emotions,translation of emotion into human language)

11 responses

efficient and can be accessed easily when I want to detect the emotion of the horse.

Safety warning system when the horse is angry

8.1.2 Composite Character

Name: David
Age: 20
Background: UTM undergraduate student,passionate about equestrian sports with 6 months recreational riding
Goals:

- Want to have new different experiences
- Build better connection with horses by understand horse behaviours
- Make this sport accessible to other students

Pain Points:

- Communication gap existed
- Progress feels slow
- Not secured and not confident
- Cannot find like-minded friends because less people take part in equestrian

Reactions / Behaviour:

- Shows signs of disappointed as cannot find a like-minded friend
- Nervous when riding because feel unsecured

8.2 Define Mode

Based on insights gained in the empathy phase, analysis on user feedback is conducted to clearly identify what are the major problems and needs of our users. As a result, we can ensure that our solution addresses what is really important. Below are the problem statements, followed by their causes and needs.

i) Low awareness and participation in UTM equestrian activities

Causes:

- Lack of promotion and accessible information about events.
- No attractive point for students unfamiliar with the sport.

User Needs:

- Students need an interesting way to learn about and connect with equestrian sports

ii) Riders feel frustrated when riding because they cannot control or understand the horse

Causes:

- Cannot interpret equine body language and emotions.
- No real-time feedback on guiding their actions

User Needs:

- Able to understand the specific reason why a horse behaves in a specific way to gain clarity and confidence.
- Immediate feedback on the horse's emotional state to reflect and adjust their actions.
- Build trust with the horse, securing their safety and making riding more fulfilling.

iii)Fans experience low engagement caused by unable to connect with horses on an emotional level

Causes:

- Lack of interactive elements that can help fans to understand horse's perspective and emotional change during a performance.

User Needs:

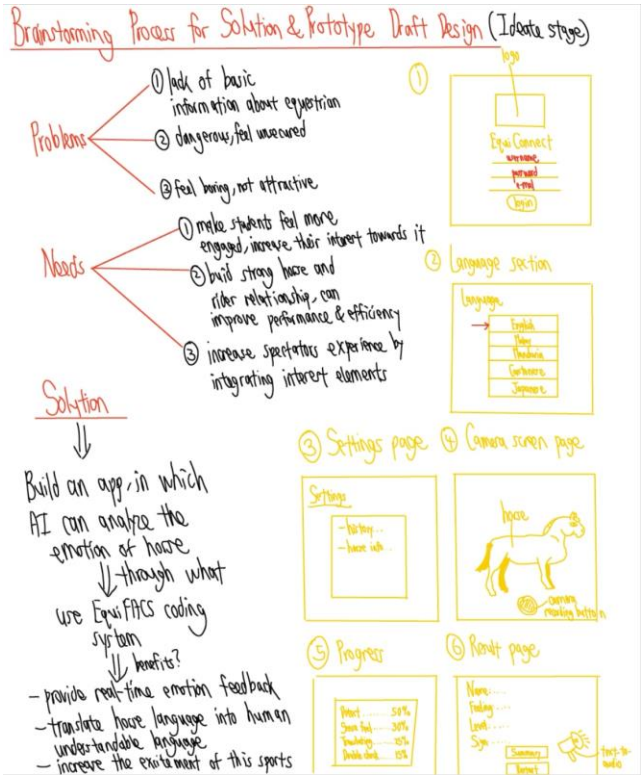
- Need a fresh way to better immerse themselves with equestrian sport, follow the horse's state during events and feel a profound connection to the performance.

8.3 Ideate Mode

In the ideate stage, we brainstormed ideas to solve the problems that we have found.Many workable ideas were thought and we selected the best one in designing our EquiConnect app.

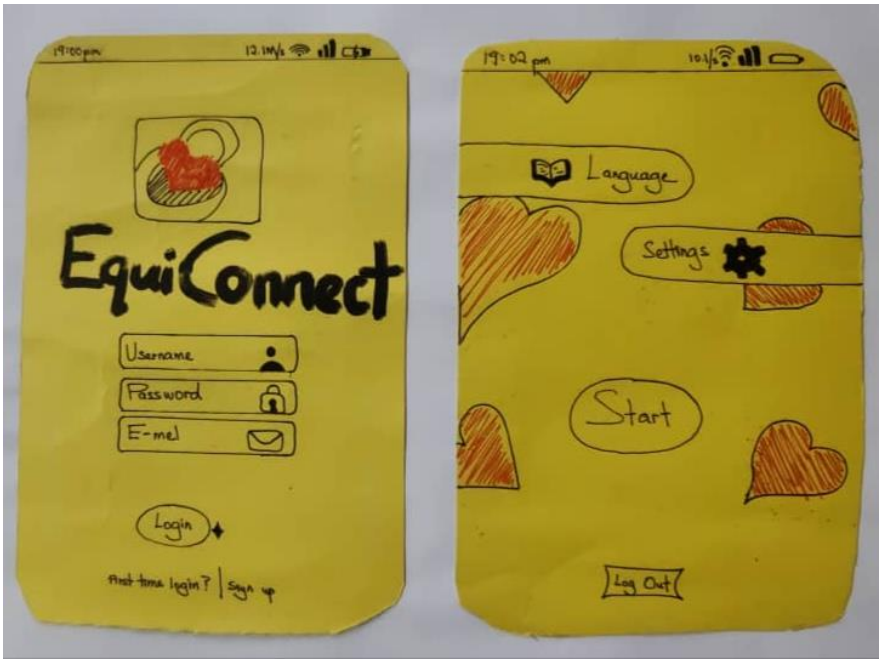
Firstly, we discussed as a group by doing team meetings and looked for information using Internet. After searching information online, we realized there is a system called EquiFACS, a Facial Action Coding System for the domestic horse. It is a systematic methodology of identifying and coding the facial expressions of horses based on the underlying facial musculature and movement of the horse's muscles (Wathan J, Burrows AM, Waller BM, McComb K,2015). At that time, our main idea was come out and we decided to use AI to read a horse's emotions and translate the emotion into human language.

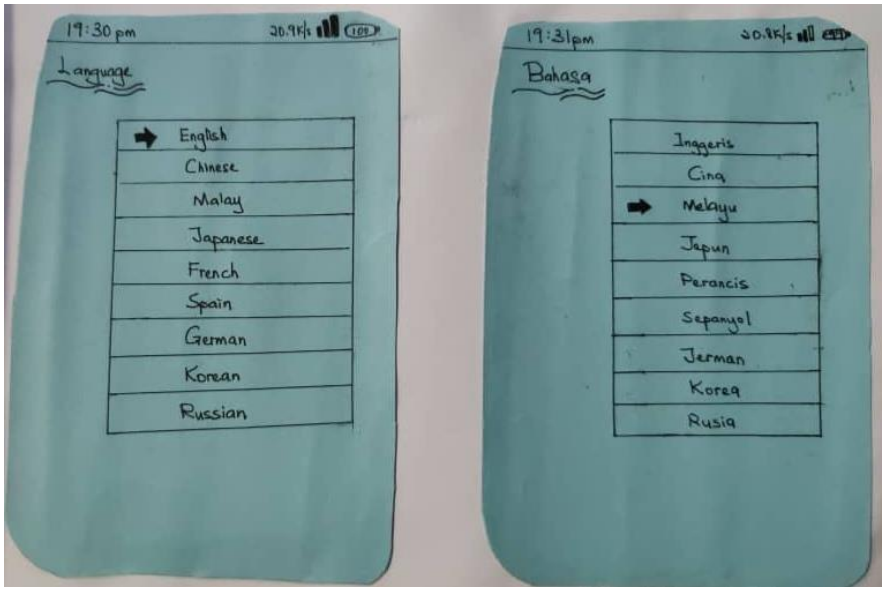
Next,everyone of us had helped each other on sketching a basic draft design of the interface of the application.We designed different screens such as a camera screen for analyzing the horse's state and a screen that explains the emotion of the horse.Then,we did voting based on the design that was easiest to use,possible to build and most useful.We finally agreed on a plan.To design an application using system EquiFACS as a reference guide, we can design an application that utilizes AI that incorporates EquiFACS and the camera of the phone to identify the instantaneous emotions of the horse.Therefore,the spectator's experience,engagement rate of students can be enhanced as well as help the riders to be aware of the abnormal state of the horse.



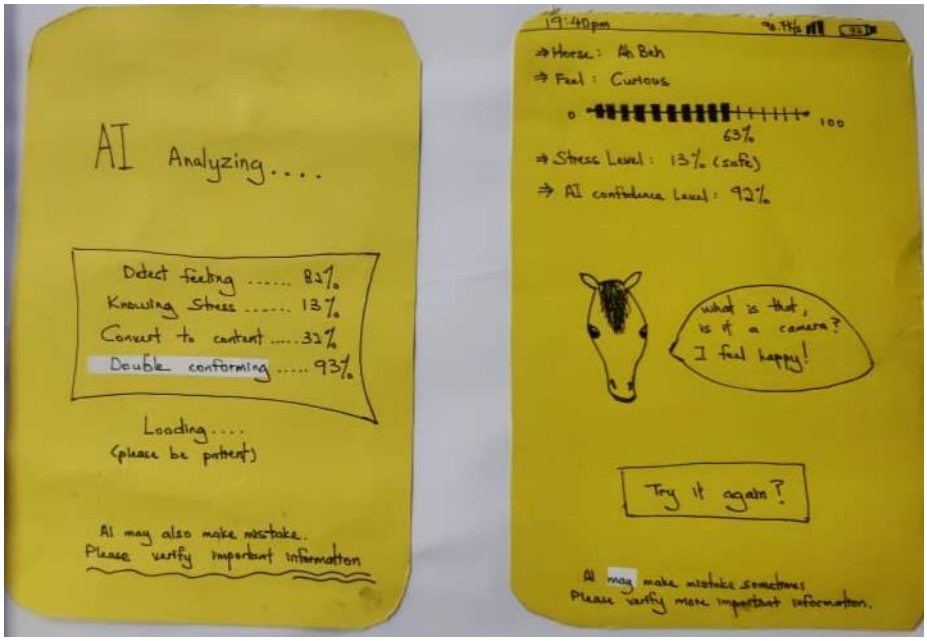
8.4 Prototype Mode

In this phase,we were able to turn our abstract concepts into something real that everyone can see.We created our prototype using simple materials such as paper and manila cards.It was cheap and easy to be modified.We could make an immediate ammendment if we want to implement a new concept or solve a problem.Our paper prototype consists of our login page,our live camera page where we can analyze the horse,our simple features page,our analyzing progress page and our AI interpreting result page where we can translate the emotions of the horse into simple human language.We always continued to refine our prototype to ensure that its quality is the best that can be delivered.






22:00 pm
Settings
- All horse name
- Feeling dictionary
follow us!
Take photo to know the emotion


AI Analyzing....
Detect feeling 82%
Knowing Stress 13%
Convert to content 32%
Double conforming 93%
Loading....
(please be patient)
AI may also make mistake.
Please verify important information
19:40pm
⇒ Horse: Ah Beh
⇒ Feel: Curious
0
63%
100
⇒ Stress Level: 13% (safe)
⇒ AI confidence Level: 92%
what is that, is it a camera? I feel happy!
Try it again?
AI may make mistake sometimes
Please verify more important information.

8.5 Test Mode

In this phase, we demonstrated EquiConnect to users and asked their feedback from perspectives of functionality, usability and overall experience. We did this by giving a presentation in class. This will help us identify if there were any problems or potential areas for improvement that were missed.

Test 1:Settings & Language Configuration

What we explained:

-The settings page enables the user to set their preferences, which include the language and the ability to view previous results. The user is given guidance in switching between different languages and is also shown how to view their previous results.

Expectation:

-The change in language is estimated to occur smoothly on all screens with no glitches. Users can go to Settings, select their language, and see the changes in the interface without having to restart the app. Meanwhile, they can easily access and view their previous results from the same section.

Test 2:Live Camera AI Analysis

What we explained:

-The feature for analysis using AI in our application can be enabled when we open the camera and start recording a video. It will automatically detect any slight change in facial expressions and focus on the horse, starting the emotion analysis.

Expectation:

-The camera is expected to open successfully and detect subtle change in facial expressions of horse in the frame efficiently and start analysis immediately.

Test 3:AI Emotion Translation

What we explained:

-The application can analyze a horse's state or movement using AI correctly and translate it into a language that humans can easily understand.

Expectation:

-The app is estimated to display a clear emotion level and percentage label related to a horse's behavior, such as "Stress 70%," with audio explanations using text-to-speech technology.

9.0 CONCLUSION

In conclusion,after conducting this project,we have laerned how to design and utilize advanced technology nowadays to solve real-world problems by following design thinking phases,which are empathy,define,ideate,prototype and test.

10.0 REFLECTION

NAJMI :

My goal is to become a professional engineer who can design, build, and manage effective data-driven systems to solve real-world problems. I aim to create reliable data transmissions that can help companies make better decisions and organize information effectively.Design thinking, especially the emphathize mode, helped me to understand the significance of data accuracy, consistency and accessibility. I became aware of how ineffective data management can cause miscommunication and misplaced records. This experience allows me to solve and learn about real-world problems.To improve my potential in the industry, I intend to grow my skills in data modeling, database management, and data integration. Besides, I also want to keep practicing user requirement analysis and solving real-world problems. This action helps me to design and create data-driven systems that are reliable and efficient.

NG KAI CHUN :

My goal regard to my course is to become a skilled and professional Data Engineer.I wish I can use the knowledge I have learned to identify and solve real problems across different industries and fields.Teaching me a correct structured way to approach a problem is my key takeaway from this project.I will always follow the design thinking phases in my own future project to make sure I would look at problems from every angle and stay on the right track towards developing better solutions.To improve my skills,I will focus on mastering important programming languages such as Python,SQL and Scala.I will also always learn and stay updated with new technology trends to see their amazing points and potential on solving problems effectively.

LING YU AN:

First and foremost, I would like to say that when I first started this course and saw seniors coding, I think they looked powerful, so I plan to join competitions such as hackathons and also datathons during my university life. Also, through this Design Thinking program, I learned that there are many phases involved in a project. Innovation, which is critical to show our team's creativity and uniqueness. Lastly, building an e-portfolio will be involved in my improvement progress with focus on translating complex projects into simple, friendly interfaces that highlight our program uniqueness.

HING QI WEI:

My dream is to become someone who can understand and take control of data because I believe that understanding data means understanding the direction of the world. Therefore, my goal is to start my career as a data engineer and help companies better manage complex data. Through this design thinking process, I have realized the importance of data and information is unpredictable and useful. Behind every successful product, there is always accurate, well-organized data and info. Without these, the product is like a pizza without cheese, which loses its value and purpose. At the same time, I also realized that an excellent team with good communication is essential to prevent work from stagnating and to ensure smooth progress. In the future, I need to work harder by learning continuously like researching and seeking information to gain deeper insights, practicing reflection and mindfulness to enhance creativity, and constantly updating myself so that I can keep up with the pace of the times.

WONG JING JIE:

As a data engineering student, my dream is to become a proficient person who can grasp multiple types of coding skills to help the company manipulate complex data. Through this assignment, I learned about the criteria of thinking skills that can help us to solve problems by developing them step by step. Also, this project assists or nourish me to embrace challenges and drives me to excel in dynamic environments and contribute effectively to innovative projects since many of my soft skills have been learned, such as collaboration, communication, problem-solving, and so on. In the future, I plan to step out of my comfort zone, be willing to accept the challenge to hone myself, and increase my ability. I will try to reflect on myself all the time after the project and find my shortcomings. I believe I can gradually become a trustworthy and reliable person in the future.

11.0 REFERENCE

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Link Video:
https://drive.google.com/file/d/1402PlvdiA134xlzf35xmo26nLL4BXux3/view?usp=drivesdk