Augmented Reality in Agriculture

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AUGMENTED REALITY IN AGRICULTURE

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Abstract:

Rapid development of society is enhancing with new emerging technologies. Augmented reality (AR) is one such immersive technology that will change the way of living in prospective future. In India farmers committing suicide is becoming major concern due to the lack of cultivation of crops. Implementation of augmented reality (AR) will aid farmers to detect the soil properties in real time, insects, space requirement, water supply requirement and favorable weather condition for crops. In this paper, we present the effective use of AR in farming that will amalgamate real world and computer generated perceptual information to assist farmers in the field so that they can serve their families and nation.

Keywords:

Augmented reality, agriculture, soil sensor, yielding of crops.

1. INTRODUCTION:

Augmented reality has been consequently dominating gaming and entertainment world, with the world wide success of game like Pokémon Go and social media platform snap chat. But this emerging technology has setup its own identity to innovate industries beyond entertainment from aviation and education to tourism and healthcare, augmented reality can become a technology pacesetter in different fields. This technology is now making its impingement in agriculture. Implementation of augmented reality (AR) in farming will help farmers to come up with improved and increased amount of harvest. This technology can be used to analyze the quality of a land and soils for farming purposes and will help in yielding crops in different climatic conditions [1]. Augmented agriculture in India is a new breakthrough technology and would suggest the farmers appropriate pesticides and treatment for the bugs. Further this technology can educate the urban and rural population about India's rich flora and fauna.

2. History of Augmented Reality:

Augmented reality technology was invented in 1968, with Ivan Sutherland's development of the primary head-mounted display system. 1901: First recorded regard to AR was made by the author of

The Wizard of Oz, L. Baum. He describes a present called the Character Marker within the novel the passkey. 1952 Cinematographer, Morton Heilig, starts creating the world's first computer game (VR) machine which was called the Sensorama Machine. 1962 Morton Heilig, patents the Sensorama Machine. 1968 Ivan Sutherland creates first head-mounted display system and it's given the nickname The Sword of Damocles thanks to its weight. In1974 Computer Artist and Researcher, Myron Krueger, builds a Video place. In 1982 programmer, Dan Reitan and his team creates RADAR the primary interactive AR system shown on TV, creating video images for weather stations. In 1990 Boeing Researcher, Tom Caudell, coins the term reality to explain the merging of virtual graphics onto a physical display. In 1992 Louis Rosenberg develops one among the earliest and therefore the first fully immersive AR systems for the AR Force. It had been called Virtual Fixtures. In 1993 KARMA, a system which used knowledge-based AR is introduced by Steve Feiner and a team of Columbia University students. It had been wont to provide instructions for repair and maintenance procedures. Fitzmaurice creates the primary example of handheld AR. 1994 the primary AR theatre production is produced by Julie Martin and is named Dancing in Cyberspace. 1996 Cyber Code was created, the primary AR system using 2D markers. Cyber Code would become the model for future marker-based AR systems. In1997 Canon Inc. and therefore the Japanese government jointly fund the most important industrial research center for mixed reality research. It's called the Mixed Reality Systems Laboratory. Columbia University develops the primary outdoor AR system The Touring Machine. 1998 NFL debuts AR during a live game, created by Sport vision. AR is employed to cast a virtual yellow first down marker. 1999 NASA uses AR. NASA's x-38 was flown utilizing a special AR dashboard for navigation purposes. Steve Mann aka the father of wearable computing creates Eye Tap. A tool that worked as both a camera and a computer screen. 2000 The AR Toolkit, the world's first open-source software library, is made by Hirokazu Kato. The world's first outdoor AR game, AR Quake, is launched. In 2003 Wagner and Schmalstieg present the primary handheld AR system on a personal digital assistant. This leads the way for AR on smart devices augmented reality has the facility to vary and impact numerous areas of our lives. It's come an extended way since the Sword of Damocles and therefore the possibility of what's to return, seems pretty endless.

3. LITERATURE REVIEW

The world's population is expected to reach 9.1 billion people in 2050, up from 7.4 billion in 2016.Farmers globally must increase food production around 70 percent compared to 2007 levels to meet the needs of larger population.[2] By conventional Farming it is not possible for the farmers to satisfy the demand of people in 2050.Augmented Reality(AR) has the potential to elevate the productivity of crops. Now-a-days most of the students are more fascinated to adopt a career in fields like Engineering, medicine, E-commerce, banking and etc. where Agriculture gets sidelined. By implementing AR in farming, it can create interest among students and they may be influenced to acquire farming as a career. As more number of people will be engaged in farming it will result in higher production of crops. AR has most of its practice in Gaming world but AR can be beneficial in agriculture too. Hence AR is the one stop destination for most of the problems related to agriculture. Therefore, Augmented Reality is "THE FUTURE OF FARMING".

4. Methodology

The device used in augmented reality is display computers inputs and tracking device. Monitor

based display plays main role of displaying real and virtual over the users view of the world. AR uses real world and its physical object to generate a computer image over top of reality in real time. AR makes the used tolook at their ownimagination world in a 3D manner.

WORK OF AR IN FARMING

AR can analyze and detect the soil quality, fertility and nutrition required for the development of crops to grow in fruitful way. It can also predict the weather condition. It will be containing whole information about any plants to grow by providing its all requirement to a farmer.

HEADMOUNTED DISPLAY.

It is a device worn on head is a part of helmet, feature small display optic in front of each eye. Opticscombines the real world and computer-generated Scene.

IMPROVEMENT IN HMD

Optical system with multi zooming capabilities should be introduced in HMD, with detecting and sensing devices capabilities, UV light, infrared light, information about the capabilities of absorbing light by different molecules in storage memory.

WORKING OF HMD:

1. Device will focus source of UV light on a particular area. Then it will zoom the area as much as possible. As we know that useful
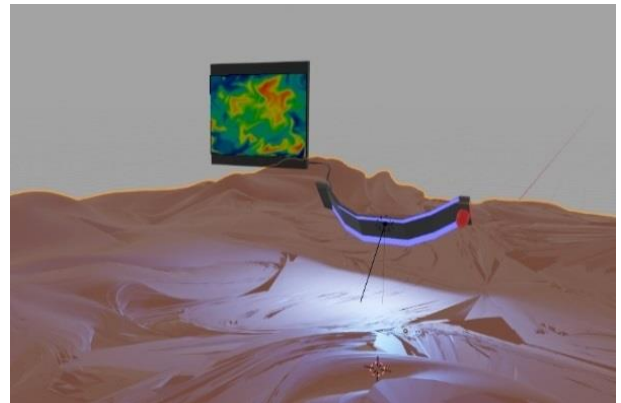
element in the soil are present in the combined state rather in Free State. And every molecule has a capability of absorbing light of different wavelengths.

Sr.No.	Name of minerals	Amount of light absorbs (nano meter)
1	Iron	223 – 224 nm
2	Potassium	766.5 (nm)
3	Magnesium	285.2 (nm)
4	Calcium	422.7 (nm)
5	Sulphur(fluorescence)	190 – 230 (nm)
6	Nitrogen	Very little amount
7	Phosphourous	They emite light

So the transmitted light on the soil will be absorbed by the molecule. Now the amount of light absorbed in every part of area of the soil will be seen on the screen in the form of different color. Different colors will be indicating different molecules.
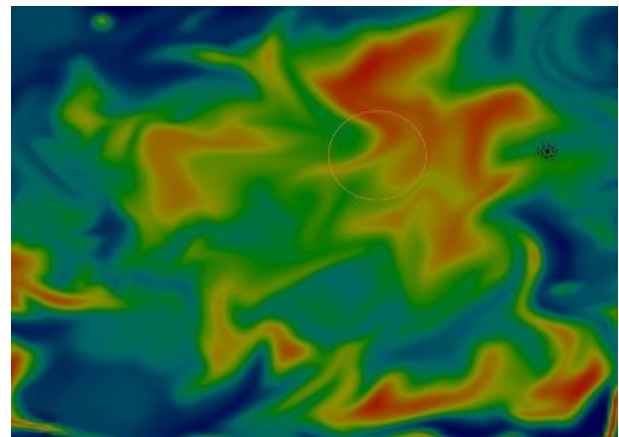
This color will be calculated in the form of percentage. Here the device will compare this percentage with the range of percentage it contain and respond accordingly. Detection process should be done 3-4 times at different places to get an average percentage. In this manner it will detect fundamental properties of soil. And also soil consist of living organism present will be seen by temperature sensor, as different body has different body temperature, by detecting the value of temperature it will be identified that weather it is bacteria, fungi, nematodes, protozoa, arthropods, etc.

And then it will show that if u act as per the instruction of machine how fruitfully your crops will grow. By showing a 3D view created by computer graphics)

5. Future scope of augmented reality:

Augmented reality is one of the newest technologies for many users in the world. And also it has many applications in various fields, Like Gaming, Healthcare, Education, Travel tourism, Military, Automobile industry AR has shown tremendous growth in gaming industry. In future it is possible that instead of coding game most of the people will be learning AR gaming. Which is quite simpler then code game? Health care industry is one of the developing industries in AR. Today doctors are using x-ray machine, but in future it is possible that AR will take the place of x-ray machine. Because it has capabilities of presenting the patient's whole inside part of body in a 3D view in front of our eyes. Which will even help doctor's more effectively. Imagination in education is one of the major problems for students in learning. AR can solve this problem within second by just providing a 3D view of the object. And especially it will be much helpful for solving math problem by understanding every concept. Even today tourist needs one of the guider to travel at various places. AR can be helpful by just providing the right rout of your destination and whole information about the place you are visiting. Military use this technology only for training purpose in flying jet and practicing shooting but in future it can also be used for tracing the enemy at night. Automobile industry use this technology by making 3D models of automobile and also check whether the machine works efficient or not.

6. Result and Discussions:
Augmented Reality will definitely be a boon to a farmer by making maximum possible use of their land in a better and organised way. People in future will have food demands with a better quality. Here augmented reality can be trustworthy. Also AR will attract more number of students to practice farming due to its innovative way of farming.AR will make the farming simpler and less time consuming. So why not to switch from traditional farming to a more organised "Augmented Farming".

7. Conclusion:

Since the Augmented reality has potential to revolutionize farming, therefore the farmer will greatly benefited by implementation of augmented reality. As augmented reality can sense through the sensors, that what the temperature and moisture of the soil is? What is the porosity of the surface and water absorbing capacity? And which is the best crop to be cultivated in those following conditions? It can also forecast the weather so that farmers should stay alert and could do some arrangement so there would not be any kind of loss [3]. Consequently the augmented reality can also be evolving as a revolutionary learning

tool in farming. It will provide the precise measurement scheduling and scientific approach to yield the best harvest hence in short it will minimize the crop losses and maximize yield of crop cultivation.

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