ALTERNATIVE TO EXPENSIVE VIRTUAL REALITY

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Abstract : This paper proposes a way or an alternative of VR (Virtual Reality) which will help people to use VR less expensive. This system is hybrid of hardware and software, method and process are described in this paper. Virtual Reality (VR) is a computer technology that use software to generate image and sound to make an immersive environment for gaming, education, medical and military purpose. In this we are using a mechanical device called VR headset or Virtual Reality Box. This headset consists of two adjustable lenses and a display, which we find in actual VR like Oculus Rift, Steam VR and HTC-Vive. We can use a Smartphone display as an alternate to HMD (Head-Mounted-Display). We intend to cast PC/laptop screen on smartphone display. The head movement and other input can be taken from the inbuilt Gyroscope. Some essential or important thing in VR is head tracking, motion tracking and eye tracking which is used as an input from the user to interact in virtual environment. This could only be possible with the help of Gyroscope, infrared and other sensors.

IndexTerms **– Virtual Reality, HMD, Gyroscope, Virtual Environment**

I. INTRODUCTION

Virtual reality technology (VR) is based on computer graphics, which can create scenes and virtual elements that can be manipulated by the user through input devices, and to be seen, listened to, touched and even smelled through output devices and the user may feel well immersed during the interaction. By using a well designed and built VR system, users can feel almost like they are in the real world. In virtual reality, the environment shown is totally virtual, which is opposite to the real world, and among them is augmented reality and augmented virtual reality.
Our research involves experimenting with virtual reality in a different way without using virtual reality, but using a virtual box with a smartphone as a screen to project the PC / laptop screen on a smartphone screen so that it works like the HMD screen in virtual reality.

II. LITERATURE SURVEY

The key idea behind using this virtual reality box is that it makes the real VR headset less expensive, which will allow everyone to experience virtual reality without having to pay extra. One of the biggest advantages is that you can play all games compatible with VR or not compatible

In this virtual reality box, this is not possible in virtual reality. The only disadvantage we find is the image quality and the field of view (FOV) that is not possible without the HMD screen.

1) Augmented Reality Technology: Augmented Reality (AR) technology is used to improve or modify the virtual environment based on the user, improves our perception and helps us to see, hear and feel the environment in a better way. It is a technology that converts or adds virtual objects in the real world to make the real environment more interactive for the user. It has gained popularity due to its applications or uses in various fields, such as games, entertainment, advertising, military and medical training.

2) Educational Screencast: Screencast is a way of displaying the PC / laptop screen on a smartphone or other screen and can be used as an input device. The use of screencasts as a didactic or didactic tool, particularly used in the teaching of PC software. Its use has helped student's study and learn.

3) Virtual reality headsets: virtual reality (VR) is an emerging field that has the potential to do everything possible in a virtual environment with a 3D experience. Oculus Rift is one of those VR headsets. It also provides a great visual, sound and tactile response.

III. DATA SET

A google survey was made to collect data for data visualization, link (https://goo.gl/forms/xSHNo94Xm54SudCK2) was collected from many people who have knowledge about Virtual Reality.
The link was also sent on many discord, telegram and gaming channels which make the data set genuine. The data set was then downloaded as a (.csv) file.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Gender	Student	Curren_ Ag	Occupatior	Playing_tin	Own_VR	Wh_VR	Wa_Experi	Game_gen	Don't_like	Buy_VR_ifc	Wholeset_	H_pay	SF
2	Male	Yes	18 - 24	Student	2 - 5 Hours	Yes	Mobile VR	Yes	RPG (Role	It Is Too Ex	Yes	Buy Individ	5K - 10K	5
3	Female	Yes	18 - 24	Student	Less Than 1	No	None	Yes	Horror;Adv	It Is Too Ex	Yes	At Once	11K - 20K	4
4	Male	Yes	18 - 24	Student	2 - 5 Hours	No	None	Yes	Action	It Is Too Ex	Yes	Depends O	5K - 10K	5
5	Male	No	25 - 50	Buisness	2 - 5 Hours	Yes	Mobile VR	Already Ha	Horror;Act	There Are N	Yes	At Once	11K - 20K	5
6	Female	No	25 - 50	Working	Less Than 1	No	None	Yes	Horror;Adv	I Do Not Di	Yes	At Once	5K - 10K	5
7	Male	Yes	18 - 24	Student	2 - 5 Hours	Yes	Mobile VR	Yes	RPG (Role	It Is Too Ex	Yes	Depends O	5K - 10K	4
8	Male	Yes	18 - 24	Student	Less Than 1	No	None	Yes	Horror;Act	It Is Too Ex	Yes	At Once	5K - 10K	4
9	Female	Yes	18 - 24	Student	2 - 5 Hours	No	None	Yes	Action;Sim	I Do Not Di	No	At Once	5K - 10K	5
10	Male	Yes	Above 50	Working	More Than	Yes	Mobile VR	No	Horror;Adv	There Are N	No	Depends O	5K - 10K	1
11	Female	No	25 - 50	Working	Less Than 1	No	None	Yes	RPG (Role	It Is Too Ex	Yes	At Once	5K - 10K	5
12	Female	Yes	18 - 24	Student	2 - 5 Hours	No	None	Yes	Simulation	It Is Too Ex	Yes	At Once	5K - 10K	5
13	Male	Yes	18 - 24	Student	Less Than 1	No	None	Yes	RPG (Role	It Is Too Ex	Yes	Depends O	5K - 10K	4
14	Male	Yes	18 - 24	Student	Less Than 1	No	None	No	Action	It Is Too Ex	Yes	At Once	5K - 10K	4
15	Male	Yes	18 - 24	Student	2 - 5 Hours	Yes	Mobile VR	Already Ha	Horror;Act	There Are N	Yes	Depends O	11K - 20K	3
16	Male	Yes	18 - 24	Student	2 - 5 Hours	No	None	Yes	RPG (Role	It Is Too Ex	No	At Once	5K - 10K	3
17	Male	Yes	25 - 50	Working	Less Than 1	Yes	Oculus Rift	Already Ha	Horror;Act	I Do Not Di	Yes	At Once	11K - 20K	5
18	Female	No	25 - 50	Working	Less Than 1	No	None	Yes	Action;Adv	It Is Too Ex	Yes	At Once	11K - 20K	3
19	Male	No	25 - 50	Buisness	Less Than 1	Yes	HTC Vive	Already Ha	RPG (Role	There Are N	Yes	At Once	11K - 20K	4
20	Female	Yes	18 - 24	Student	2 - 5 Hours	No	None	Yes	Horror;Adv	I Do Not Di	Yes	At Once	5K - 10K	4
21	Female	Yes	18 - 24	Student	Less Than 1	No	None	Yes	Action	It Is Too Ex	Yes	At Once	11K - 20K	5
22	Male	Yes	18 - 24	Student	2 - 5 Hours	No	None	Yes	Horror;Act	There Are N	Yes	At Once	11K - 20K	4
23	Male	No	25 - 50	Buisness	2 - 5 Hours	Yes	Mobile VR	Yes	Horror;Act	There Are N	Yes	At Once	11K - 20K	3
24	Male	Yes	18 - 24	Student	2 - 5 Hours	Yes	Mobile VR	Yes	RPG (Role	It Is Too Ex	Yes	Depends O	5K - 10K	4
25	Female	No	25 - 50	Working	Less Than 1	No	None	Yes	Action	I Do Not Di	Yes	At Once	5K - 10K	5
26	Female	Yes	18 - 24	Student	Less Than 1	No	None	Yes	Horror;Adv	It Is Too Ex	Yes	At Once	11K - 20K	4
27	Male	Yes	18 - 24	Student	2 - 5 Hours	Yes	Mobile VR	Yes	RPG (Role	It Is Too Ex	Yes	Buy Individ	5K - 10K	5
28	Male	Yes	18 - 24	Student	2 - 5 Hours	No	None	Yes	Horror;Act	It Is Too Ex	Yes	Depends O	5K - 10K	4
29	Male	No	18 - 24	Buisness	2 - 5 Hours	Yes	Mobile VR	No	Action	There Are N	Yes	At Once	11K - 20K	5
30	Male	Yes	18 - 24	Student	Less Than 1	No	None	Yes	Horror;Adv	It Is Too Ex	Yes	At Once	5K - 10K	4
31	Female	No	25 - 50	Working	Less Than 1	No	None	Yes	RPG (Role	It Is Too Ex	Yes	Depends O	5K - 10K	5
32	Male	No	25 - 50	Buisness	2 - 5 Hours	Yes	Mobile VR	Already Ha	Horror;Act	It Is Too Ex	Yes	At Once	11K - 20K	3

Fig 1

There are many attributes which specify Gender, Occupation, Age of the person taking the survey, some of the important attributes are Own_VR (Do You Own A VR), Wh_VR (Which VR), Wa_Experiance (Want to Experience), Buy_VR_ifcheap (Would You Like To Buy VR If Cheap), H_pay (How Much Would You Be Willing To Pay).
With this dataset we can find that most of people want to experience a VR but it is not possible as VR is expensive, In this paper we will make a Virtual Box using mobile VR headset and smartphone display as Head-Mounted-Display (HMD).

IV. Observation

Public responses gathered from the survey included people from different age groups.

Data Visualization :

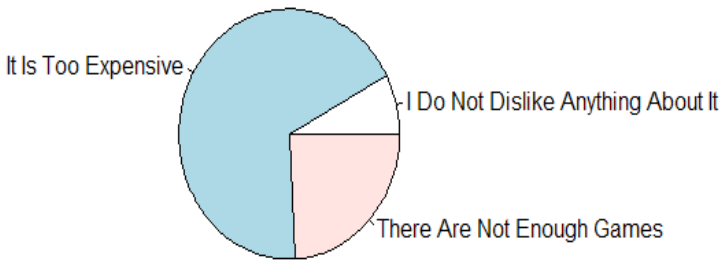

Fig 2

The visualization tell us what people think about VR , most of the people said the VR is too expensive.

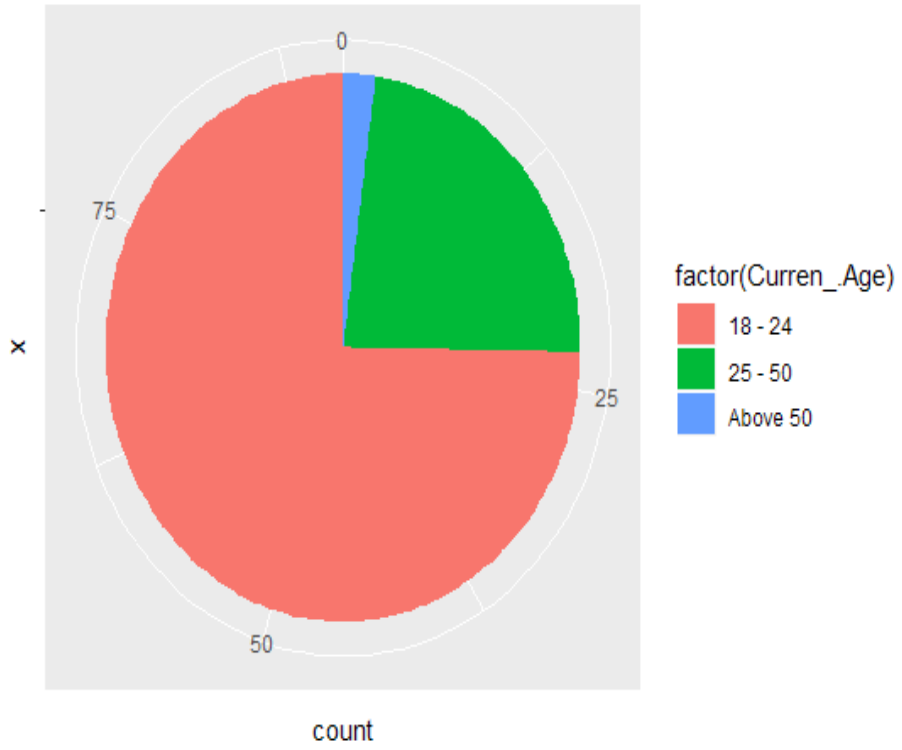

Fig 3

This visualization tell us the age of people taking survey

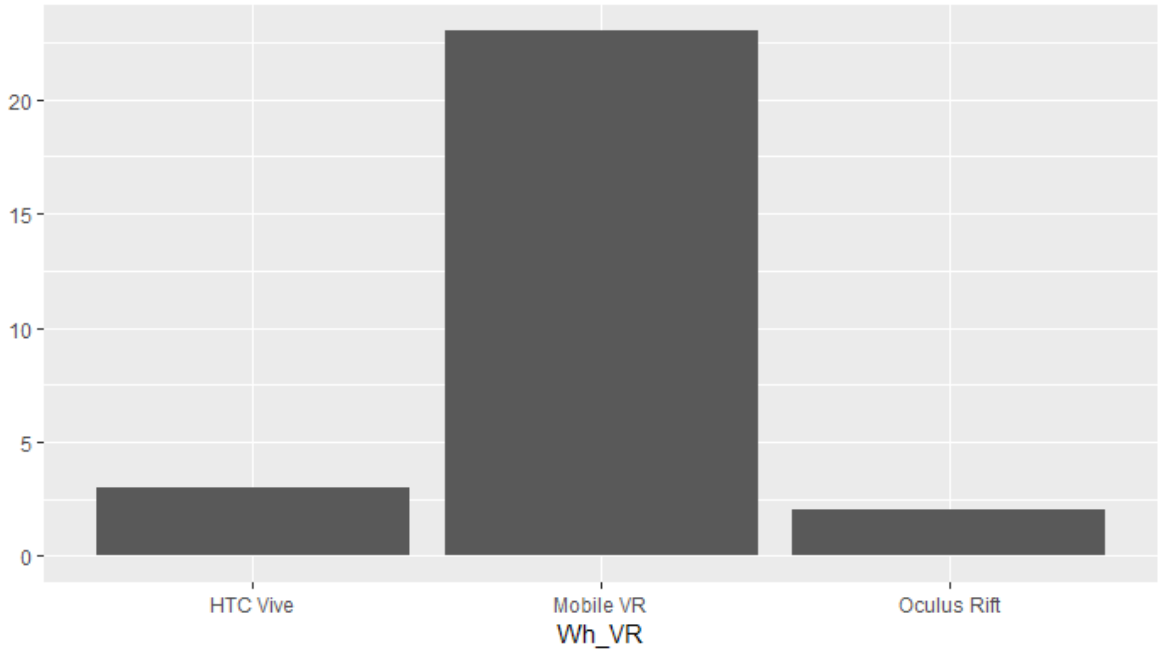

Fig 4

This visualization tells us which VR they have or have experienced. Most of the people have Mobile VR

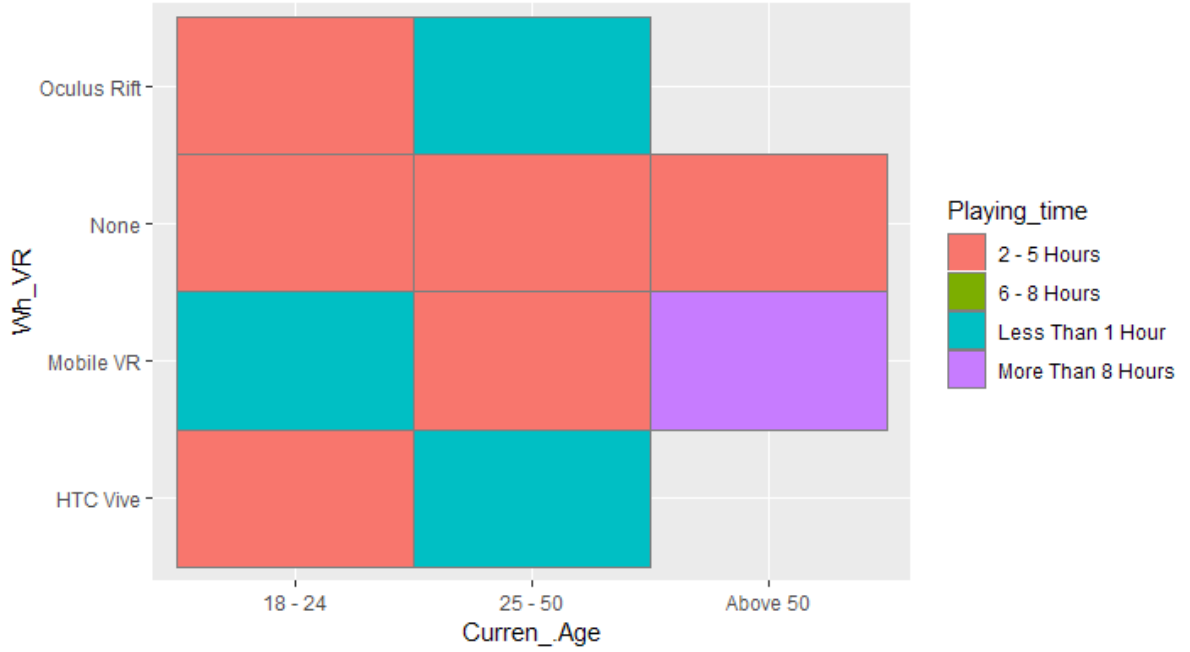

Fig 5

This visualization relates between which VR they have and what is their age and the time they play

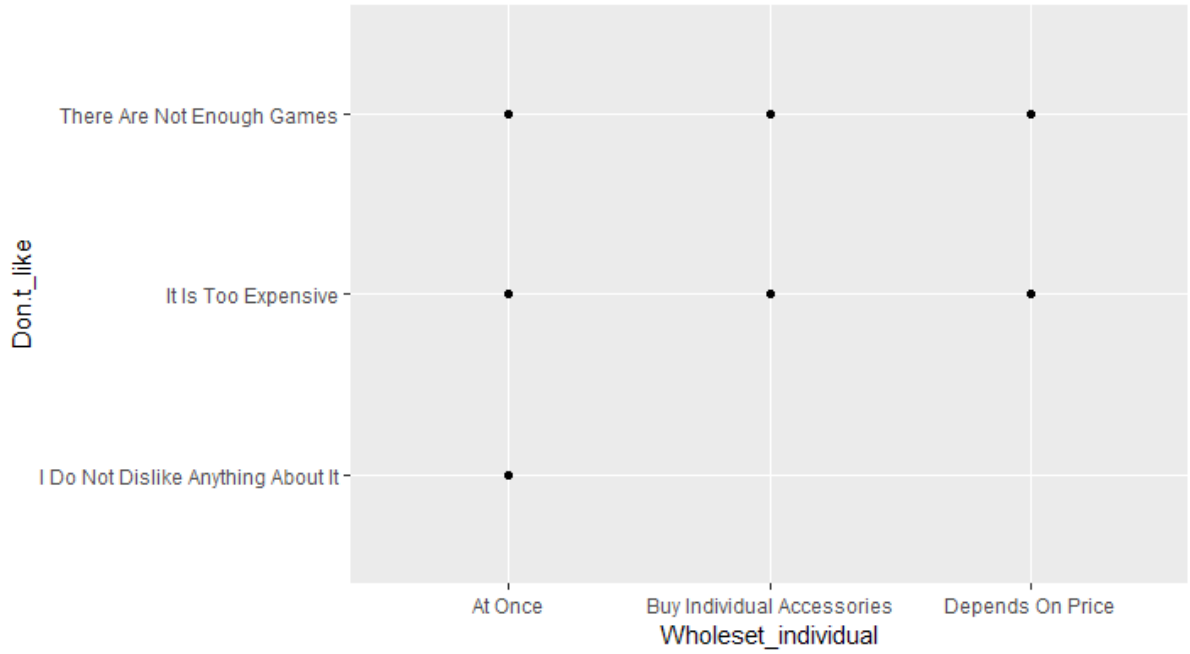

Fig 6

This visualization tells us what people don't like about VR and the preferred way of buying VR

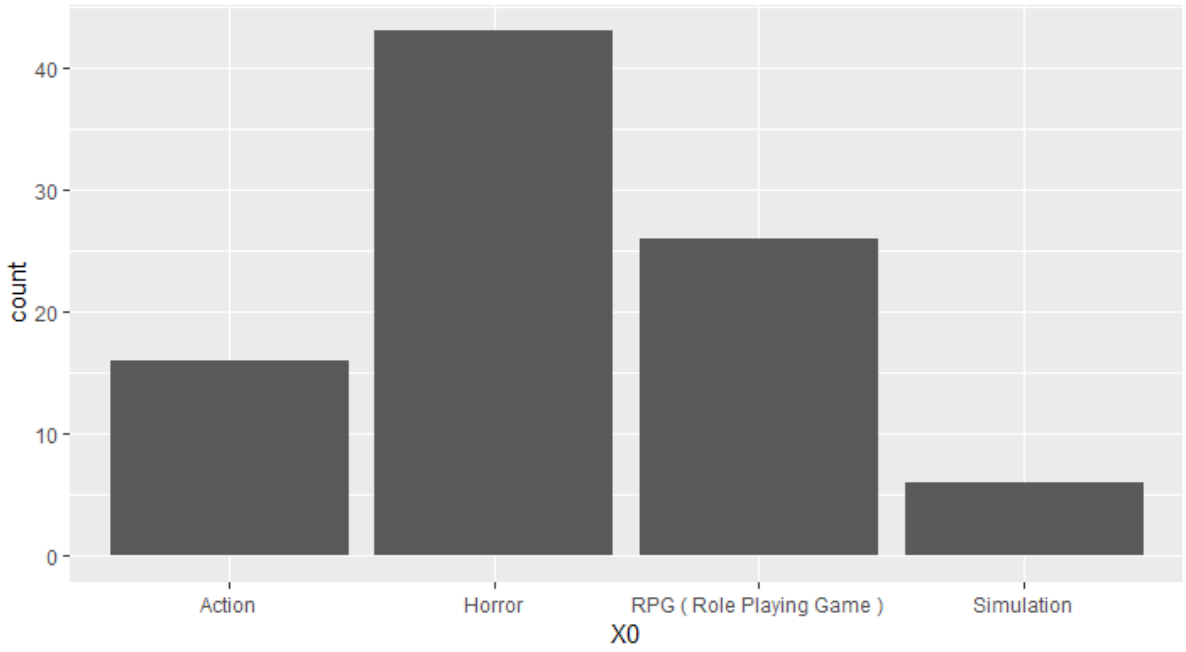

Fig 7

This visualization tells us what game genre do people like to play on VR

V. Proposed System

In this paper we will make a VR device which will allow users to experience Virtual Reality at home without buying expensive device like Oculus Rift, HTC-Vive. Those expensive devices have Head-Mounted-Device (HMD) but we could use a smartphone display which everyone has, then we can use a mobile VR headset like Google Cardboard or Durovis Dive which would cost only Rs. 1000 – 3000 (30$) rather than buying an actual VR which will range from 50,000 to 1 lakh. We will also use a screen casting software which will cast PC/Laptop display to smartphone display which will divide smartphone display in two parts to view from each lens we also have to take input from gyroscope and use it as user's head movement for PC display pointer input to interact with the virtual environment.
To build the proposed system we will need some prerequisites which are

1) Google Daydream
A google cardboard or any mobile VR in that matter

2) Graphic card
We will also require a Desktop /Laptop with a good graphic card to play VR or any games smoothly in highest resolution. Using high resolution will give a good view. Minimum graphic requirement GTX 1050 4gb ddr5 or better to play top games in medium graphic settings.

3)Mobile/Smartphone
We will also require a mobile device, we can use any mobile device which has display size between 4.5 - 6.5 inch. A good display device is preferred with display of 6 inch and above with AMOLED, OLED, POLED display for better colours and resolution.

4) Trinus Virtual Reality
Then we will require a screen viewing software to view the Desktop or Laptop screen on the mobile display which can be either connect by data cable or through WIFI. For this we will use a software called Trinus Virtual Reality which will not only view desktop screen on mobile but will also give to images for 2 lenses to give a 3D VR experience

Trinus Virtual Reality have many options for VR like Resolution settings, Performance, Lens Calibration and Steam VR which will allow to play original VR games with multiplayer from Steam. You can also play Non-VR games or old games in VR with the help of this software which is its biggest advantage over original VR like Virtual Reality

VI. Procedure

After having all the important required components given in the propose system, we could now build our own VR headset. First we need to download the software needed to view the screen on mobile display, Trinus Virtual Reality link (https://www.trinusvirtualreality.com/) also an application in mobile link (https://play.google.com/store/apps/details?id=com.loxai.trinus.full&hl=en)
Then we require a mobile VR headset like Google Daydream also to view the computer display we require a smartphone, connect the smartphone to the computer either through a Wi-Fi with computer as host and smartphone as client or with a data cable.
After this we need to put the device into the mobile VR box and start a game or video that you want to play. You could either use mouse or keyboard as input or a joystick as per your convenience

VII. Reference

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