Mega TabLight

Specification Document

Version : 4

**<**20.11.15**>**

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Document revision history:

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Editor | Descriptions of Changes | Notes |
| 29.10.15 | Michal & Elyasaf | Starting… | - |
| 01.11.15 | Michal & Elyasaf | Working | - |
| 12.11.15 | Michal & Elyasaf | Conclusion | Not finished yet |
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**1. Introduction**

* 1. General explanation about the product
* **Product name:** Mega TabLight
* **General explanation about what the product is:**The product will be a big board that will be suit to be a cover to a table or a wall.  
  Our Mega TabLight will offer confident and quick control to the user to simple and fundamental things like a keyboard, mouse, media control and games.  
    
  Mega TabLight won't be able to display pictures or movies in full resolution, but simple things like keys and buttons.  
    
  To make it easy and comfort to use, Mega TabLight will be able to respond to simple touch (as in a smartphone) and to objects above it.
* **Description of the product's main purposes and benefits:**
* **Purposes:**Comfort control on the PC, entertainment and room design with lights.
* **Benefits:**Comfort and simple workspace environment, OS wide support, can work with or without host PC.

1.2 Definitions

**The definitions, ideas, concepts and acronym we will use later in this document**

* IR receivers – Photodiodes that will capture infrared light.
* IR emitter – IR LED, transmit the infrared light that the receiver will capture.
* Visible LED – LED strips, each LED in this strip will be able to show any color and could be address individually.
* Raspberry Pi 2 – the Raspberry Pi 2 will be the computer of the product, it will contain all the code, receive the data from the sensors and will make the output image.
* ADC – analog to digital converter. It will convert the data from the IR receivers (sensors) from analog data to digital data the Raspberry Pi will be able to read it.

1.3 References

**Places or resources we the ideas and concepts from:**

* **LEDs screen:** <https://www.youtube.com/watch?v=sbdvrfwr6Sg>
* **Control using IR emitter – receivers concept:** <https://www.youtube.com/watch?v=OLfF4b49MLs>

1. **General description**
   1. Functionality:

* **First priority :**
* Controlling Control (media, mouse, keyboard)
* Cursor (touch feedback) – the user will use it to notice where he touches
* Identifying objects and mark around them.
* Lights (wallpapers) and painting.
* Displaying the input data (picture) for debugging.
* **Second priority :**
* Games – Hockey (must have! ☺), Snake, Pacman, Sudoku and Mazes.
* Multitasking – part the board to different parts so we could do things in parallel.  
  (for example – playing Sudoku while controlling PC media.)

* 1. Users features :
* **Users types :**

Normal user : The user will use all the regular functions available.  
Developer : The developer will be able add and develop new functions.

* 1. Main constraint :
* **Physical limitations :** Our product shouldn't be too thick, and should be strong enough to deal with heavy weight.
* **Software limitations :** It should be easy and simple to use. Should connect to popular devices and OS, like Windows, Linux and Android.
* **Hardware limitations :** The product should function and respond quick enough, should have only one connect for power (simple and easy – plug and play).

2.4 Presumptions and dependents :

* Must be based on IR because all the following based on it.
* Must have LEDs to create screen to give the user the output.

**2.5** Coverage of the market situation today : **Similar products :**

* **coffee table**

- <https://www.youtube.com/watch?v=OLfF4b49MLs>

Intended to specific purpose and can't connect to other devices (not universal   
 device).  
 We took the hardware concept from it.

* **Microsoft Surface**

<https://www.youtube.com/watch?v=hMW7pd41Cz0>

Works like big tablet and not like an interactive table and assistance.  
 It is expensive and stationary.  
 It is smart – we took the smart ideas from it.

1. **Detailed requirements**

3.1 Functionality requirements

* **Turn on –** The user will plug in the Mega TabLight and push the button to turn it on.  
  The Mega TabLight will turn on and loading screen will show up, and then I will ask to enter its password.  
  The password can be set up in two patterns : clicks in specific areas or pull lines between points (like in a real smartphone).  
  If the password is incorrect ERROR massage will show up in red color and the user will be asked to try it again.  
  If the password is correct, the device will be ready to use and home page will show up.
* **General:**
* The Mega TabLight will react like touch screen or PC mouse.  
  From great distance touches feedback will be shown (curser), where the object (or hand) will be.  
  The curser's size will be 3X3 LEDs, while the outside frame will turn on and the center will turn of.  
  Closer to the board will be defined as click (can be changed).
* Format of options presentation - option (like in the menu) will be shown as squares.  
  Minimal size will be : 9.6 cm (6 LEDs).   
  Maximum size will calcu
* **Menu :**To access the menu, the user will press the menu's symbol.
* **Menu's symbol –** the menu's symbol will be placed in one of the corners (default – down left), and will be accessible all the time.  
   The symbol will be rectangle of **3X6** LEDs with the letter 'M' in it.

In the menu will be buttons that will lead to the categories menus for the use : **Settings, Light, Games** and **Computer Control**.  
The Menu frame will be in colorful and changing lights.  
Each one of the buttons we mentioned before will be a rectangle (see format of options presentations above).  
  
In each of the functions we mentioned above will be the first letter in the function's name:

* **S –** settings.
* L – light.
* G – games.
* C – computer control.
* **Light [L] :**

Two options will be shown as we already described in format of options presentations (see above) :

* WallPapers **[W]** :  
  This option will lead to another page where list of files will be shown, the user will be able to choose file to show (picture, wallpaper).  
  In this list will be files from the gallery and files that the user paint.
* Live WallPapers **[L]** :   
  As in the wallpapers page, a list of file to show will present, but the files here will be live wallpapers, something like short movie or gif (like the dancing man that Michal want… :)).  
    
  When the user will enter WallPapers or Live WallPapers a list of the available file will be shown. In each page will be shown 5 files names (because of the low resolution). Every letter in the names will take **5X4** LEDs to present and in the side of the page will be button to browse to the next page. The button will be rectangle on **7X7** LEDs (12.5 cm) and triangle of **3X3X3** in it.

After taping the chosen file the picture will be shown.

* **Settings [S] :**

In this menu will be 4 options :

* Sensitivity **[S]** :  
  Two lines will be shown (length of 1m = 60 LEDs), above each one of them in the middle will be its meaning and on the right will be number in percentage of its current status. On each of the lines will be rectangle (**4X4** LEDs) that will indicate the status. To change the status, the user will tap and drag the rectangle to the wanted position.  
  The line's color will be change according to its status (from red to green).  
    
  **Click indicator :** Minimum value – touch distance (0).  
   Maximum value – 25cm.

**Sense indicator (curser):** Minimum value – the maximum of the click.  
 Maximum value – 100cm.

* Change Password **[P]** :   
  The screen off the password will be shown and the user will need to insert his new password twice.
* Curser (Touches Feedback) **[C]** :   
  Two rectangle buttons (**19X9**) will be shown, in one will be the word "YES", and "NO" in the other. The chosen one will turn on ( yes – green light, no – red light).  
  YES will turn on the curser, NO will turn it off.
  + Brightness **[B]** :   
    A line indicator, like we describe in Sensitivity (see above), will be shown.  
    Its brightness will be change according to its status and the user will be able to choose its color from the chart of colors bellow.

**After changing the settings, confirm massage will be shows with OK button (rectangle of 14X9), and then the user will be returned to the menu.**

* **Computer Control [C] :**

Mouse **[square symbol of computer mouse] -**The mouse page will look like a net.  
On the right side will be button with the letter 'R', and on the left side will be button with the letter 'L'.  
This mouse will control the computer mouse.  
To move the mouse, the user will need to move his hand above the net (just like touchpad in laptop), and to click there will be the right and the left buttons.

* Keyboard **[K] -**  
  The keyboard will look like a laptop keyboard, there will be squares of **7X7**, in the squares will bet the letter they represent.
* Media **[M] -**

On the screen will be hexagonal (**9X9**), in each one will be another button (play, stop, next, prev, vol up, vol down…).

* Shortcuts **[glasses..?] -**Like in the media – hexagonal, with shortcuts buttons.
* Games **[G]** :
* Hockey **[H] -**

Hockey game as we all know.  
There will be two players, for each one of them will be circle (**8X8**) that they can control it by pressing and moving it. The players need to move their circles toward the disc (**4X4**) and to push it to his opponent gate.  
The disk will be colored in the color of the last player who touched it.  
After someone will make a point, a table of the winning and losses will be shown.

* Paint **[P] -**Just like in the paint of Windows, the user will be able to paint with his hand on the screen. Everywhere his hand will be, there will left a color for his choice.  
  The user will be able to change the color he paint with, and save his paint to the Wallpapers (save button **22X7** with the save word).

3.2 Requirements of external interfaces

* **User interface :**

**Normal user –** computer or another device (smartphone…) that he will be able to   
 connect to the product.  
**Developer –** he will need to know about programing (daaaa), computer, and the API   
 of our system.

* **Hardware interfaces :**USB port (or Bluetooth).
* **Software interfaces :**openCV.[**https://learn.adafruit.com/neopixels-on-raspberry-pi/overview**](https://learn.adafruit.com/neopixels-on-raspberry-pi/overview)
* **LEDs library**
* **Communication interfaces :**USB and Bluetooth.

3.3 Not functional requirements :

* **Performance :**Our Mega TabLight will have to react fast enough.
* **Reliability :**Will have to be strong enough so we will be able to put things on it like a desk.
* **Availability :**We will be able to turn it on with no problems and limits.
* **Security :**Encryption of the password.  
  Securing the database.
* **Maintainability :**We will be able to fix things in the hardware simply and quickly.
* **Portability :**Because it is a big board it should be able to break apart.  
  We should be able to use it in big, middle and small modes.

3.4 Database requirements :

* **Saved data :** passwords, files, records…
* **Format :** Don't know, don't really care.
* **Storage capability :** We have enough…
* **Security level :** Some of it will be encrypted… not important…

3.5 Other requirements and things

