CS-308-2014 Final Report

NT³

Non Touch To Touch

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1. Introduction

- Name of our project is NT^3(Non-touch to touch)
- Touch screen are very convenient and easy to use but are very costly. Since there are many cheap non-touch screens in the market, we want to use some device to convert such screens to touch
- We can use our device on any non-touch screen such as a TV monitor, Laptop screen, Projector screen etc. and use it like a touch screen

2. Problem Statement

- Our aim is to detect and analyze our finger movements, touches on the screen and do the necessary functions

3. Requirements

3.1 Functional Requirements

- Cameras which detect the fingertips using image processing algorithms

3.2 Non-Functional Requirements

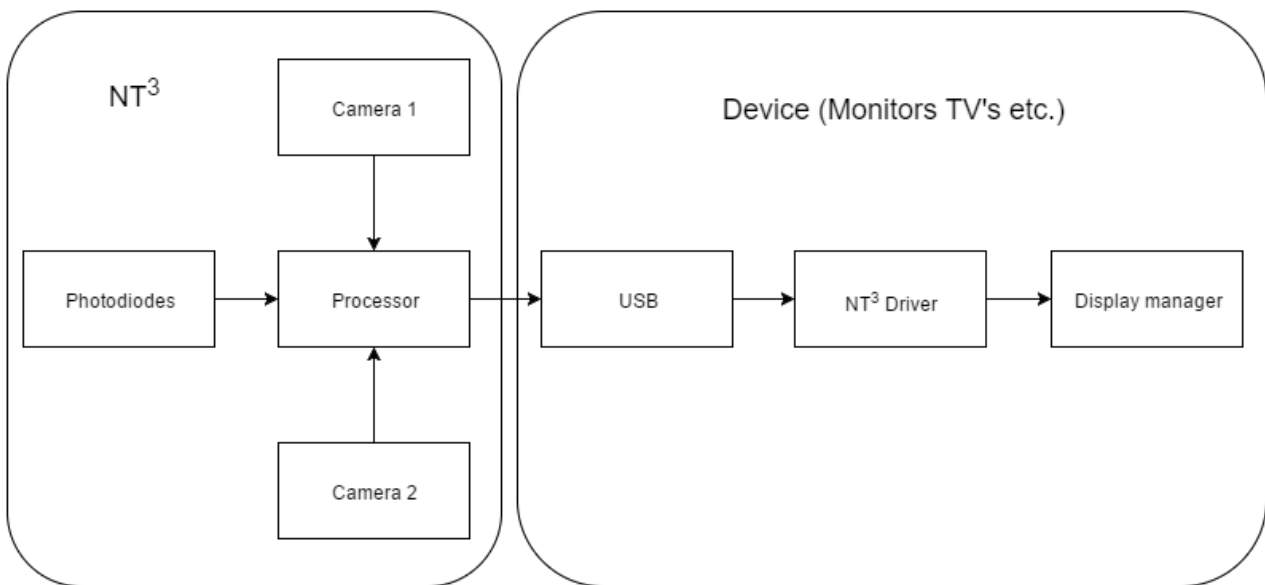- Cameras should be pointing the screen which we wanted to convert to touch

3.3 Harwdare Requirements

- 2 usb camera with stands
- A processor such as R-pi

3.4 Software Requirements

- OpenCV-C++
- Xdotool to control the mouse movements, clicks

4. System Design

- We use 2 cameras to detect our hands on the screen using finger detection algorithms and map them
- We take photos of the laptop screens from both the laptops and map them to a plane rectangular surface
- We take the finger tip from both the photos and map them on this rectangular surface and check the position of the finger on this surface
- Now if the both positions are very close we detect it as a click
- If they are in not too close and not too far then it is a hover
- If they are far apart then there is no movement of the mouse
- During this entire phase the cameras should not be moved

5. Working of the System and Test results

- We weren't able to acheive the goals mentioned in the project statement.
- In our version of project there will be white screen with black border which will be used as our touch pad and a stylus which will do the functions of a finger.
- The two camera's will be faced towards the screen such that the whole screen will be in the camera's view.
- we will set up the cameras until they were able to detect the screen.
- In our toned down version, the stylus pointer should be in red color. Our cameras can only detect red, but actually they should be able to detect fingers.
- Move the stylus over the screen while touching it and you can observe that mouse pointer of the laptop screen will move along with the stylus.

6. Discussion of System

a) What all components of your project worked as per plan?

- We are able to detect the fingertip and move the mouse as per plan and detect the mouse touch and movement

b) What we added more than discussed in SRS?
- We were unable to add anything else other than what we have discussed in SRS

c) Changes made in plan from SRS:
- We were unable to make it work on the screen itself, so we made it work on a plane rectangular surface with white background and red colour as fingertip
- The main problem was detecting fingertip in the background noise from the screen since there are no existing algorithms which can detect fingertip accurately when it is on the screen which has noise

7. Future Work

- To detect the screen take a screen shot of the screen and use object detection on the image of the camera
- To detect the finger, find the differences between the screen shot and projected image of the camera.

8. Conclusions

- We hope this is really interesting idea and can save lot of money by not buying touch screens and convert non-touch to touch screens

9. References

- None