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Augmented Reality: A Staggering Insight into the Future

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Abstract-
Augmented Reality (AR) has risen to prominence by using this real-time direct view of a physical real-world environment. The user's perception of and interaction with the real environment is improved through augmented reality. Technology in education can influence students to learn actively and can motivate them, leading to an effective process of learning. Previous research has identified the problem that technology will create a passive learning process if the technology used does not promote critical thinking, meaning-making or metacognition. Since its introduction, AR has been shown to have good potential in making the learning process more active, effective and meaningful. This is because its advanced technology enables users to interact with virtual and real-time applications and brings the natural experiences to the user.
Augmented Reality is quickly finding its place in a range of applications in the consumer, commercial, and industrial worlds. AR uses displays, cameras, various types of sensors, and software to augment artificial perceptual experience to the user's exact representation.
It was critical to take a fresh approach in this pandemic-affected society. Businesses were harmed, economies were shattered, and people were forced to barricade themselves inside their homes. Technological transformation was inevitable in this unprecedented situation. Schools and universities were forced to shut down, and businesses incurred substantial losses.
With the help of Augmented Reality, it was possible to show consumers a perceptual experience. Through the use of AR, the precise physical product might be realistically assessed. Customers greatly benefited from the AR since they were able to view the actual product in hand despite the fact that the actual manufacturing plant was located far away as it takes acres of land to put up the plants in the vicinity of the city. While AR is not a new concept, advancements in areas, such as computer vision, sensing technologies, data storage, displays, and software technologies, have now made AR a much more practical solution for consumer, commercial, and industrial adoption.

Key words- Augmented Reality, Perceptual Experience, Real world environment, Augmented Reality applications

INTRODUCTION

Augmented Reality aims at simplifying the user's life by bringing virtual information not only to his immediate surroundings, but also to any indirect view of the real-world environment, such as live-video stream.
The product could be simply depicted to the consumer in industrial applications using AR. On the tip of our fingers, we could dismantle the entire product and reassemble it. This cut the customer's trip time in half, and the information exchange via AR was so effective that there was no need for the buyer to see the products in reality. The computer algorithm in augmented reality uses sensors and markers to detect the present location of physical items and to calculate the location of simulated ones. After that, the image that will display on the camera is rendered by this technology. In education, augmented reality opens up truly limitless opportunities for teaching and learning. With realistic real-life simulations, additional reality offers a novel cognition path. Technology allows for a completely realistic psychological and physical experience, as well as the creation of an authentic virtual experience that can be used in real life.
All of these incidents, when combined in the industrial, business, and educational fields, were unquestionably beneficial to all parties involved. Explanations and aid with complex 3D tasks are one of the most promising future applications of augmented reality. AR plays a huge role in enriching the content, increasing sales, improving notoriety, saving costs, reducing risks, etc. There are some factors which could slow down the mass adoption of augmented reality.

2. Methodology

a. Market Survey

b. Design
c. Implementation
d. Evaluation
e. Validation

3.Working of Waste Heat Recovery Boiler

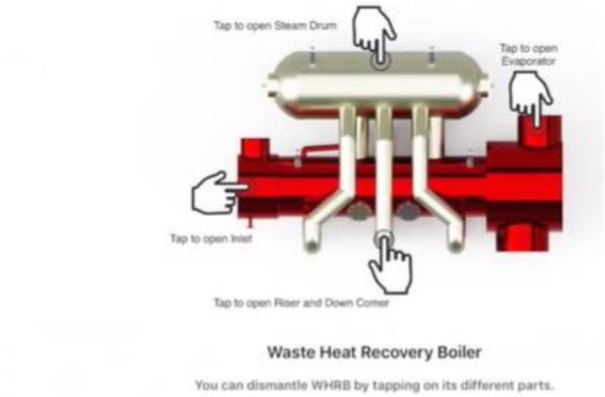
Waste Heat Recovery Boilers are fire tube industrial boilers equipped with advanced instrumentation to deliver maximum possible heat recovery. These boilers are ideal to recover heat from Flue Gas, Incinerators, blast furnace exhausts etc. They enhance the system efficiency and help save fuel and money. It's not just about saving fuel in a boiler, even your process may be such that it includes furnaces, kilns where a large proportion of heat after combustion of fuel gets wasted as a dry flue gas loss. Though in this case, extra fuel is not used in the equipment still there are a huge amount of flue gas losses. This heat can be utilized somewhere in a process where they are currently using fuel to generate heat either to produce steam or even for local heating of water or air or any other fluids. As the name suggests, the heat going waste from the process like flue gases of Diesel Generator **sets** is utilized in these boilers to generate hot water or steam**.**

Since no fuel is fired, whatever heat we recover in the boiler is free of cost. Recovery of waste heat can result in low process cost, reduction in utilities consumption. There are several other indirect benefits of waste heat recovery such as reduction in fuel consumption etc. based on the application requirements of the plant.

Waste Heat Recovery Boilers (WHRB) Benefits:

i. Highly Reliable in operation and robust in construction.
ii. Quick payback returns are achieved.
iii. One time investment with lifetime returns.
iv. No combustion and emission and hence eco friendly.

4.Augmented Reality – An actual Insight



As it can be seen from the above images, the Waste Heat Recovery Boiler when displayed in Augmented Reality, is of great benefit. This technology can be used to entirely explain the working of the boiler, its parts, terminology and end use. Similarly, it can be useful to provide in-house training to executives as well.

5. Code

```
func  addSootBlowerW(){

      if !didInitializeScene{

          if let camera =
sceneView.session.currentFrame?.camera{
              didInitializeScene = true

              var translation = matrix_identity_float4x4
              translation.columns.3.z = -1.32
              translation.columns.3.y = -0.15
              translation.columns.3.x = 0.0

              let transform = camera.transform *
translation

              self.position =
SCNVector3(transform.columns.3.x,
transform.columns.3.y, transform.columns.3.z)

              newRotation =
SCNVector3Make(0,Float(-90.degreesToRadians),
0)

          }

      }

      pipes =
sceneView.scene.rootNode.childNode(withName:
"pipes", recursively: false)!

      pipes.position =  SCNVector3(position.x,
position.y, position.z)
      pipes.eulerAngles = newRotation

      pipes.name = "APH Tubes"

      pipes.geometry?.firstMaterial?.isDoubleSided
= true

pipes.geometry?.firstMaterial?.metalness.contents =
1

pipes.geometry?.firstMaterial?.roughness.contents =
0.1

      pipes.geometry?.firstMaterial?.shininess = 50

      pipes.geometry?.firstMaterial?.transparency =
1

      pipes.scale = SCNVector3(0.0001, 0.0001,
0.0001)
```

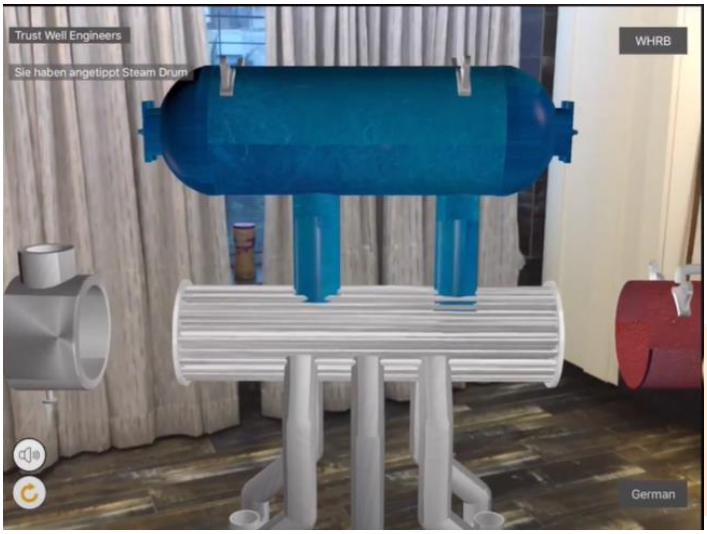
```
sceneView.scene.rootNode.addChildNode(pipes)

    case1 =
sceneView.scene.rootNode.childNode(withName:
"chimney1", recursively: false)!

    case1.position = SCNVector3(position.x +
0.0085, position.y, position.z)
    case1.eulerAngles = newRotation

    case1.name = "Reactor-pt"

    case1.scale = SCNVector3(0.0001, 0.0001,
0.0001)

case1.geometry?.firstMaterial?.metalness.contents =
1

case1.geometry?.firstMaterial?.roughness.contents
= 0.1

    case1.geometry?.firstMaterial?.shininess = 50

    case1.geometry?.firstMaterial?.transparency =
1

sceneView.scene.rootNode.addChildNode(case1)

    let fire = SCNParticleSystem(named:
"fire.scnp", inDirectory: nil)!
    particleNode.addParticleSystem(fire)

    fire.emitterShape = SCNTube(innerRadius:
0.0001, outerRadius: 0.0001, height: 0.43)

     particleNode.eulerAngles.x = Float(-
90.degreesToRadians)

    particleNode.eulerAngles.y = Float(-
90.degreesToRadians)

    particleNode.position =
SCNVector3(case1.position.x - 0.36 ,
case1.position.y
        + 0.13, case1.position.z)

sceneView.scene.rootNode.addChildNode(particle
Node)

    smokeNode.addParticleSystem(smoke)

    smokeNode.position =
SCNVector3(case1.position.x - 0.08,
case1.position.y
        + 0.13, case1.position.z)

sceneView.scene.rootNode.addChildNode(smokeN
ode)

    rainNode.position =
SCNVector3(pipes.position.x +
0.0065,pipes.position.y + 0.07 ,pipes.position.z
        + 0.0323)

sceneView.scene.rootNode.addChildNode(rainNod
e)
```

```
        case2 = sceneView.scene.rootNode.childNode(withName: "chimney2", recursively: false)!

        case2.position = SCNVector3(position.x + 0.0085, position.y - 0.002, position.z)
        case2.eulerAngles = newRotation

        case2.name = "Reactor"

        case2.scale = SCNVector3(0.0001, 0.0001, 0.0001)

case2.geometry?.firstMaterial?.metalness.contents = 1

case2.geometry?.firstMaterial?.roughness.contents = 0.1

        case2.geometry?.firstMaterial?.shininess = 50

        case2.geometry?.firstMaterial?.transparency = 1

sceneView.scene.rootNode.addChildNode(case2)

        case3 = sceneView.scene.rootNode.childNode(withName: "chimney3", recursively: false)!

        case3.position = SCNVector3(position.x, position.y - 0.002, position.z - 0.001)
        case3.eulerAngles = newRotation

        case3.name = "Air Preheater"

        case3.scale = SCNVector3(0.0001, 0.0001, 0.0001)

case3.geometry?.firstMaterial?.metalness.contents = 1

case3.geometry?.firstMaterial?.roughness.contents = 0.1

        case3.geometry?.firstMaterial?.shininess = 50

        case3.geometry?.firstMaterial?.transparency = 1

sceneView.scene.rootNode.addChildNode(case3)

        case4 = sceneView.scene.rootNode.childNode(withName: "chimney4", recursively: false)!

        case4.position = SCNVector3(position.x, position.y - 0.002, position.z + 0.0012)
        case4.eulerAngles = newRotation

        case4.name = "Air Preheater-1"

        case4.scale = SCNVector3(0.0001, 0.0001, 0.0001)

case4.geometry?.firstMaterial?.metalness.contents = 1

case4.geometry?.firstMaterial?.roughness.contents = 0.1
```

```
        case4.geometry?.firstMaterial?.shininess = 50

        case4.geometry?.firstMaterial?.transparency =
1


sceneView.scene.rootNode.addChildNode(case4)

        shell =
sceneView.scene.rootNode.childNode(withName:
"carbonDrum", recursively: false)!


        shell.position = position
        shell.eulerAngles = newRotation

        shell.name = "Shell"

        shell.scale = SCNVector3(0.0003, 0.0003,
0.0003)

shell.geometry?.firstMaterial?.metalness.contents =
1

shell.geometry?.firstMaterial?.roughness.contents =
0.1

        shell.geometry?.firstMaterial?.shininess = 50

        shell.geometry?.firstMaterial?.transparency = 1


sceneView.scene.rootNode.addChildNode(shell)

        dummyNode1.geometry =
SCNSphere(radius:0.000001)

        steamPiping =
sceneView.scene.rootNode.childNode(withName:
"sootPipes", recursively: false)!


        steamPiping.position = position
        steamPiping.eulerAngles = newRotation


        steamPiping.name = "Steam Piping"

        steamPiping.scale = SCNVector3(0.0003,
0.0003, 0.0003)

steamPiping.geometry?.firstMaterial?.metalness.con
tents = 1

steamPiping.geometry?.firstMaterial?.roughness.co
ntents = 0.1

steamPiping.geometry?.firstMaterial?.shininess =
50

steamPiping.geometry?.firstMaterial?.transparency
= 1


sceneView.scene.rootNode.addChildNode(steamPip
ing)
```

```
dummyNode1.geometry?.firstMaterial?.diffuse.cont
ents = UIImage(named: "orangTexture.jpg")
        dummyNode1.position = position
        dummyNode1.name = "dummyNode1"

sceneView.scene.rootNode.addChildNode(dummy
Node1)
}
```

6. The Past, Present and the Future



Augmented reality is a more recent technology than VR and shows an interdisciplinary application framework, in which, nowadays, education and learning seem to be the most field of research. Indeed, AR allows supporting learning, for example increasing-on content understanding and memory preservation, as well as on learning motivation.

7. CONCLUSION

Augmented reality in industrial training is surging in popularity in schools worldwide. Through augmented reality educators are able to improve learning outcomes through increased engagement and interactivity. It is clear that AR in education can turn out to be a very exciting and useful intervention that will change the education system for the next years. And, this isn't just about elementary education, rather it will also transform higher education and training systems. It is well known that for AR to be able to trick the human senses into believing that computer-generated information coexist with the real environment, very accurate position and orientation tracking is required. AR is still in infancy stage, and as such, future possible applications are infinite. Advanced research in AR includes use of head-mounted displays and virtual retinal displays for visualization purposes, and construction of controlled environments containing any number of sensors and actuators.

- A Swift and Effective Learning System
- Easy Access to Learning Materials Anytime, Anywhere
- Immersive Practical Learning
- Engage Students and Spruce Up Their Interest
- Elevated Student Engagement
- A Better Explanation of Complex and Abstract Concepts

AR is prospering as a growing trend in industry, and with further research and process-oriented approaches in manufacturing plants and units, it could expand to new heights.

Augmented reality research is very young and changing with time, but the top-10 authors in this field have made fundamentally significant contributions as pioneers in AR and taking it beyond mere technological development. The purpose of the following highlights is not to rank researchers; rather, the purpose is to identify the most active researchers in order to understand where the field is going and how they plan for it to get there.

8. REFERENCES

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