

ESPY: A Work Monitoring Solution by Facility Mapping of Smart Cities

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Abstract - As per the concept of Smart City to provide efficient urban mobility and affordable housing facility, a lot of construction work has begun at different geographical points to turn this concept into reality. Work monitoring of Construction Company by higher government authorities is necessary to get work done quickly, get daily updates and prevent corruption. For this work Construction Company has Site supervisors who provide weekly or monthly updates but process is manual and time consuming. Also, with lots of Construction going on, citizens face severe problems which requires immediate attention of officials. To have an easy interface between Site Supervisors and higher officials of government and also between common people and government we aim to create an Android Application named “eSPY” which will give facility to Site supervisors to daily report the work progress to authority online or offline along with necessary proofs such as geo-tagged image of work done that day, details of expenditure etc. Citizens can use the App to register complaints regarding construction work at any location causing problems. On the other end, a website will be provided to officials for receiving proper report in specific pre-determined format for saving time and quick action. Officials can view received geo-tagged image or can establish a real time video connection to quickly monitor work at various sites. For establishing the connection between Android application and website, WebRTC as technology is used which will provide easy connectivity, less data and efficient offline support.

Keywords:--- Android Application, Construction, Geo-tagging, WebRTC, Website, Work monitoring

I. INTRODUCTION

As per estimates, about 25-30 people will migrate every minute to major Indian cities from rural areas in search of better livelihood and better lifestyles and with this momentum about 843 million people are expected to live in urban areas by 2050 [1]. To accommodate this urbanization, we will require efficient urban mobility and affordable housing facilities in our future smart cities. So a lot of assets are being constructed to fulfill future needs and construction work is on boom. In fact India is expected to emerge as the world’s 3rd largest construction market by 2020 [1]. It is very important to track progress of this construction activities so that corruption is prevented and work completes on allotted time. The traditional method of work monitoring requires field engineers or Site supervisors to collect data, send it to the office and develop progress reports and then convey it to higher officials [2]. Producing the reports is a manual process and extremely time-consuming so work progress is not communicated quickly and effectively. Also the citizens for whom this construction activities is being carried out face a lot of problems which they are unable to report to anyone due to lack of interface. To solve all above problems we are developing an Android Application named “eSPY” which

aims at providing a direct communication medium between Site supervisors, higher authorities and citizens.

Our Application will provide services in three main aspects, firstly it will provide Site Supervisors a way to directly report daily activities to the authorities along with a geo-tagged image of work done and the necessary details about work like expenditure that day, no. of workers working that day etc.

Secondly it will provide citizens an interface to directly communicate with the higher authorities regarding their complaints about the construction work while it is in progress and also after it is completed for complaining about maintenance activities. And thirdly it will provide a website for higher officials to view recently uploaded reports from work sites or complaints from the citizens on daily basis.

II. TECHNOLOGY OVERVIEW

The connectivity between the Android application and the website is formed on top of the open source application programming interface called WebRTC. WebRTC has a lot of components which helps to develop high quality real time applications for browsers and mobile devices [3]. In our application WebRTC helps to exchange

arbitrary data between browsers and mobile devices without use of any intermediary. It makes it possible to communicate the data without any additional third party software's or additional plugins. The RTCPeerConnection interface is used primarily to establish connection between two peers but in our application we used RTCDataChannel Interface to exchange data between two peers.

In the beginning the connection is established between the application and the web browser with the help of RTCPeerConnection interface. Once the connection is established, we connect RTCPeerConnection to RTCDataChannel interface. For this connection the RTCDataChannelEvent send the datachannel interface to RTCPeerConnection. After this happens, bidirectional data transfer can happen between application and the browser. During data transfer, RTCTrpSender manages the encoding and transmission of the data sent on RTCPeerConnection while RTCTrpReceiver manages the decoding and reception of the data sent on RTCPeerConnection.

III. PROPOSED SYSTEM

The working of the proposed system is shown in the figure. Proposed system consists of two important parts firstly the Android application and a website on admin end. The application has two types of users, Site supervisors or field engineers and citizens who needs to register before using the application. After registration user will have an authenticated username and password to access the system. Also while registration the IMEI number of the users Smartphone will get stored to the database to maintain security and prevent data discrepancy.

If the user is a site supervisor, he will be prompted with the list of amenities under development boundaries of government such as schools, roads, houses, hospitals, gardens, statues etc. After selection of proper category on which he is working he will be directed to take an image of workplace which will be geo-tagged and exif header will be added with the image. Then user can add textual information such as no. of workers, expenditure, and resources used, and other project related information. All this information will be converted to XML format and image will be attached along with it. If the internet connection is available user will be prompted with upload file option else it will be saved to send later list and sent in availability of internet connection.

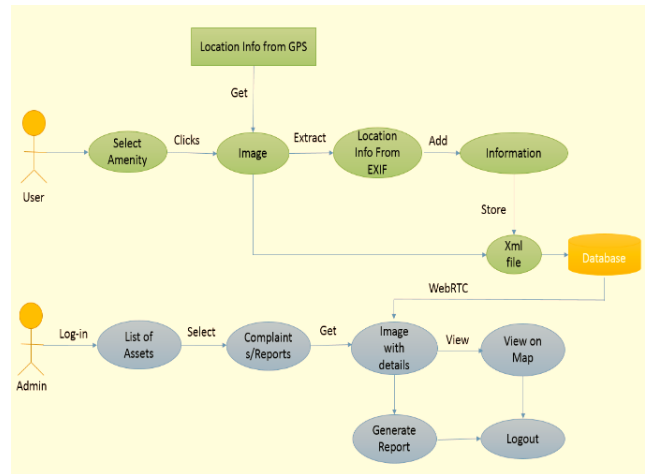


Figure 1: Working of the Proposed System

If the user is a citizen he will be asked to file a complaint and take a geo-tagged image of the place causing problems. This will be converted to XML format and sent in availability of internet else sent later.

On the admin end a website will be given. Authorities with proper rights can log-in to the website and view the work progress at various workplaces of their choice. They will also be able to view complaints filed by citizens regarding inconvenience caused by construction work and authorities can take preventive measures immediately. Also for quick functioning on the admin end, report of the filed complaint will be generated directly in the pre-determined format so that the complaint should be forwarded to concerned official immediately and the problem can be resolved.

IV. CONCLUSION

The paper presented an initial research on the Smartphone-based Work Monitoring system in the form of an Android Application. To perform monitoring of work, our solution will prove helpful. It will be affordable, reliable, easy to use and will have a simple interface. Its ability to adapt to dynamic needs will prove beneficial to users. Also it doesn't require any special hardware as it uses only the existing resources of Smartphone.

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