**COFFE SHOP WAIT TIME MONITORING USING SMARTPHONE**

**1. TEAM “WAIT N WATCH”**

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**2. PROJECT IDEA**

The long and unpredictable queues at places like coffee shops, stores, etc cause a large amount of inconvenience in our day to day lives. Many scientific studies indicate that customers have shown a lot of dissatisfaction over such waiting times. So, this project aims to develop a system which can predict and report current/future waiting time of the queue using smartphone. This will help the users make more informed choices.

In our project we consider the coffee shop present at Indiana University campus.

**3. APPROACH**

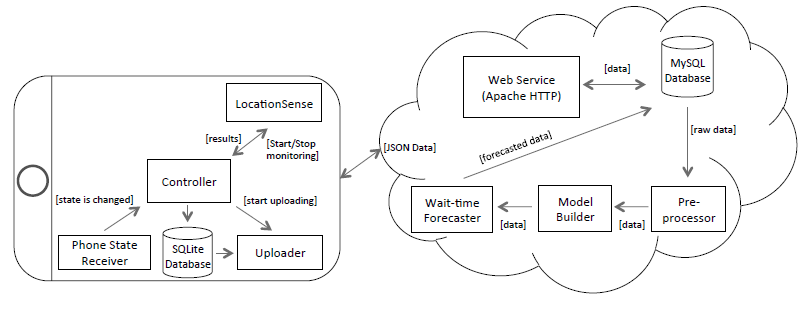
Our application consists two components :

i) Client-side component on the smartphone.

ii) Server-side component.

The client-side component provides automatic wait-time detection and uploads the data onto the server. The server-side on the other hand, uses the collected data to provide accurate wait-time estimation.

The overall architecture of our system is as depicted in Figure 1:

FIGURE 1 : Overall System Architecture

**3.1 Wait-time detection :**

In order to detect the wait-time automatically, the client side makes use of two main sub-components along with the controller – Location senser and Data uploader.

3.1.1 Location Senser :

We use GPS in user's smartphone to accurately predict if the user has entered the Coffee shop. We also make use of Phone-state-receiver subsystem of android i.e. *Proximity Alert Receiver s*ervice to monitor the wait-time. Proximity Alert Receiver periodically checks the location of device and fires alerts for entering and exiting for a specified geo-fence region. So once it triggers entering, we start monitoring. Once triggered exit we stop monitoring and store the time in database.

3.1.2 Data Uploader

After completing wait-time detection, the system tries to upload the collected data to the server. The application immediately tries to upload the data. However, due to certain connection problems, if the application isn't able to upload the data immediately, then it is the responsibility of the data uploader sub-component to transmit the pending data at later point of time.

**3.2 Wait-time estimation**

Once the client-side component uploads the wait-time detection data, the server-side uses this data to build estimation model to predict the waiting time. This task is accomplished mainly by four sub-components at the server side – Web service, Pre-processor, Model Builder and Wait-time forecaster.

3.2.1 Model Builder

To solve the problem of wait-time estimation we choose Nearest Neighbor Estimation(NNE). We consider week of the year, day of the week and interval of the day as three parameters to construct the estimation model. We later plan to use regression-based optimization technique to improve NNE.

Metric : We use Mean Square Error (MSE) to measure the accuracy of the system.

3.2.2 Wait-time Forecaster

The current query is fed to the wait-time forecaster to predict the wait-time.

**4. KEY CHALLENGES**

**5. PROJECT ROAD MAP**