

Google Material Design – The User Interface Development Notion

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Abstract— The multidisciplinary nature of User Experience (UX) on digital platforms has led to expansions in perspectives on User Experience (UX), each approaching the concept of UX from a different viewpoint. There is no one idea that suits all perspectives. [1] A conceptual design philosophy that confers the creation of a universal interface for the digital platforms and outlines how apps should look and work on different interfaces on digital platforms that remains spontaneous to users of all age, gender, quiescent knowledge is called material design. This paper focuses on the concept of Material Design developed by Google Inc. to felicitate a uniform interface for all its services provided on the digital platforms.

Key words: User Experience, User Interface, Google Material Design

I. INTRODUCTION

As computers grow more powerful, less expensive, and more widely available, people expect them not only to perform obvious computational tasks, but also to feel lithe in operating with the advanced platforms. This shift is causing some user-interface (UI) researchers to rethink the traditional reliance on methods that are more machine-oriented and to look at ways to support properties like ambiguity, creativity, and informal communication. The idea is to bend computers to people's way of interacting, not the other way around. [2] A visual language for the users that synthesizes the classic principles of good design with the innovation and possibility of technology and science. This is material design. [3]

Material Design is a language – it is a conversation between users and the interface, the way users communicate naturally with the interface. Material design makes use of shadows, elevation, motion, color, balance, etc. w.r.t different materials on the interface to make it intuitive and attractive both to the users. Material Design makes more liberal use of grid-based layouts, responsive animations and transitions, padding, and depth effects such as lighting and shadows. [4]

Material Design is how the details combine to create purposeful brand experience, where interface is the brand and material design is the price. Material Design is the need of the hour for any web development process. Many times websites/applications lack in creating a powerful impact in user experience and fail to impress the market. Material Design is one such concept that focuses on how an interface can transform from a sheet of paper to meaningful motioned interface.

Design is never done. It is an endless process to perfection for the ease of user experience that inculcates a lot-starting from analyzing the materials of what interface can be made up of, experimenting with different techniques, sculpting the ideas, characterization of graphics and finally turning the ideas into reality.

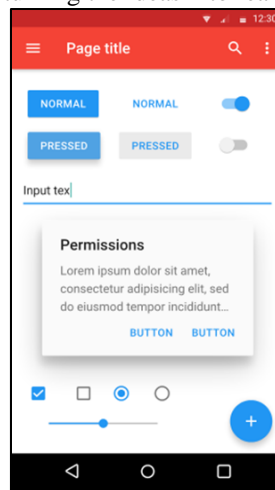


Fig. 1: The use of different materials in creating an interface

A. What does the market say?

The web design trends are all heavily focused on creating a brilliant user experience. Material design is no exception. The ultimate goal of material design is to immerse users by creating a natural-feeling interface that's free of distractions. So, websites that are not user-friendly will become obsolete as websites with great material design will become increasingly popular among the users. [5]

User experience seeks to promote rich, engaging interactions between users and systems. In order to unfold this experience, the user must be motivated to initiate an interaction with the technology. Henceforth, specific variables of user

engagement in the interface environment viz. materials are necessary to provide considerations for the inclusion of different types of motivation into models of engaging user experiences. [6]

Thus, Material Design introspects various pitches - such as animation, style, layout, gives guidance on patterns, components and usability.

According to Google, “Material has certain immutable characteristics and inherent behaviors. Understanding these qualities of material will help you manipulate material in a way that’s consistent with the vision of material design”. Henceforth, Google has divided the concept of Material Design into sub topics as:

- Material Design
- Motion – Movement, Choreography, Duration
- Style – Typography, Writing
- Layout – Responsive UI
- Components – Buttons, Cards, Dialog Box, Menus, Grid List, Pickers, Expansion Panel
- Patterns – Fingerprint Gestures, Navigation, Scrolling, Data Formats
- Growth And Communication – On Boarding, Gesture Command
- Usability – Accessibility, Bi-directionality
- Platforms – Adaption To Platforms (Android, IOS)
- Resources – Fonts, Icons, Color Palettes

Here, the topic of Material Design in its core is reviewed.

II. MATERIAL DESIGN GOALS

- To create a visual language that marks the use of conventional design principles in blend with innovation, technology and science.
- To develop a system that allows for a unified experience to the users across different platforms and device sizes.

Material Design focuses on how an idea of building up an interface can turn to the best of user experience with materials needed for creating an interface, their graphics and the motion of those materials when the user intends to have a flow in the interface. This review paper focuses on the concepts of material design – about how an interface can be build up to the expectations of the user.

III. PRINCIPLES

The principles of Material Design cover mainly three major concepts:

- Material as a metaphor
- Graphics – Bold and Intentional
- Meaningful Motion

The above three combined form what is called affordance. Affordance of any interface describes the way it will perform on user demands.

A. *Material is the metaphor*

A material metaphor is the unifying theory of a rationalized space and a system of motion. “The material is grounded in tactile reality, inspired by the study of pen and paper, yet technologically advanced and open to imagination”, as Google says. Surfaces and edges of the material provide visual cues that are grounded in reality. The use of familiar tangible attributes helps users quickly understand affordances. Yet the flexibility of the material creates new affordances that supersede those in the physical world. Briefly, material metaphor relates to that every element is made up of flexible and tangible piece of material that has a definite shape, size, depth and other such dimensions.

B. *Bold, Graphics, Intentional*

The foundational element of material design is graphical representation of materials used that may include typography, grids, space, scale, color, and use of imagery or visual treatments. These elements do far more than please the eye. They create hierarchy, meaning, and focus. Deliberate color choices, edge-to-edge imagery, large-scale typography, and intentional white space create bold and graphic interfaces that immerse the user in the experience intended for ease.

C. *Motion Provides Meaning*

Motion in material design can be defined as how bits of material move on one click of the user. Instead of animations that are artificial and mechanical, motion in material design appears fluid and natural. Motion respects and reinforces the user as the prime mover. Primary user actions are inflection points that initiate motion, transforming the whole design in a motion picture. All those actions take place in a single environment i.e. on the interface. Objects are presented to the user without breaking the continuity of experience even as they transform and reorganize. Motion is meaningful and appropriate, serving to focus attention and maintain continuity. Transitions of materials are efficient yet coherent.

IV. ENVIRONMENT

Material design is a three-dimensional environment containing light, material, and cast shadows.

- All material objects have x, y, and z dimensions.

- All material objects have a single z-axis position.
- Key lights create directional shadows, and ambient light creates soft shadows.
Shadows are created by the elevation difference between overlapping material. [6]

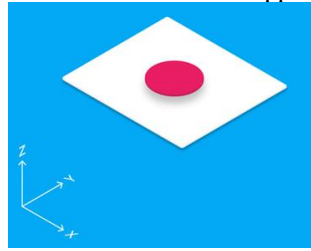


Fig. 2: Shadows depict the relative elevation between material elements [7]

V. MATERIAL PROPERTIES

Understanding material properties enables designers to manipulate the design of interface with a vision of material design. The physical properties of materials include x-y-z axis of the material that defines the movement of material in the environment on user demands. Shadows can never be approximated by coloring materials. The contents of material transforming material properties deal with shadows, placement of materials in the environment, etc. Contents never add to the thickness of material i.e. the thickness of materials remain constant. Content can behave independent of the material, but is limited within the bounds of the material.

A. Nature of Materials

- Material can change shape
- Material grows and shrinks only along its plane (x-y axis)
- Z axis motion typically depicts user interaction with the material
- Material can move along any axis
- Materials never bends or folds
- Materials can be spontaneously created / destroyed in the environment
- Material can split and become whole again

Previously, before the introduction of material design to the world in 2014, the interface of any website used to be conservative to the demands of users. The application environments were dimensionless. While after the knowledge of what material design is, various User Experience /User Interface (UX/UI) experts are now hired in the world of graphics specifically to concentrate on the user experience, the way user expects to communicate with digital environment. User Interface includes working on constructing a basic application interface, adding graphics to that, enforcing movement between different objects in the interface and imparting an ease to the users and Material Design is one such concept of the User Experience. No restrictions should stop the users from a comfortable interaction with the application interface.

VI. CONCLUSION

The concept of Material Design developed by Google Inc. is a path-changing innovation which has incorporated an ease and comfort, also providing the user with the luxury to let the device interface decide the paramount for the user. Material Design emphasizes on the conceptual design viewpoint that sketches how apps should appear and work on different devices. It takes account of areas such as animation, style, layout and usability. At this point of technological advancements, only a few apps have taken the initiative to accept the norms of Google's Material Design Concept. Rather, every application available on the digital platform must go with the Material Design Concept for a flexible use of the interface developed and running with the same old conventions over the years. Google and some second party applications such as YouTube, Tumblr, etc. have associated to work with the Material Design Concept and are making their user base the most powerful.

In my view, Material Design Concept developed by Google can possibly be accepted worldwide by every interface developer to reduce the muddles for the interfaces to run various environments on a single device. Rather, design a single interface platform common to all applications running on mobile devices for the ease to users as well as to the environment. The material design changed the UI and UX of android operating system. Customization has reached a new level and much more responsive. Lesser use of power and battery and provides much more graphic option and customization.

REFERENCES

- [1] Demarcating User Experience: Bringing clarity to the concept of user experience, February 11, 2011
- [2] <https://material.io/guidelines/material-design/introduction.html>
- [3] Sketching Interfaces: Toward More Human Interface Design 0018-9162/01 © 2001 IEEE
- [4] https://en.wikipedia.org/wiki/Material_Design
- [5] Najjar, L. J.: Designing e-commerce user interfaces. Handbook of human factors in Web design, pp. 514–527 (2005)
- [6] <https://material.io/guidelines/material-design/elevation-shadows.html>
- [7] <https://material.io/guidelines/material-design/material-properties.html#material-properties-physical-properties>