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Implementation of the Augmented Reality Based Human Interaction Robot for The Industry/Institute

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Abstract: In this paper a concept and its implementation of Augmented Reality based human interaction robot system for supporting human workers at industrial environments and for institutes is introduced. Different aspects of Augmented Reality were analyzed and evaluated with respect to industrial requirements: tracking methods, interaction devices, accuracy, cost etc. This proposed method supported to the embedded solution with the help of image processing and augmented reality where real life interaction is possible. Quality is busted by using simultaneously taking frame and applying image processing and AR algorithm for that frame and gets result as the quality of the AR process.

Keywords: Augmented Reality(AR).

I. INTRODUCTION

Augmented Reality (AR) could be a growing and promising area in virtual reality (VR) analysis. an AR system generates a composite view for the user by combining the real scene viewed by the user and a virtual scene generated by a computer. Virtual data is embedded into the real world, thereby augmenting the real scene with further information [1]. augmented Reality (AR) is to merge the real world and virtual environment. Virtual object added into real world so as to enhance or to add a lot of information from the object. AR could be a computer-generated data integration with the real world, that among others is done with computer graphics rendering on a real-time footage.[7] AR adds info and desiring to a real object or place. unlike virtual reality, augmented reality does not create a simulated reality. Instead, it takes a real object or space and uses technologies to add contextual data to deepen our understanding of it. AR finds applications in various fields such as education, medical, mobile phones, defense etc. In education it helps students expose to an experiential, explorative, and authentic model of learning early in their higher education careers, augmented reality may help shift students from passive to active learning modes and therefore become a lot of successful learners.

II. RELETED WORK

First steps towards augmented Reality primarily based human robot interaction for industrial robots were taken. The analysis of the fundamental requirements for an AR enabled robot interaction device made it clear that today's usually used visualization devices for augmentedReality, particularly Head Mounted Displays, are fragile devices with several cables and electronics that almost all likely wouldn't long survive industrial operating environments.[1] The planned algorithm has been successfully implemented on a custom designed and fabricated robotic platform. Within the presence of angular perturbations experienced by the detection tag and increasing distance between the tag and the camera, the results were still satisfactory.[2] in the conferred use case a human worker has to build a simple toy car. While performing this task, he is monitored by the assistant system. As shortly as he stops operating, the system is ready to react on his behavior. Supported the activity analysis, it's possible to give facilitate instructions.[3] Augmented Reality (AR) could be a splicing of virtual elements, mainly computer-generated graphics, onto the real world so each may be perceived by the users at the same time. when applied in robot programming, AR offers the possibility to visualize the motions and trajectories of a robot overlaid on the real environment, enabling the users to intuitively interact with the spatial data.[4] To simplify the human robot interaction experience and allow humans with little or no experience with robot technology to intuitivelyoperate and communicate with a diverse range of complicated robot technology.[9] To explore the impact of augmented reality on robot teaching, as a first step we've chosen a Sphero robot control scenario and conducted a within-subject user study with 19 professional industrial robot programmers, together with novices and experts. They targeted on the perceived workload of industrial robot programmers and their task completion time once using a tablet-based AR approach with visualization of task-based information for controlling a robot.[12]

III. SYSTEM MODEL

In presented system we are going develop the human interacting robot that guide the interacting human to specific co-ordinates say like the Director Office, Educational faculty

lab. This robot also can give the information in voice format to user about same and other information like the arrangement of the function, machine status and give the presentation.

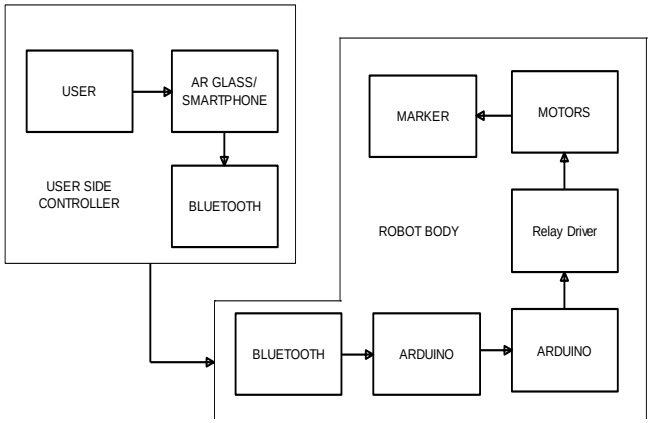

Fig1. Block diagram of system.

The above block diagram shows how this sorting system works and how data and interrupt controls passes though system**.**

Fig2.

A. System Functionality

In this system, android mobile system as the viewing the augmented reality with eyes and android is connected to Arduino and Arduino act as the controller part of the robot and interaction system through voice. Arduino controls the motor through motor driver. When user sees the marker on the robot 3D model of robot initialize and then when we can interact with that through the voice command, when the proper voice command is given robot actuate his augmented part/speaker or robotic wheel and complete the command execution.

B. Input/Output Section

Robot Body: Robot body is essential component for the proposed project that adds the physical movement to the AR model in physical space. And AR marker which has 3D robot model which is attached to the marker we have places in our database. Robot body has 2 motor to allow body to move in 2D plane (right, left, front, backwardE.g.) this action can be controlled using voice or touch input. Here we have used Arduino supported by DC geared motor for perform the robot movement process.

C. Image Processing Section

HUD GUI Update Processing: After detecting update in the robot movement after each update result Arduino update the whole GUI window with respect to the System estimation.

GPIO Interrupt: After detecting which grade is selected the whole mechanical structure motor is controlled through the GPIO pin. In which case, it has the 40 pin GPIO Connections to control the Real Physical Motor Attached to the robot movement system.

IV. METHODOLOGY AND IMPLEMENTATION

Model of this project will be box shaped in which all hardware component are fitted carefully such that we gate high efficient working system. This box does not allow enter the external interference inside the box and marker placed on the top of the box. All the system work on the Battery Supply and Bluetooth signal which flows through system as command to robot. Flow chart of proposed system is shown in following figure.

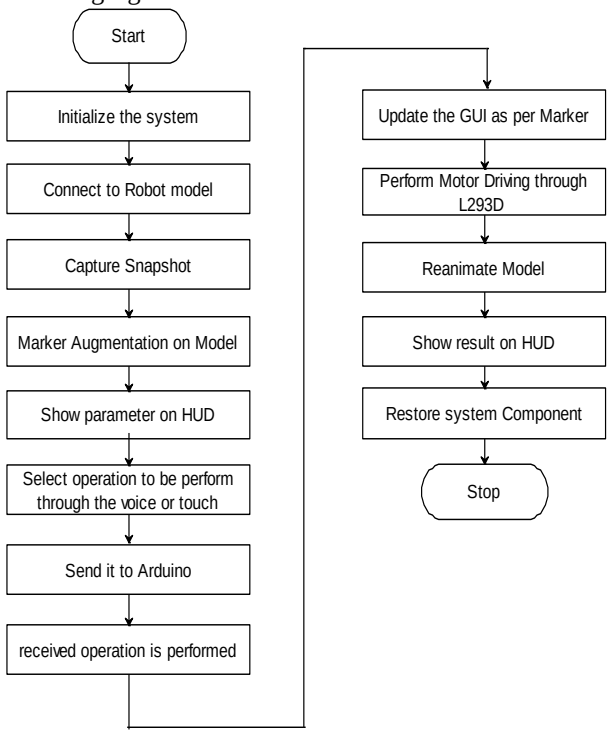

Fig3. Flow chart of the process.

A. System Initialization

At this step, the entire component will be start. System will check the entire component for its status. If any component fails then system correct that error or notify the user about component failure. If there is no such failure then system goes online and starts working. Operation like following takes place in this stage

- Robot driving motor are in halt state.
- GUI application on HUD

- Camera takes the number of snapshot per second and send it to system
- Robotic Mechanism at the initial Position.

B. Capture Frame

At this stage Camera Takes the Snapshot of the Model with the smart phone camera which moving with the HUD. Camera takes the Snapshot and transmit it to the System To process using smartphone with unity 3D built Software.

C. Perform marker augmentation

Image we got from the last stage does not have that many details in the captured frame so we have to perform preprocessing operation on the captured frame so that we get some details about the model and user's fingerprint or the voice input. At this stage we perform following operation on the captured frame, to get detail output

- detecting the fingerprint and their location
- if the voice command is given detect it
- model Augmenting

D. Detect touch or voice command

After previous step detail in the frame enhance to the greater extent, no we have to find out if how touch is detected on the real time are detected on frame. For that purpose we use the High Pass Filtering Method and finger touch detection. It is technique to find out there is touch in the frame or not. Same above process is done for voice detection and recognition if the voice input is given.

E. After the touch/voice detection

After previous stage if there is no sign of touch/voice detection then camera initialize itself for new frame take the new snapshot from the Model Environment, If We get the sign of touch/voice detection then we proceed to next Stage of finding command code which is detected and send its cammand code to Arduino.

F. Perform color analysis

After getting the Result of detected command code we have display information about which command is selected for execution, then this interrupt should be generated through this swapping of data to the Arduino, so Arduino get aware of which mode of operation it has to generate though the execution process

G. Initialize robotic Mechanism using the Arduino IDE.

after executing interrupt service routine program as per the user input at HUD side System should give the satisfied output at the robot Section and So that the interaction of USER should be real time or say fast. It gives the highest interacting System using above proposed Methodology.

V. RESULTS AND DISCUSSION

This is augmented robot integrate on electromechanical robot chassis that is controlled using Arduino Uno and which communicated through the Bluetooth module this model can be seen using VR Box and can be interact though touch or speech integration. This implementation is done using unity 3D and Arduino IDE. This causes realistic modeling of robot which is not actually present in real time and save the budget cost of development and space.

Fig4.

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