# "Survey Paper on Towards a Secure Mobile Edge Computing Framework for Hajj"

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***ABSTRACT***— The cloud computing paradigm faces the challenges of providing low latency, high handiness, and real-time location-aware services wherever many individuals are mobile. During this paper, we tend to propose a mobile edge computing framework that may support period, location-aware customized services to a really massive crowd. The framework uses a hybrid of cloud at the server finish and fog computing terminals (FCT) at the group edge. The conception of FCT is realized by adding a middle layer acting as a proxy between the user finish and cloud infrastructure. Every FCT node covers a geographic zone and provides a set of services and resources supported the geographic location of a mobile user. Once a user moves from one FCT-covered zone to a different, the secure shake of information regarding the user is shared with the new FCT node. The communication between mobile users' terminals like smartphone and the FCT is assumed as 4G/5G networks, whereas the communication between the FCT and cloud on high speed, perpetually offered, and reliable web association. The situation of every mobile user is created secure and shared according to our novel privacy policy paradigm. The framework is intended to change between FCT and cloud, depending on the task, network condition, geographic closeness, and resources offered at intervals the shopper unit, we have enforced the framework to support context-aware services to many pilgrims that gather along during a very little space of land every year. we'll share the inspiring results that we've got gathers once initial readying.

***INDEX TERMS:*** Fog Computing, Mobile Edge Computing, Cloudlets, Crowd Sourcing, Crowd Sensing.

## I. Introduction:

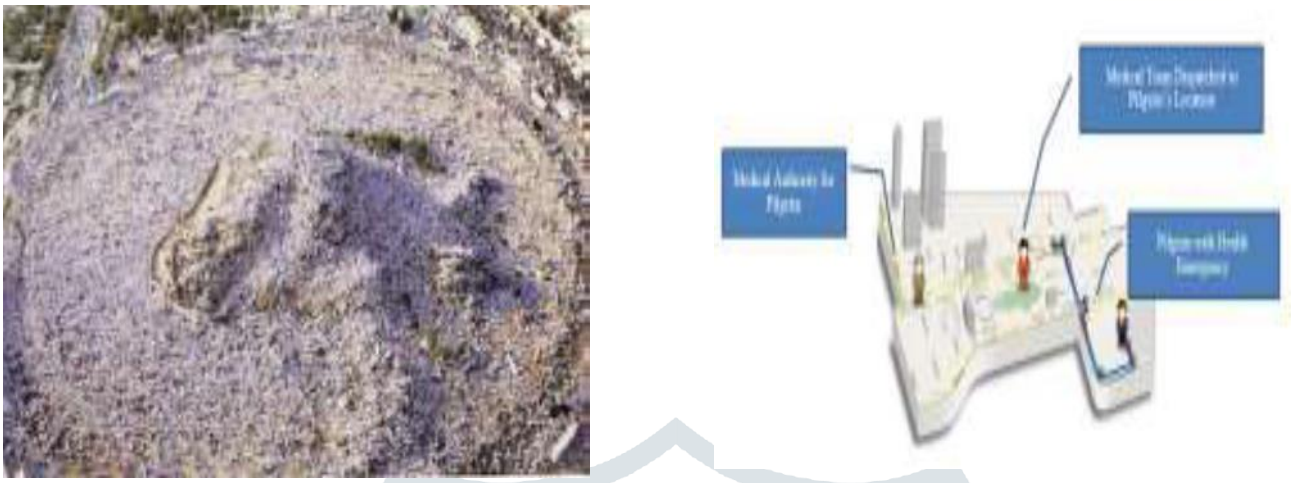
Hajj could be a yearly event wherever ample folks from nearly each country gather along within the Holy Land of Makkah and Madinah to perform their spiritual duties [1]. Since most pilgrims ar returning for the primary time, their recent ages similarly as totally different languages, cultures, and academic and social backgrounds build their journey a quite difficult setting. Providing security, safety, accommodation, health, and transportation services, to call a number of, is a intimidating task for such an outsized crowd. In different words, knowing the contexts of every pilgrim like location, time, geographic zone, and events round the atmosphere at intervals the gang and so providing inter-pilgrim and intra-pilgrim context-aware services could be a challenging task. Since the pilgrims move around totally different holy zones or boundaries, they face many challenges. Thousands of people get lost; they face bother locating places of interest like the nearest hospital, cash exchange, and restaurants because of the huge crowd and language barrier; traffic conditions are

unstable during pilgrim's journey, thus it's tough to seek out the simplest route to one's places of interest; and finding transportation at the correct place and right time is hard [2]. Pilgrims therefore would like location-aware, extremely offered, and mobility-aware services to form their journey safe, secure, and comfortable.

The pilgrim's journey social network consists of associate ad-hoc network, which starts growing once pilgrims arrive within the Holy Land and diminishes once the pilgrim's journey journey ends; thence, the time period of this dynamic ad-hoc social network is a couple of month. Every year, a new Hajj social network is made. The pilgrim's journey social network consists of entities like pilgrims, their relations, pilgrim's journey organizers, vehicles and transport systems, municipalities, governments, health institutions, and emergency handling agencies. Once connected, all these entities will share geo-tagged transmission spatio-temporal information to support totally different eventualities, each period of time and offline [3] [4]. This poses many challenges. First, the pilgrim's journey social network needs an enormous data repository to store the content created by and shared among different entities withinthe terribly giant pilgrim's journey crowd [5] [6]. Second, collecting users' context and placement information sharing have to be compelled to think about the privacy needs of every user. Finally, spatio-temporal real-time queries have to be compelled to be answered by the framework within the eventualities (e.g. associate old person is lost, a hearth or accident in an exceedingly tent, emergency evacuation), which needs low latency, perpetually offered, and live query process [7]. Thanks to current advancements in high speed web availability over 4G/5G networks, cloud computing, smartphone technology, mobile edge and fog computing, present M2M (machine to machine) property, monitored or utterly ad-hoc device to device (D2D) direct property via LTE-A, BLE, or Wi-Fi Direct, location-aware systems, crowdsourcing mistreatment social network events [16], and internet services, to call a number of, providing location-aware services to the pilgrim's journey crowd is not any longer a dream

1. Each user interaction, user query, and sensory knowledge square measure routed from the pilgrim's smartphone to the backend cloud server for processing, mining the phenomena, and at last storing or preparing results to be sent to the user terminals via the core backbone. This poses a big bottleneck, particularly on the 9th, 10th, 11th, and twelfth days of the

twelfth Arabic month once millions of pilgrims roll up a little land. Figure one shows this bottleneck state of affairs. within the case the net service supplier is down, the entire location-aware communication system is compromised, even in emergency things.



(A) (B)

Figure 1. . Location and other multimedia data shared with the cloud in real-time for various emergency scenarios. (a) Millions of people gather near Mount Arafat during their pilgrimage. (b) In the case of a medical emergency, the location of a sick pilgrim is shared with the emergency response team and the medical team in close proximity
handles the patient. (Article *in* IEEE Access · June 2017**)**

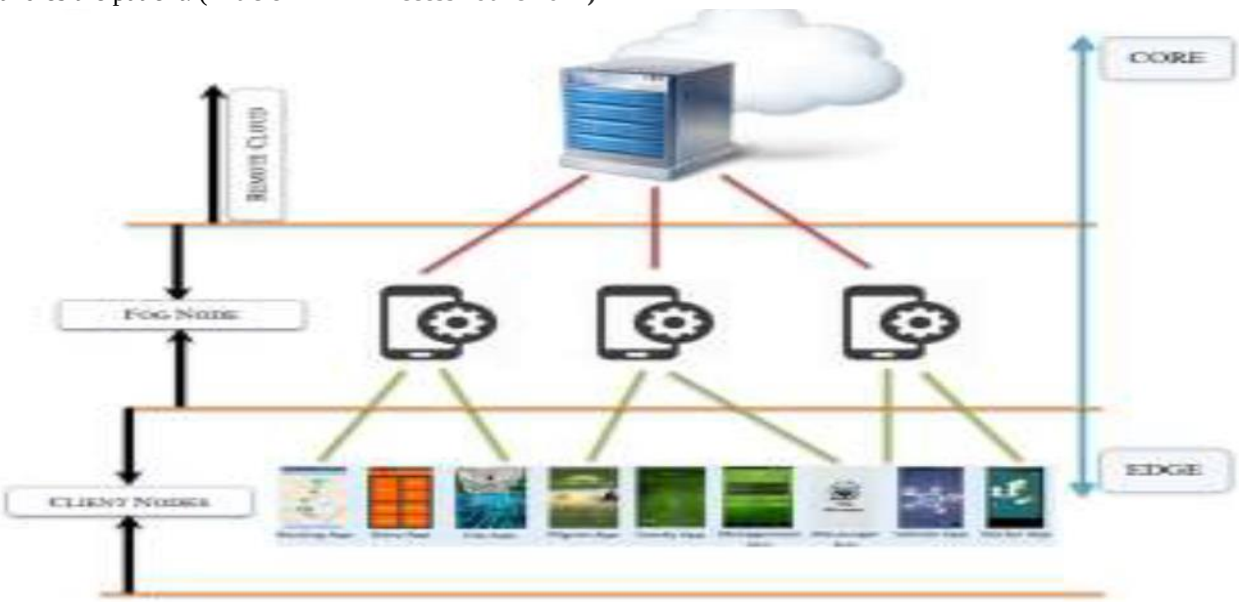



Figure 2. Fog nodes sit between user terminals and the remote cloud (Article *in* IEEE Access · June 2017)

To this finish, we tend to propose a three-tier design (see Figure 2) to handle such an outsized crowd: the consumer tier consists of lots of pilgrims' smartphones as service shoppers or information producers, the fog tier consists of smartphones as edge devices as mini-clouds, and the cloud tier contains a fastened IP-based infrastructure. Tier one contains human intelligence, specifically human sensors which will sense real-life events, answer queries from alternative pilgrims, and use smartphone resources to retort to fog tier requests. The fog tier helps within the real-time processing of spatio-temporal cooperative or individual processes, whereas the cloud tier is large massive information storage, heavy duty analytical computation, and offline question process. The fog nodes at intervals the framework usually follow a one-hop communication paradigm within the case of D2D communication. However, the communication between distributed fog nodes and therefore the cloud tier is finished via the multi-hop communication paradigm. We show our style concerns and initial prototypes altogether the tiers.

## II Literature Survey:

Research Paper one (Towards a Secure Mobile Edge Computing Framework) In this paper, we have a tendency to propose a mobile edge computing framework that may support period of time, location-aware personalized services to a really massive crowd. The framework uses a hybrid of cloud at the server finish and fog computing terminals (FCTs) at the gang edge. The idea of FCT is realized by adding a middle layer acting as a proxy between the user finish and cloud infrastructure. every FCT node covers a geographic zone and provides a set of services and resources supported the geographic location of a mobile user. once a user moves from one FCT-covered zone to a different, the secure handclasp of information regarding the user is shared with the new FCT node. The communication between mobile users' terminals, like smartphone and also the FCT, is assumed as 4G/5G networks, whereas the communication between the FCT and cloud relies on a high speed, perpetually obtainable, and reliable net affiliation. the situation of every mobile user is formed secure and shared in line with our novel privacy policy paradigm. The framework is meant to change between FCT and cloud, reckoning on the task, network condition, geographic distance, and resources obtainable at intervals the shopper unit. we've got enforced the framework to support context-aware services to many pilgrims that gather along in an exceedingly} very tiny space of land every year

we are going to share the inspiring results that we've got gathered when initial preparation

Research Paper a pair of

Cloud-based Context-aware Mobile Applications and Framework for pilgrimage and Umrah Management This paper proposes a standard framework for the distributed management of these events. during this framework, a cloud-based international server is employed to speak general info with a pilgrim mobile application. On the opposite hand, every campaign is appointed a cloud-based campaign server for human activity its campaign-specific info with its corresponding pilgrim applications. In each cases, info is communicated in every pilgrim language. The pilgrim application may give small-size static info. to boot, a campaign manager mobile application permits every manager to outline rules for human activity campaign-specific info in an exceedingly context-aware fashion despite the fact that those managers usually lack programming capabilities. Constraints square measure implemented on the developed rules to assist avoid errors. The system provides location-based services undoable exploitation Google Maps. Empirical analysis has shown extreme satisfaction of past and potential pilgrims with the capabilities of the pilgrim application and also the high usability of the manager application.

### Apache Cordova

Apache Cordova (formerly PhoneGap) could be a mobile application development framework originally created by Nitobi. Adobe Systems purchased Nitobi in 2011, rebranded it as PhoneGap, associate degreed later discharged an open supply version of the computer code known as Apache Cordova.[8] Apache Cordova permits computer code programmers to make applications for mobile devices exploitation CSS3, HTML5, and JavaScript rather than wishing on platform-specific genus API's like those in golem, iOS, or Windows Phone.[9] It permits wrapping of CSS, HTML, and JavaScript code relying upon the platform of the device. It extends the options of markup language and JavaScript to figure with the device. The ensuing applications square measure hybrid, that means that they're neither really native mobile application (because all layout rendering is finished via internet views rather than the platform's native UI framework) nor strictly internet-based (because they're not simply Web apps, however square measure prepackaged as apps for distribution and have access to native device APIs). combination native and hybrid code snippets has been attainable since version one.9.

### Ionic Mobile App Framework

Ionic could be a complete ASCII text file SDK for hybrid mobile app development created by grievous bodily harm kill, mount discoverer and Adam Bradley of Drifty Co. in 2013. the first version was discharged in 2013 and designed on prime of AngularJS and Apache Cordova. The newer releases, referred to as Ionic three or just "Ionic", square measure designed on Angular. Ionic provides tools and services for developing hybrid mobile apps exploitation internet technologies like CSS, HTML5, and Sass. Apps will be designed with these internet technologies then distributed through native app stores to be put in on devices by investment Cordova.

### AngularJS

AngularJS could be a terribly powerful JavaScript Framework. it's utilized in SPA (Single Page Application) comes. It extends markup language DOM with extra attributes and makes it additional conscious of user actions. AngularJS is totally free, open supply, and employed by thousands of developers round the world. it's authorized below the Apache license version a pair of.0

**Google Reverse geocoding API**

In our Project we have a tendency to use the Google reverse geocoding API (Application programming interface) services. Geocoding is that the method of changing addresses (like "Post workplace Rd, Sinhgad Road, Pune, geographical area 411009, Asian nation ") into geographic coordinates (like latitude nineteen.8882361 and meridian seventy- five.3302264), that you'll be able to use to put markers on a map, or position the map. Reverse geocoding is that the method of changing meridian and latitude into a human-readable address. The Google Maps Geocoding API's reverse geocoding service additionally allows you to notice the address for a given place ID. The Google Maps Geocoding API provides an immediate thanks to access these services via associate degree HTTP request.

**Apache Cordova plugins**

As of version three.0, Cordova implements device-level genus APIs as plugins. This plugins will be accustomed access the native feature of the mobile during which the appliance is put in, they will access all the options like camera, geolocation, measuring device etc. we've got used the camera plugins in our paper for accessing the camera of the mobile for taking the image that square measure used for capturing the pictures

**Hybrid Approaches:**

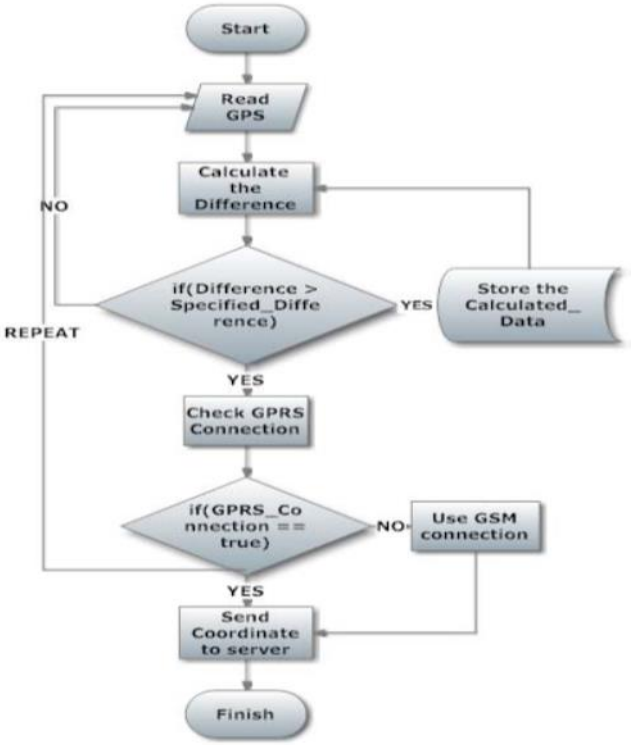



Fig. 3: Client-side flowchart in server updating (HajjLocator: A Hajj Pilgrimage Tracking Framework in Crowded Ubiquitous Environment)

In order to compensate the period of time update and at identical time being cost efficient, we've got determined to use the dynamic update triggering to the server. In alternative words, the user are in a section of circle with an outlined radius and therefore the system can only send associate update to the server, ought to the user moves additional than the outlined distance. For this reason, to realize quality and widespread usage, our projected framework is developed in an exceedingly balanced approach and provides the power to facilitate real-time update in an exceedingly cost-efficient method.

**III Result and Discussion**:

Reliability, accessibility and availableness of the projected framework may be achieved through thought of 3 elements.

A. Accuracy of GPS coordinates

In general, the GPS system used works fine in open areas and even in sure semi-opened places. solely on few occasions do the information haven't been able to be sent to the server. Through several testing, the result shows that there ar some losses where the server doesn't receive any notifications, or a null data are received. There are some exceptional situations wherever the GPS system provides a giant deviation in giving the particular user's location. knowledge like that might be identified about its accuracy with the utilization of info within the server. As a database is offered to store historical knowledge of the user's locations, we are able to decide that coordinate is feasible and so exclude any immaterial and unacceptable location

which may be received. estimation, the clear-bordered path drawn in map is that the actual route of the testing, whereas the solid black pathway is that the route drawn from the GPS coordinates sent to the server.

B. Credible technique of Updates Through the testing, the 3 forms of chase technique, which is that the user request, time-based and distance-based tracking, get a detailed examination. Via the user request update, user can send their coordinates solely with their consent. On-demand updates will significantly facilitate individuals in desperate situations to alert others concerning their whereabouts. By that, other people will then apprehend spot-on wherever that person is and solely when it's required. On the opposite hand, whereas this feature is one of the foremost economical cost-cutting strategies, it ought to solely be used at the side of different change strategies associate degreed used as an addon function, instead of substitution them. Affordable price.Thereis large distinction in price, mistreatment 2 completely different types of connections, that ar the GPRS and SMS. GPRS offer reliable and economical cost-cutting whereas SMS may be the alternative association ought to there's no GPRS property available, like in tunnels and remote areas.

## IV Conclusion & Future Scope:

In this paper, we have a tendency to analyzed the leverage of D2D communication using the fog or edge nodes sitting between the mobile shoppers and the remote cloud. Since pilgrim's journey brings along voluminous pilgrims, in addition to town residents and guests, maintaining time period communication with a really great deal of transmission payloads is a difficult issue, that we have a tendency to tried to handle with the state-of-the art edge computing paradigm. the sting nodes ar simulated employing a smartphone node for this experiment. we have a tendency to hope to deploy some mounted node design with a lot of powerful nodes within the coming back days.

For future enhancements, except simulations, additional testing in world eventualities in Makkah is required to check the prototype and to feature many options like geolocation, geofence, SOS button, etc into the applying within the good phone. we tend to additionally have to be compelled to take under consideration the old by developing special hardware (not a electronic device or Mobile phone), with pre-installed emergency numbers and also the SOS button

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