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Responsive Web Development

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Abstract-This paper is based on Responsive web development which is aimed to provide optimal viewing experience. A website designed with Responsive Web Development adapts the layout to the user by using fluid, proportion-based grids, flexible images, and CSS3 media queries an extension of the media rule. The layout changes based on the size and capabilities of the device. Responsive web design (RWD) is a web design approach basically aimed at crafting sites to provide an optimal viewing experience such as easy reading and navigation with a minimum of resizing, panning, and scrolling—across a wide range of devices from mobile phones to desktop computer monitors. It can be said it's worth putting a little extra consideration into the people who are using different devices. In this paper we will also discuss about twitter bootstrap which is an important toolkit for responsive web development.

Keywords- Responsive, Development, layout, extension, navigation, bootstrap.

I. INTRODUCTION

A. Goals

Our main goal is to survey or present general view of absolutely up-to-date i.e., current stage of Responsive Web Designing with the help of this paper. There is a multitude of different screen sizes across phones, tablets, desktops, game consoles, even TVs. Screen sizes will always be changing, so it's important that the site that developer make can adapt to any screen size, today or in the future.

B. Definition

Responsive web development sounds complex, but it's quite simple in this modern world. What it means is that website is designed in such a way that it displays properly on all major types of devices, and is fairly easy to use on each. Responsive web design, originally responds to the needs of the users and the devices they are using. The layout changes based on the size and capabilities of the device. For example, on a phone, users would see content shown in a single column view; a tablet might show the same content in two columns. It is aimed to provide optimal viewing experience.

C. Motivations

Responsive web development is an interesting topic because it is related with web and devices and they are the heart of technical world. It is very important for the developer because it is worth putting a little extra effort for making his/her website compatible with any device in this modern environment. Creating a responsive website isn't a complete mobile strategy, and won't answer every brief, especially if a developer is building a website for good purpose such as business, college etc. Then he/she should consider it as a very serious option.

II. IMPORTANCE OF RESPONSIVE WEB DEVELOPMENT

A. Easy for Google to crawl, index and organise content

Google states that responsive web design is its recommended mobile configuration. This is because responsive design sites have one URL regardless of device, which makes it easier and more efficient for Google to crawl, index, and organize content. Google prefers responsive web design because content on one website and one URL is much easier for users to share and interact. Google is now placing on user-experience as a ranking factor, this is essential to take into account with regards to SEO.

B. Compatible with many devices

A responsive website can provide a great user-experience across many devices and screen sizes. This is an important characteristic, since it is impossible to anticipate all the devices and screen sizes searchers will use to access any website. A site that works well regardless of these variables will provide a better and more consistent user-experience than a separate website that is designed for a specific device and screen size.

C. Easier to Manage

A separate desktop and mobile site requires separate SEO campaigns. Managing one site and one SEO campaign is far easier than managing two sites and two SEO campaigns and this is a key advantage of responsive website over a separate mobile site.

D. Same code base to load on all platforms.

This makes development simpler and changes easier to incorporate. Writing separate codes for each platform would make the code difficult to maintain.

E. Better SEO Benefits

Loading the same website with the same URL linking to the same HTML, with only the CSS changing for each device, derive better SEO results. The same URL will show up on Google searches on all platforms whether it is a tablet, mobile phone or a desktop. If there were more than one URLs for different platforms, it might confuse and irk the users since they might end up clicking on the URL meant for a smart phone, on a desktop device. In fact, even Google recommends RWD for websites for a better Google ranking.

F. Performance and Speed

Mobile internet is almost always not as fast as a wired connection and therefore the website loading times on hand held devices might continue to be lower. This is also accentuated by the fact that the a large amount of code still need to be sent to the device before the application can recognize it and use the code required for that device alone. These factors can greatly bring down the loading speed and thus not give as good a user experience and Responsive web designing is supposed to give.

G. No redirects

The fact that you only have one website for all devices also means that you have the same page URLs to deliver content to all your users. There is no need to worry about redirects or incompatibilities between different devices. This can be pretty much useful for promoting links.

III. WORKING

Responsive web development is done by HTML5 coding, CSS and JavaScript coding. Though Responsive Web Development can be done through many tools. But most efficient used tool for responsive web development is Bootstrap.
Bootstrap is a free toolkit for creating websites and web applications. It contains HTML and CSS-based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions and was released by twitter . It was developed by Mark Otto and Jacob Thornton at Twitter as a framework to encourage consistency across internal tools. Before Bootstrap, various libraries were used for interface development, which led to inconsistencies and a high maintenance burden and were quite complicated.

A. Features of Bootstrap

Bootstrap is compatible with the latest versions of all majorly used browsers. But, it gracefully degrades when used on older browsers such as Internet Explorer 8. The layout of web pages adjusts dynamically, taking into account the characteristics of the device used (desktop, tablet, mobile phone). Starting with version 3.0, Bootstrap adopted a mobile first design philosophy, emphasizing responsive design by default. Bootstrap is open source and available on GitHub and was introduced by twitter. Developers are encouraged to participate in the project and they make own contributions to the platform. Recently, Bootstrap community members have translated Bootstrap's documentation into various languages, including Chinese, Spanish and Russian.

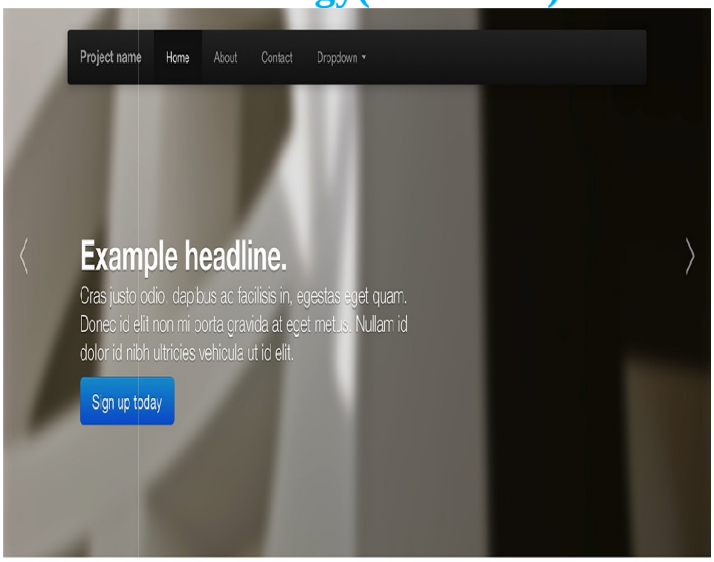

Fig. 1 Bootstrap

B. Structure and functions of Bootstrap

Bootstrap usually consists of a series of LESS style sheets and they usually implement the various components of the toolkit. Developers can adapt the Bootstrap file itself and can make use of components in their project. Adjustments are also possible to a limited extent through a central configuration style sheet. LESS style sheet language allows the use of variables, functions and operators, nested selectors. The subsequently generated package already includes the pre-built CSS style sheet.

Fig. 2 Functions of Bootstrap

Grid system and responsive design comes standard with a 1170 pixel wide and is a grid layout. Alternatively, developer can also use a variable-width layout. For both cases, the toolkit has four variations to make use of different resolutions and types of devices: mobile phones, portrait and landscape, tablets and PCs with low and high resolution. Each variation is used for adjustment of width of the columns.

1) The CSS style sheet: Bootstrap usually provides a set of style sheets that provide basic style definitions for all key HTML components. This provides a uniform, modern appearance for formatting text, tables and form elements.
2) Re-usable components: Bootstrap contains many commonly used interface elements. These interface element include buttons with advanced features (e.g. grouping of buttons or buttons with drop-down option, make and navigation lists, horizontal and vertical tabs, navigation, breadcrumb navigation, pagination, etc.), labels, advanced typographic capabilities, thumbnails, warning messages and a progress bar.
3) JavaScript components: Bootstrap comes with several JavaScript components and they are in the form of jQuery plug-in. They provide additional user interface elements such as dialog boxes, tooltips, and carousels. Not only this, they also extend the functionality of some existing interface elements. The following JavaScript plug-in are supported: Modal, Dropdown, Scroll spy, Tab, Tooltip, Popover, Alert, Button, Collapse, Carousel and Type ahead.

IV. Applications Of Responsive Web Development

A. *Business*

Websites developed for the business purposes should be responsive so that the website is compatible with majority of devices and led to growth of the business. E-commerce websites, websites developed for selling products, online businesses come into this category. The growth of the business is totally dependent on the traffic on the website and traffic will be more and more if the website is compatible with majority of devices. So almost all the websites developed for the business purposes are responsive.

Fig. 3 Responsive Web Development in E-commerce websites

B. *Public Sector*

Public Sector basically includes the work under Government. There are many work that need to be done online by the Government. This provides online facility to the users for paying bills, getting jobs etc. These web sites are also responsive since the website should run on multiple devices and compatible with every modern devices and future devices.

Fig. 4 Responsive Web Development in public sector

C. *Education*

There are variety of institutions in our country and each institution is providing online facility and provides sight of bigger picture of their college to the students and people and this is done through their websites. Students get study material, college

schedule and other important information through college websites. Online quiz competition and many other information students get from their website of the college.

There are many courses, competitions, quiz conducted online. Now, students can register online at any place and can participate in events conducted online.

V. Future Scope Of Responsive Web Development

Responsible web designing has entered with a bang and made a comfortable place for itself amongst the most happening technologies of the day, for it to grow further, efforts need to be made to make it more easy and light. One step in that direction is the emergence of RESS, which is defined as a "responsive website with server side detection." With this technique, detection and recognition of the device making a call to the website is transferred to the server side, instead of the client side. The server will find out whether it is a tablet or a PC requesting the website, and send only the code pertaining to that platform to the client. Therefore, the code travelling to the device is largely reduced and therefore time spent by the device in loading it also gets reduced. And so, better performance and more simplicity.

VI. Challenges For RWD

A. *Different devices remain different*

There is only one set of code website remains the same regarding content and structure, but different devices require a different way of thinking. People browse website according to their very specific needs and goals, and not to mention their unique context of use.

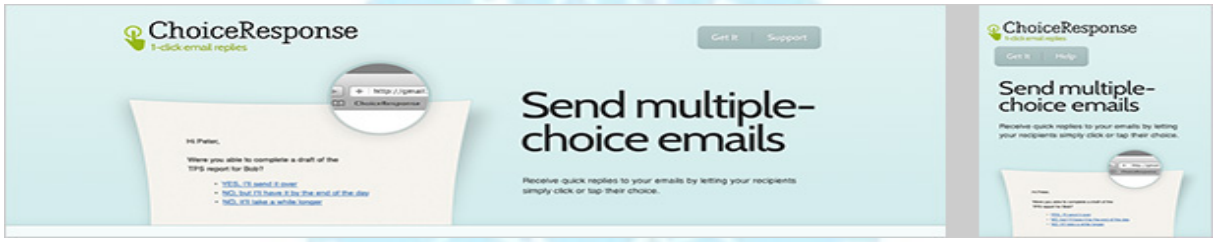

Fig. 5 Compatibility of a Responsive Website

Desktop version can display a lot of content at once, for smaller screens there is need to know exactly what matters. In order to create a great user experience for all your users, there is need to consider that people will use different devices in different circumstances and with different goals.

B. *Complexity*

RWD as an approach can be quite a complex process if not handled with diligent planning and some creative designing. Web developers and business owners need to be very clear about what they want the users to see on their websites, when viewed through a desktop or a tablet or a smart phone. Some features that look great on desktop might not work on other devices. The design should be carried out in such a way that the website looks and feels great on every platform. All these views greatly increase the complexity of creating a responsive website.

C. *Development time*

The most obvious minus point about building a responsive website is that it takes more time. A regular desktop site takes less preparation time, less resources to build it, and also testing it requires less effort. It usually takes longer to convert an existing website into a responsive one than to build one from scratch.

D. *Limited support of media queries*

Responsive websites work with media queries to determine the screen size of every visitor and then display the correct layout. The problem here is that old browsers, don't recognize media queries. Currently, about 14% of web users worldwide still use Internet Explorer 8. 14% is a substantial portion of users.

E. Scalable images lose details

Another limitation of RWD is the scaling of images. Scaled images quickly lose details and thus their meaning. Basically, scaling happens strictly based on screen size and not on context. An alternative to scaling images might be to crop them. Still their meaning and the experience that comes with it will ultimately be altered.

Fig. 6 Scalability of images of a Responsive website

F. Navigation menus

Navigation menus make up for an important part of any website. Especially on more complex desktop websites we are used to multi-layer drop-down menus while smaller devices always encounter limited screen real estate, which makes designing intuitive navigation menus a challenge.

G. Different devices offer different interactions

Desktop version not only differs from the mobile version in a hypothetical, but also in a very practical way. Interaction that works just fine on one device may be irrelevant on another and this is because the way we interact with desktop and mobile devices differ. While we use keyboard shortcuts and a very defined mouse pointer to navigate through a website on one device, we have nothing more than our fingers on the other.

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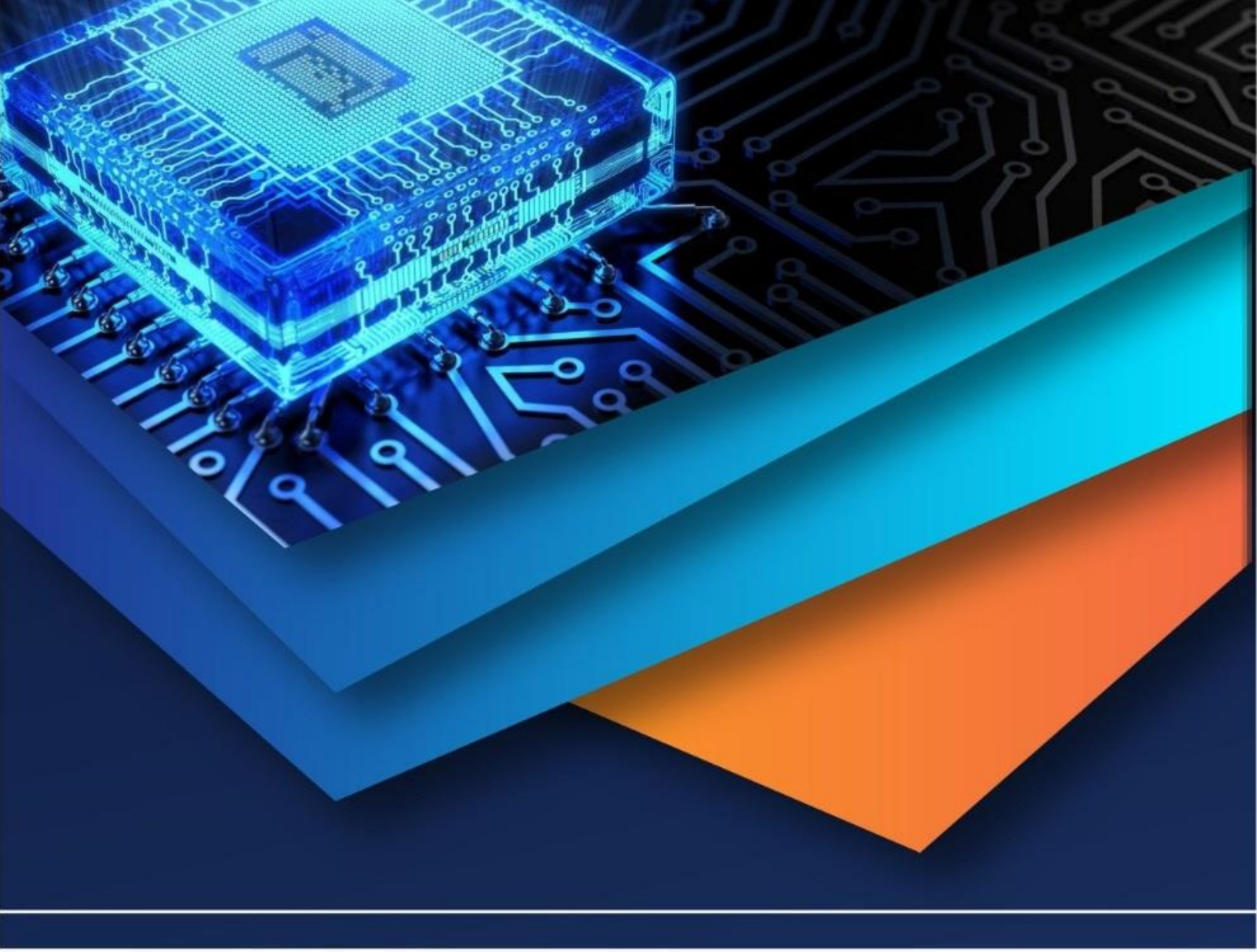

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