Demo: Code In The Air - Simplifying Tasking on Smartphones

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ABSTRACT

Smartphones now are equipped with a variety of sensors including inertial sensors (accelerometers and gyroscopes) and multiple position sensors (GPS, WiFi, and cellular radios). These powerful capabilities have made smartphones an attractive platform for *tasking applications*. Tasking applications are rapid developing mobile applications which process data from multiple sensors continuously to determine user's context (such as location or activity) and take certain actions based on pre-defined conditions. Examples of such applications include location-based reminders, notifying when friends are nearby, changing the ring-mode of a phone automatically depending on the location, automatically tracking and storing movement tracks when driving, and inferring the number of steps walked each day. However, today, developing tasking applications is non-trivial for two reasons: poor abstractions and poor programming support [1].

We address these shortcomings through *Code In The Air* (CITA), a system that simplifies the development of tasking applications. CITA achieves this by providing an activity composition framework and a tasking execution framework that allows developers and end-users to easily write and compose tasks. Figure 1 shows the CITA architecture.

Categories and Subject Descriptors

C.3.3 [**Special Purpose and Application Based Systems**]: Real-time and embedded systems

Keywords

Tasking applications, Mobile programming,Mobile sensing

1. DEMONSTRATION

During the demo, participants will be able to develop tasking applications by using CITA's programming model, and be able to use and interact with their applications in real time. We have implemented two programming platforms for participants to compose and create single- and multi-device tasking applications:

- **The end user interface.** The end user interface on the phone enables participants to compose their own tasks by "mixing and matching" available activity primitives or tasks. We have implemented various activity primitives such as *isWalking, isBiking, isRunning, isDriving, isOutdoors, enterPlace,* and *leavePlace*. Figure 2 shows a screenshot of using the user interface to compose a single-device application: "Disable WiFi when I am walking outdoors or driving."

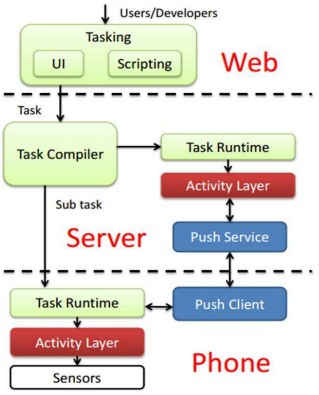

Figure 1: CITA Architecture

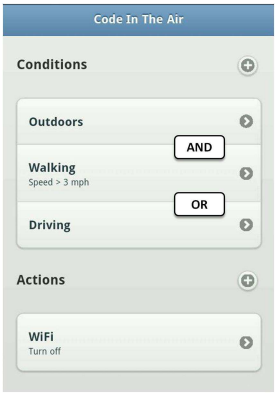

Figure 2: A screenshot of the end user interface.

- **The JavaScript programming model.** In CITA, participants can create tasks by writing only server-side JavaScript code. The execution framework will automatically divide these tasks into sub-tasks and distribute them among multiple devices or servers. The following CITA script expresses the multi-device application: "Alice would like to be alerted whenever Bob leaves his workplace":

```
p = getDevice('Bob','Phone');
q = getDevice('Alice','Phone');
p.registerActivityCallBack('leavePlace(
        work)','trueAction', null);
function trueAction(e){
       q.vibrate();
       q.alert('Bob left work');
}
```

We will also show how CITA's activity layer continuously processes data from multiple sensors to recognize user's context in an energy efficient way.

2. REFERENCES

[1] L. Ravindranath, A. Thiagarajan, H. Balakrishnan, and S. Madden. Code In The Air: Simplifying Sensing and Coordination Tasks on Smartphones. In *HotMobile*, 2012.

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