Digital Collaborative Mural Painting

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ABSTRACT

Mural painting for social causes or as a group/community activity is a growing art. In this, many people get together to paint a picture over a wall. Normally, an artist paints the outline of a picture and the people just fill in the colours. This activity is called a collaborative mural painting.

1 INTRODUCTION

To achieve digitization in the mural painting experience, an augmented spray can was designed. The aim was to create a collaborative mural painting experience for multiple people using spray cans, where the painting medium (wall) and the spray cans will be marked with AR markers to help map the position of the painting, cans and people. Here multiple cameras will point at the wall where people paint, and pick up on the positions of the cans with respect to the wall and the computer coordinates the positions of the cans (people/painters) and directs them where to/not to spray-paint.

2 BACKGROUND AND RELATED WORK

The main background is that of actual physical spray painting. The same idea was used except that instead of an artist drawing the outline, we let the users paint by themselves and give them continuous feedback about it.

3 SYSTEM DESCRIPTION

First iteration:

The first spray can design involved the idea that one single spray can will have multiple colours and the colour will be sprayed according to the area detected by the camera and the picture mapped to it.
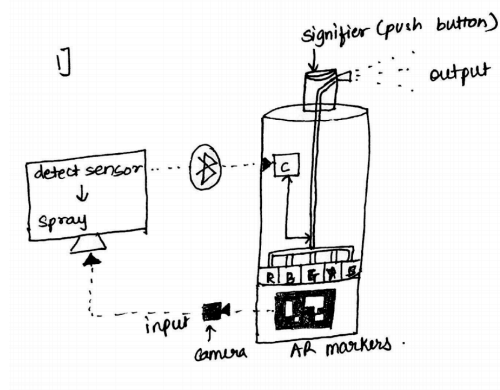

Figure 1: Multiple colours in one spray can

But as this involved having specialized spray cans, this was not feasible. The next design involved use of specialzed Bar Code in the can holder which would detect the colour of the spray can automatically.
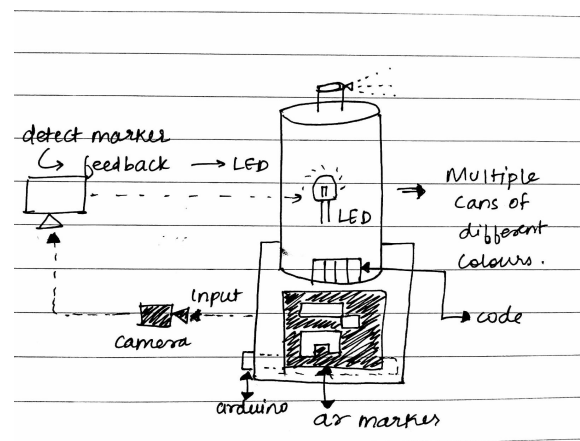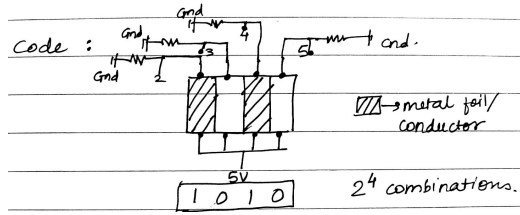

Figure 2: Final Design

Figure 3: Bar Code design for colour detection

This barcode would involve 4 metal/plastic strips and wired connections which would detect the number and position of metal strips. Thus a total 2^4 combinations would exist.

Here, the AR markers would give the entire positioning of the system, wall, markers etc. Now, if the user is painting at the wrong place, or holding the can in a wrong position, the LED present on the can would start blinking red. This would be one of the feedbacks to the user.

Hardware

Arduino is used for sending feedback to the user and also for detecting the colour of the Spray can. Arduino is sent input by using serial communication after detecting the markers and positions. The other hardware is cameras for detecting markers on the can holder and the wall.

Fabrication

FreeCad was used for designing the can holder. It has a circular pocket on top to hold the can and a screw and nut to fix it in place. There is a rectangular pocket to hold the Arduino. The design is very simple and compact.

Figure 4: 3D printed Can holder

Software

OpenCV (C++) was used to process the ARUCO Markers. Arduino was used for giving the feedback to the user. The Arduino was coded to detect the colour of the can and output it as well as to blink if the positioning of the can was wrong.

Planning to develop an application where the user uploads the picture to be painted which is the projected/mapped to the wall using OpenCV.

4 EVALUATIONS

Figure 5: Markers being detected on the wall

USER STUDY

As the prototype is a part of a larger project, it cannot be individually tested on users. One will need an actual spray can and an actual painting to properly study user behavior. Thus the wizard of Oz test was done where opinions were asked about the idea. As a response to how likely are people to use this instead of normal spray can painting (on a small group), it was 10/15. The reasons for not using were: bulky holder(3), divided attention to feedback and painting(1), already an artist(1)

5 CONCLUSIONS

Spray can is ready to use. From the user study, some new ideas came into picture like division of attention.

Future Work:

In the future we can devise some other methods like projecting the entire picture on the wall. Also, making the holder more compact is another important task.