

# Emu: Engagement Modeling for User Studies

Bo-Jhang Ho, Nima Nikzad, Bharathan Balaji, and Mani Srivastava





#### Engagement is essential to enhance study quality



#### User study



#### Intervention

### Push messaging drives 88% more app launches

#### 🗮 AMAZON

now

Delivered: Your package with 3 Lbs, Single Origin Unroasted Green Coffee Beans, Specialty Grade From Single Nicaraguan Estate, Direct Trade was delivered.

Press for more

#### Notification management



#### Existing solutions:



Our approach:

#### Deliver me only when <condition> is met

#### It is challenging to specify contextual conditions programmatically



#### Remind user:

measure the blood pressure if the user doesn't do it within 15 minutes after running

#### Challenges:

- When to send reminders?
- When the activity start/end?
- Concurrent conditions?





notificationManager.cancel(NOTI\_BP\_ID);
scheduleNextRunningNotification();



private class SendNotificationHandler extends Handler {



- 1. **Specify complex contextual events** to reduce the burden for study designers or app developers
- 2. Increase the engagement of participations in user study or medical interventions

#### Related work



#### A typical intervention cycle

### Condition match

Notification

User compliance

#### Emu task





#### Complex contextual event

#### Scenario 1:

Conjunctions, disjunctions, or mixed

```
TaskBuilder.when(
    "walking for 1 hour
    or running for 15 minutes");
```

Scenario 2:

Sequential conditions

TaskBuilder

.when("running for 15 minutes")
.then("measuringBloodPressure
 within 1 hour");

#### Notification preference

```
TaskBuilder.notify(
    "Measure blood pressure", // content
    PRIORITY_MEDIUM, // priority
    "snooze 2 times", // number of snoozes
    "every 15 minutes" // snooze gap
);
```



#### System architecture



#### System architecture



#### Evaluation results



## Thanks for listening

- Increasing user engagement is important but hard
- EMU is designed to alleviate developer's burden
- We propose a language and the architecture to address these challenges

#### Emu: Engagement Modeling for User Studies

Bo-Jhang Ho, Nima Nikzad, Bharathan Balaji, and Mani Srivastava



