Poster Abstract: TickHelp - A D2D Mobile App For Requesting Online/Offline Assistance *

Hongda Xiao, Shiyu Chen, Lihui Lu, Zhouhang Shao, Corey Baker
Department of Electrical and Computer Engineering
University of California San Diego
La Jolla, CA
hoxiao@ucsd.edu, shc142@ucsd.edu, lil067@ucsd.edu, z2shao@acsmial.ucsd.edu, cobaker@eng.ucsd.edu

ABSTRACT

The emergence of Mobile ad hoc network (MANET) technology has enabled mobile devices to establish self-maintaining and adaptive interconnections without relying on a fixed infrastructure. The decentralized infrastructure of MANET coupled with the proliferation of social networking applications enables the ability to provide offline communication between multiple devices.

This poster discusses TickHelp, a prototype mobile application written in Swift for iOS devices that provides D2D communication allowing users to send/receive help requests from nearby users without relying on a fixed network infrastructure. TickHelp (i) enables users to communicate offline over peer-to-peer WiFi networks and Bluetooth personal area networks and (ii) synchronization of D2D communication with the infrastructure mode when a centralized access point is available in order to connect with a back-end database to provide better location accuracy.

CCS Concepts

•**Networks** → **Mobile ad hoc networks;**

Keywords

mobile ad hoc networks, device-to-device, mobile applications, social networking

1. INTRODUCTION

The proliferation of mobile communication networks has enabled many mobile applications to incorporate innovative networking concepts into practical use. Among the various networking features, wireless ad hoc mesh networks have proven to be advantageous due to its' decentralized nature which does not require any pre-existing infrastructure to facilitate communication. In mobile ad hoc networks (MANETs), each mobile device acts as a node that connects with adjacent neighbors to form a self-organizing network [2]. As some mobile devices already come with native support for establishing device-to-device (D2D) connections, it becomes increasingly interesting to use D2D communications to build native proximity-based mobile applications that enable users to communicate offline.

In this poster, we propose an application that enables end users to communicate with nearby neighbors in both online and offline scenarios. TickHelp enables end users to seek immediate assistance from nearby people without cellular and Internet connections. Furthermore, when TickHelp users are online, nearby neighbors who are outside of radio communication range can be discovered and pinged for assistance through notifications.

*

Submission to ACM Sensys 2016 Stanford, CA USA

DOI: …

2. SYSTEM ARCHITECTURE

TickHelp is designed to have two different modes that enable its users to 1) log in as an online user or 2) continue as an offline user. Figure 1 shows how the two modes work together and how the application transitions to different states.

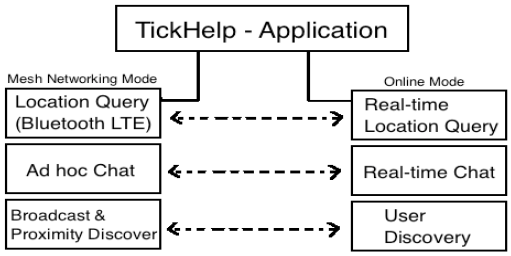


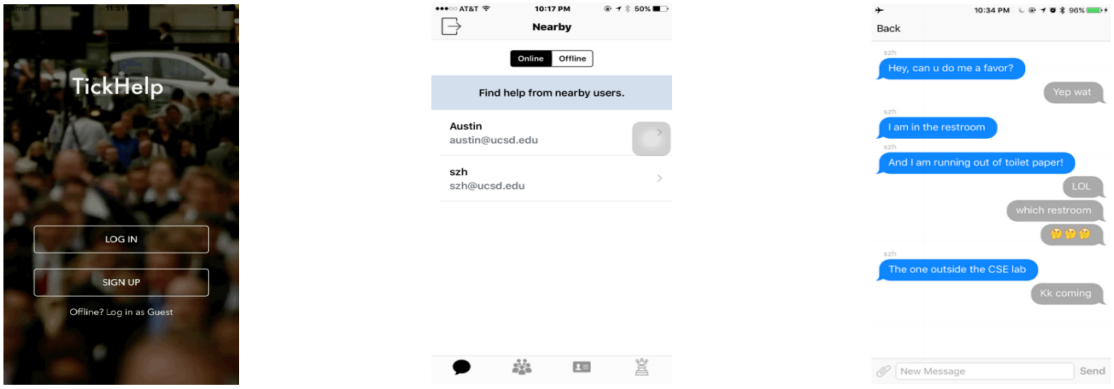
Figure 1: System Architecture of *TickHelp*

2.1 System Overview

2.1.1 Offline Mode

Enabling the offline login feature allows a user to simply login to the application by choosing a display name. Once a nearby user is detected, both users can establish a connection, TickHelp forms a D2D connection between the two devices allowing them to chat with each other using Bluetooth and peer-to-peer WiFi.

2.1.2 Online Mode



(a) Login (b) Discovery Mode (c) Offline Chat

Figure 2: TickHelp mobile application

Location Data Collection. Online mode allows the user to create/login to TickHelp which increases the discovery range for nearby devices by taking advantage of the user's physical location via GPS. TickHelp stores each online user's current latitude/longitude information to the applications back-end server, enabling devices withing 200 meters to discover each other.

2.2 Comparison with other existing Apps

	Offline Chat	Online Chat	Search Nearby	Contact List	Sensor Enable	Emergency Notification	Global Chat Room
TICKHELP	✓	✓	✓	✓	✗	✓	✗
FIRECHAT	✓	✓	✓	✗	✗	✗	✓
LIFE ALERT	✗	✗	✗	✗	✓	✓	✗

Figure 3: Comparison of TickHelp and other similar applications on market

Real-time Chatting Online mode also allows users to find nearby users and add them to their respective friend's list. Users can send help requests to other users by sending real-time messages through TickHelp. This feature is important to TickHelp for two reasons 1) Allow users to send help messages in real-time and immediately notify nearby users 2) Provide a monetary reward system in which the person requesting help can easily find someone who can provide assistance.

Traditionally, devices rely on infrastructure networks requiring all data to be stored/retrieved through the cloud. However, engineering an application that enables D2D communications protocol comes with the advantage of not having to rely on an Internet connection allowing nearby devices to communicate directly using Bluetooth or WiFi [1]. Recent advances in the D2D technology has enabled mobile developers to reinvent systems that are based on the concept of offline communications.

We characterized the potential use of the application to be an assistance-seeking tool. TickHelp enables its users to send help requests to anyone, anywhere and does not rely on Internet.

3. POSTER DESCRIPTION

This poster will present a proof-of-concept mobile application allows nearby device discovery and communication in real-time with/without the use of the Internet. The poster will also discuss current challenges along with future work

4. SUMMARY AND FUTURE WORK

Some researchers have suggested that the MANET is limited by the market relevance and has only been primarily focused on its research interests [3]. However, TickHelp brings evolutionary uses to the field of Mobile Computing that allows applications to form a network without the use of the Internet. By developing this prototype application, we were able to handle the situations such as when people need to seek help but not have immediate access to Internet connections.

Future work includes categorizing the types of user help requests to target specific people who can provide assistance. The user interface of TickHelp will be improved to target demographics of people who typically need assistance such as elderly folks carrying lifting heavy loads.

5. REFERENCES

[1] C. Baker, J. Almodovar-Faria, P. S. Juste, and J. McNair. Low energy socially cognizant routing for delay tolerant mobile networks. In *Military Communications Conference, MILCOM 2013-2013 IEEE*, pages 299–304. IEEE, 2013.

[2] A. O. Bang and P. L. Ramteke. Manet: history, challenges and applications. *International Journal of Application or Innovation in Engineering & Management (IJAIEM)*, 2(9):249–251, 2013.

[3] M. Conti and S. Giordano. Mobile ad hoc networking: milestones, challenges, and new research directions. *Communications Magazine, IEEE*, 52(1):85–96, 2014.