

Motorcyclists using Hocman – Field Trials on Mobile Interaction

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Abstract. We have performed an ethnographic study that reveals the importance of social interaction, and especially traffic encounters, for the enjoyment of biking. We summarized these findings into a set of design requirements for a service supporting mobile interaction among motorcyclists. The Hocman prototype is designed to meet these requirements. It is an application for handheld devices equipped with wireless ad hoc networking interfaces. It uses a peer-to-peer architecture to accomplish sharing of HTML documents with peers in the immediate proximity. The aim of sharing is to spark social interaction among motorcyclists during brief encounters. We report a field trial on the prototype service in its naturalistic setting. Despite the unmanageable setting, e.g. the vast area, the speed, and unacquainted users, we demonstrate field trials as an effective approach to get feedback on how well a prototype service fulfils the design requirements. The results indicate that the conceptual idea of Hocman was appreciated, which suggest that the focus on interaction in traffic encounters fit with current practice of motorcycling.

1 Introduction

Motorcycling is a popular and highly mobile activity where people spend a considerable amount of time on the roads mostly to enjoy themselves. The activity is highly social seeing that the bikers appreciate riding in the presence of other bikers. There are several forms of social interaction. We argue that encountering bikers briefly and unexpectedly along the vast road network is what bikers appreciate most. This is obvious, for instance, in how they make effort in saluting. They give a quick nod, or wave, as they pass each other. Moreover, they often appreciate looking at modifications on other bikes or even show-off a quick stunt. However, these encounters are too brief and often occur too sparingly. Therefore, to get more out biking, they are eager to organize it, for instance regularly meeting at specific locations, as well as using new technologies, such as intercoms, or even web chats. This suggests that biking is an interesting activity to consider when innovating new services that exploit the benefits of the mobile life [3].

We performed an ethnographic study on bikers during the summer 2001 [5]. We used the analysis of the fieldwork to inform the design of a prototype service to add value to biking. Hocman [6] is an application for a handheld computer capable of wireless networking. It makes use of ad hoc networking [9] to accomplish automatic sharing of HTML documents, images and audio clips, during brief meetings. It is designed to support encounters in traffic between unacquainted bikers. First, it aims at being useful in situations that are contingent and very brief, i.e. two bikers passing each other in opposite direction. Second, it increases the likeliness of these meetings.

We report on field trials with the prototype. The purpose was to learn about the users' experience of the Hocman prototype. We wanted to know both if the Hocman prototype fulfils the requirements, as well as to get indications whether the requirements are valid i.e. that the analysis of the fieldwork was sensible. However, the general characteristics of bikers' interaction provide a challenge for evaluation. Bikers' meetings are distributed over a vast network of roads, and may occur anytime. How is the use of such service evaluated and observed? What data should be collected? By employing field trials, we were successful in giving the bikers enough experience to give valuable comments on usage. In general, they expressed that Hocman is able to add value to biking as it prolongs and enriches the brief meetings among them. They also gave comments on how to further improve the concept.

In the following section we present an overview of the biking study that informed the design. We continue in section 3 by presenting an outline of the Hocman implementation. We give an overview of the related work in section 4. In section 5 we give a detailed account of the set-up of the field trial. Finally, we present the results of the field trial, and conclude with a summary.

2 Design Requirements

Out of a field study on motorcyclists we generated a set of design requirement for a mobile service, which should increase the pleasure of biking [6]. Bikers take interest in encountering other bikers in traffic. However, these stray meetings are brief and the social interaction is often scant, e.g. a quick nod or wave. In order to get more out of encounters, biking is often organized e.g. they travel in groups, or meet other bikers at specific locations. In turn, these efforts naturally increase the likeliness of actually meeting somebody on the road; however, they can fail to give the same experience as such attempts often concern acquainted people. We argue there is room for some kind of further support for social interaction, seeing that one way of increasing interaction among unacquainted bikers would be to aid setting up future joint rides with bikers which have a history of meetings. This would *include* the stray encounters they cherish. Accordingly, we identified the following set of requirements on such mobile services.

- Enjoyment of driving: Motorcyclists drive their bikes to enjoy themselves. The service should augment the experience of driving or get them to drive even more, rather than rationalizing their movement in order to decrease travel time.
- Enrich traffic encounters: Motorcycling would be more fun if moments of visual interaction between fast moving bikers were enriched.

- Elaborate expression of identity: Currently, bikers express their personality by the way they drive, as well as with the bike itself and their clothes. Biking would be more rewarding if there was better means of acquiring knowledge about other bikers, and if there was more means of expressing personal identity.
- Increase likeliness of interaction: Motorcycling would be more fun if the likeliness of social interaction increased. It would be easier and more interesting to set up physical meetings, through other prevalent electronic media such as the web or mobile phones, if the people invited to negotiate joint biking were selected among those that had a history of previous encounters.
- Simultaneous activities: The ergonomics of the service must accommodate variability in attention, since driving a bike is demanding.

3 The Hocman Prototype

Hocman (Figure 1) is a prototype service designed to meet the previous requirements [6]. It is a HTTP peer-to-peer application for handheld computers capable of wireless ad hoc networking. It works as an automatic HTTP client to be used in the background of the user's attention. Upon detecting a new peer entering the ad hoc network, it plays a sound icon and downloads the index page of the main directory on the newly discovered peer.



Fig. 1. The hardware used (left). A typical biker's page (middle). Screenshot of the log (right).

HTML is a flexible format that may contain various media formats other than tagged text, such as embedded audio clips, and images. By letting the user be in control of the authoring he or she is in control of both content and format, which allows the service to mediate a personal expression accurately among semi-anonymous users. Users are identified by the content of the title tag of his or her index page.

We designed Hocman to be used as in the following scenario. Before heading out on the roads, the biker activates the device and then tucks it away, e.g. in a pocket. Thus the service is designed to operate and provide added value to biking even when being on the move. However, it will not disturb driving. Whenever encountering

another Hocman-user he or she hears the sound icon telling that he is about to meet a biker who will be sharing web pages. This increases the experience of the encounter, which they cherished. The service will automatically download a page through the background downloading mechanism. Later on, for instance, when at home, the biker can browse these pages. Being able to share HTML documents containing embedded sounds, pictures or texts, adds to the short experience during an encounter. For example, when browsing the shared material, a biker may enjoy increasing his knowledge of some other biker. By sharing images, a user may communicate his personal identity with a wide range of representations e.g. acceleration graphs or pictures of modifications. Audio clips, that contain engines roar, ambient sounds, conversations, music, also add value to this experience. Finally, the biker can take contact through other prevalent media to set up future rides with the bikers he or she met. The contents of their pages may provide contact information such as phone numbers, ICQ number, e-mail address, that may be helpful in planning and organizing biking. Thus, this will increase the likeliness of future encounters along the roads.

4 Related Work

There are several research projects that propose badges and devices providing interpersonal awareness or supporting various other aspects of mobile ad hoc collaboration. The principal systems, all relying on personal technologies and wireless communication, are the Hummingbird device [7], GroupWear Tag [2], the MemeTags System [1], and Proxy Lady [4]. Below we will give a brief introduction to each project and summarize how they were tested or evaluated.

The Hummingbird is a device used to monitor presence of other Hummingbirds in the close proximity. The presence of other devices is displayed as a continuous "humming" sound. The Hummingbird device have been studied through a set of usage experience cases [7, 10]. First, the researchers themselves tried their prototype at their lab, at a rock festival and at an academic conference. The Hummingbird device was also evaluated at a larger scope and setting. Six devices were handed out to ski instructors, who used them during a five-day trip. The researcher observed them using the devices in their daily activities. Two focus groups were arranged after the trip to complement the studies.

The GroupWear is an active badge system that lets user share and compare answers to a set of multiple-choice questions. The GroupWear badge was tested during an annual gathering of researchers, students and business people. A badge was given to all participants, and the usage of the tags was then observed.

The MemeTags System provides mechanisms to monitor other user's presence, but at a shorter range than the Hummingbird device. In addition to the awareness mechanism, the Meme Tags System also offers a simple way for personal expression, through short sentences. The MemeTags system was tested in a similar fashion as the GroupWear system. Some data on usage, such as who met and which sentences were exchanged was displayed on large screens with the purpose of giving feedback to the participants.

Proxy Lady is a system making use of handheld computers, with radio transceivers, to initiate face-to-face communication in workplaces. The design was informed through workshops. At a later stage, a user study was arranged in an office, involving four subjects, during a three-week period.

Summing up, the Hummingbird was evaluated with a limited group of acquainted people in several different environments. The tests were performed within a well-defined area in order to make meetings probable and observable. The size of the area varied however, from very limited as in the lab case, to large, as in the ski slope case. The GroupWear tags and the MemeTags system are both intended as co-operative tools to be used at conferences. Consequently, they are both tested in such settings. Both tests are characterized by a large implementations, with hundreds of simultaneous users and, since the tests are performed during a conference, a limit in time and area. Proxy Lady is designed to leverage on the many meetings that happen in, hallways, cafeterias etc. of an office. The area of an office is quite small and the test involved four acquainted users.

5 Field Trials

The related prototypes have been developed for a different context of use than Hocman. They support or spur interaction occurring face-to-face and among often acquainted users. Consequently they also differ in their design, most prominently in terms of user interface, but also in networking, software architecture, and hardware platform. Moreover, they are tested in environments where the social interaction is governed by other principles than the interaction happening on the roads. Roads are public places, the people crowding them are usually unacquainted and the time for interaction is brief.

We designed Hocman to be used on the roads among unacquainted bikers. Some of the situations it has to react on are very brief i.e. occurring during chance encounters on the road. Moreover, the encounters may take place anywhere along the road network. Taken together these factors constitute a challenge when studying the user experience. The likeliness for a traffic encounter in a small set of unconstrained users is very low. However, similar to the related work, we can increase it by setting restrictions on when and where the devices are used. We argue it is possible to overcome these challenges with a realistic, although constrained, approach. The study presented here provides early feedback on the user experiences of Hocman as well as the users' ideas for improvement of the service. Both types of user feedback will be beneficial when determining the validity of the design requirements.

We decided to conduct a field trial, where the subjects use the prototype during a limited period of time in its intended setting i.e. on the roads. We argue this approach gives an opportunity to obtain holistic data on usage. However, we found it very difficult to observe the actual meetings as they take place. Instead we settled for a semi-structured interview [8] of each user performed immediately after the trial. The interviews were performed in parallel with different investigators. The investigators had a common list of topics to cover; however each individual investigator also had the opportunity to examine other issues the respondent felt important. We opted out focus

groups although we would in such case be able to pose a coherent set of questions. In a focus group we would also gain from participants stimulating each other in the discussion [11]. However, we felt it was more important to keep the bikers apart and stay unacquainted making their comments to the point.

5.1 Participants

We sought subjects to our field trial by posting to mailing lists for employees interested in biking at various companies. We got in contact with twelve people willing to undergo the trial. Out of these, we selected eight participants on a first-come-first-serve basis, with finally six people performing the trial. All subjects were males, about thirty years of age, working in a range of professions, mainly technical as engineers, web designers, etc. They had a solid knowledge in using information technology, e.g. desktop computers, and web browsers. They also had experience of mobile devices, e.g. mobile phones, and pagers. They drove different kinds of bikes such as off-road bikes e.g. Honda Transalp; sports bikes e.g. Suzuki GSX 600; and cruise bikes e.g. Yamaha Virago.

A few days prior to the experiment, we asked the test subjects to fill in a form with information we could use to prepare their respective personal pages. The information we asked for was the make and model of their bike and a picture of it. We asked them if they had made any modifications to it or whether they used any fancy equipment they would like to tell other bikers. We also asked if they used any special web forums and in that case, which one and what nick name they used. In the form they could also specify the URL to a personal homepage, their e-mail address, mobile phone number etc. Moreover, they could specify if they had something to advertise. We prepared a personal handheld for each user based on this data. A typical page is shown in Figure 1. We selected the name of the biker or the model of their bike as the title of the page. This title labels an item in the log.

5.2 Setting

The trial was situated to a route circulating around a recreational area in downtown Stockholm. The traffic along this route is varied. In the northeast corner is a harbour and occasional heavy trucks appear. In the South and southwest there are a number of museums and embassies and the traffic is sparse. In the west we find the national radio and TV offices and many traffic lights and roundabouts to regulate the inner-city traffic flow happening there. The official speed limit along the route is 50 km/h, and driving a lap at this speed takes about 7 to 8 minutes.

5.3 Procedure

We conducted two separate trials, which engaged three test subjects each time. We set up rendezvous locations along the route at suitable parking lots. The participants should stay unacquainted during the trial, and only meet during traffic encounters to

best represent realistic situations. The numbered dots in Figure 2 display each biker's initial position for both trials. The dot labeled with an A shows the position of one researcher, who remained stationary, equipped with a Hocman unit. After some motivations, instructions and rigging the equipment, i.e. tucking away the handheld computer in their pockets and plugging in the earphones, we had them to drive two laps at the speed limit. The arrows of Figure 2 tell in what directions they drove off and the numbers show in what order they left to guarantee some encounters. When the bikers returned, we watched them use the prototype and asked them about their experiences. All interviews were taped and later transcribed.

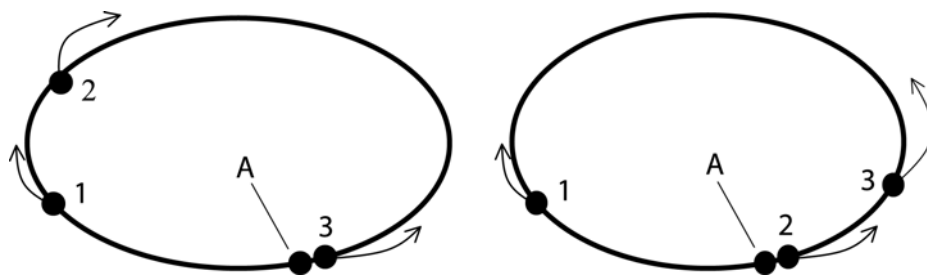


Fig. 2. Schematic view of the first (left) and second trial (right).

6 Results

Most of our questions concerned experiences from the trial. However, we also followed up on their comments on improvements and suggestions for alternative designs. Finally we encouraged them to comment on some of the functionality that was not included in the field trial, e.g. the use of Hocman to organise and plan future rides.

6.1 Hearing the sound icon

A central aspect of the Hocman prototype is the sound icon. Besides informing that a meeting is evident, it also signals there is more to the situation, i.e. a page has been downloaded. Three users gave detailed account for where the signal was heard. They used distinct and easily recognised landmarks i.e. the watchtower, museums, but also traffic lights, roundabouts etc. to specify the situations, such as in:

at the watchtower. When arriving to the watchtower the first time. Then I heard the beep down by the museum, and at the roundabout. On the second lap I was a bit ahead of him, so I passed the watchtower the second time

All users recognized the situations where the mechanism was activated, and consequently where the encounter took place. They commented upon the timing of the signal, which most often was played in advance of the encounter, i.e. prior to becoming co-located with other bikers. Such as in:

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then I met a bike, and it was like 50 meter before we  
met
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Five bikers noted that after hearing the signal, they had plenty of time to look for the approaching biker. Three of them found this time intriguing. This is illustrated by the following comment:

```
I didn't expect this long time span. In some way it was  
amusing, seeing that you had time to react and think:  
Look!
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Furthermore, one biker was even a little disappointed when he realised he met a biker without hearing the sound icon, consequently a biker not part of the test. Another biker found it slightly confusing when being alerted and thus expecting meeting someone on the road, when the cause for it was someone equipped with a Hocman-unit standing by the road. Finally, one biker found the sound icon negative and somewhat stressful. He expressed some concern of being interrupted by the sound while being concentrated on driving, as he felt he was compelled to look for the upcoming biker.

Three users said that after having heard the signal, they waved to the approaching biker. They also stated that this is what they would normally do in such situations. However, they felt a tendency to wave even more than usual, as Hocman made them feel more akin to each other.

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you wave even more while hearing this beep, so to  
speak. Then you realized, you were a bit curious on the  
others who drove with this thing
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Another biker felt extremely strong about the affinity Hocman use introduced, even claiming that hearing the signal would replace the need to wave entirely.

6.2 Sound icon design

Seeing that the prototype is used in the background of user attention, the design of the sound icon plays a central role in the user experience. Five out of six found the sound icon being comfortable and having an appropriate design, however two respondents were stunned by the loud volume. Nevertheless, both of them agreed that they would quickly get used to it. At the same time, three users found the high volume justified, since noise from the engine and the headwind easily would have drown the alert otherwise.

the volume was loud enough for these speeds and circumstances

However, all users had some suggestions on how this awareness signal might be improved or re-designed. The alternatives were divided into three categories. The first concerns improvements on the use of audio. Two users suggested ways of personalizing the sound icon. The first wanted to be able to record voice messages and have them sent over instantly, like an open-invitation audio-conference. The other wanted to be able to select among a variety of signals that the other biker would hear when he met them. The second category of proposals comes from bikers who preferred visual feedback to audio. Two bikers suggested that a lamp on the handlebars should indicate the meetings.

I preferred a lamp or something similar

One user suggested that the handheld computer should be mounted on the handlebars and the screen should display the name of the meeting biker in large letters. The last category suggested tactile feedback instead. Two bikers proposed devices that would vibrate rather than sound to indicate an upcoming meeting.

6.3 The handheld computer

Apart from the sound icon, our choice on the tangible properties, such as the hardware, influenced the user experience. All users found it acceptable to carry a handheld computer in their pocket. However, some were concerned with the bulkiness of the particular device used in the test. They needed their jackets to wear many other things:

the problem is the size, it is a bit big. In this shape it takes too much place, when having it in the pocket. Seeing that I use a quite thin leather suite, I can't have too much in my pockets. I already have my wallet and my mobile phone, while driving. It becomes too tight with these clothes

Three bikers suggested that instead of carrying the handheld, it should be either mounted on the handlebar or placed in their rucksack or in the top-case. Finally, four bikers expressed some disappointments with the earphones. Wearing earphones was not comfortable, i.e. they would fall out or squeeze the ear. Moreover, two users stated they normally wore other things in their ears, such as intercom earphones or ear defenders, which would make no room for the kind of earphones we provided. On the other hand, the peer discovery signal could easily be integrated with the existing intercom earphones.

6.4 Remembering encounters

The system is intended to reinforce the encounters with other bikers, but also to sustain them a bit longer. By examining the entries in the log, five out of six users could

easily refer back to the meetings they had experienced on the road. By looking at the list they could tell where and when most of the meetings took place and which bike they had seen. For instance:

```
Honda hornet, I suppose that is Mattias own bike, if
I'm not mistaken. GSXR 750 is the sport-bike, and the
Tiger, wasn't it parked by the road the last time I
passed here. It must be that one. Ehhh, or if I caught
up with him by the traffic light, at some occasion? I
heard the beep by the traffic light, but if I caught up
with him, or if I met him, I leave unsaid
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A single biker expressed that he could not make a connection only by looking at the log. Despite that the meetings took place recently, he could not associate them with the log items.

One encounter involved two bikers that happened to be acquainted: Eric and Patrick. They found it more relevant to think about whom they met, instead of where the encounter took place. However, the actual meeting was too brief for them to recognize each other properly. While looking through the log Eric commented this:

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was it... do you know who... was it Patrick I met on the
road?
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Later he was able to confirm that it actually was Patrick he met when locating the corresponding entry. Patrick expressed a similar concern, as he was examining the items in his log, he said:

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ok, this one, which I suspect is Eric... which it was
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Four respondents expressed positive attitudes to having a downloaded picture to look at, when recalling a particular meeting. However, further questioning also revealed that some users found that the picture was not helpful when remembering a specific meeting, as it did not resemble the actual situation that they experienced. Some users said, on the road, they notice the colour of the other bikers' suits and helmets rather than the model and colour of the bikes. They also found it hard to distinguish bikes as they often are used in their standard make without any modifications. Finally, one user found the picture of limited value. Most pictures used in the trial portrayed the bike straight from the side, but during the encounters he only saw the front of it.

6.5 Sharing HTML pages

HTML is a flexible document standard, and may encompass a wide variety of information interesting to bikers. Five bikers found it intriguing to read about other bikers on the downloaded pages we supplied them with. They liked the brief presentations:

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to get a feeling of who it is. Name, phone number and
something more
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One user said he did not find general information as presented here very interesting. Some user also followed up their claims on how they perceived the pages and talked about in which situations they would be useful.

One user said that he wanted the information when he engaged in other off-road activities, i.e. visiting web forums where biking is discussed. Being logged on, he wanted to know which other forum users he had met physically. Another user said he would find it very useful when going to places where many bikers got together. He also imagined contact information useful if he saw another biker doing something he wanted to rebuke. On the other end of this spectra, a third biker would like to know more about the people he had engaged in “mischief” with i.e. performing stunts, such as, going on one wheel.

The matter of what they wanted to know about other bikers and what they wanted to tell was divided into two themes. The first concerned the social habits of biking. One biker wanted to know other bikers’ where-to-go tips. He also wanted to know other biker groups’ hangouts, such as cafés. Another biker even wanted to know whether the biker he met was of the opposite sex, as he was looking for dates. The other theme concerned the motorbikes. The bikers expressed that they wanted to know more if they met someone using the same model or having interesting extra equipment or modifications.

6.6 Distributing the pages

The response on the matter of with whom the pages should be shared, concerned two extremes: the pages should be distributed to all bikers, or kept within members of a certain group. The fact that they potentially would spread contact information with unacquainted people intimidated one biker. However, two others found that a positive experience of the concept require widespread usage in the general public.

to have a reason for using it, the system has to be widespread

At the same time, being able to single out a group as the target of your page appealed to two bikers. Two bikers suggested that the user should specify what he or she wanted to show to whom. Finally, one biker was concerned that some authority, such as police or insurance companies, would use the service to monitor biking activities.

Even if the group that the user is sharing is delimited it might still be very large. Three bikers stated they would like to filter out some log entries on reception.

perhaps you could talk about that you want a Honda Hornet, or that kind of bike, or say that you want... use it for advertising. Its easy to use a tag, which it reacts on... so it will receive everything, but then throwing the irrelevant stuff. Like when you are going to the yellow café, you would like a filter

Two other bikers also stated a similar idea. They suggested a mechanism to sort entries, however receiving them all.

6.7 Contacting other bikers

Finally, would Hocman be useful when contacting other bikers? Four bikers were positive to the idea of using the information on the pages as a starting point to contact other bikers.

it you are interested in buying or selling, or if you
formulate that you want a bike like the one I have

One of these users elaborated the idea and found many plausible reasons for doing it in order to get company on the roads. For example:

or if you looking for company on your rides, or why not
a dating functionality

A second user found it more appropriate to supply an URL or email address. He thought that following up a joint meeting through postings to web chats or sending email messages would be an unaffected way of approaching somebody. Finally, one user did not think he would contact somebody on the basis of having a persons' page only.

6.8 Summary

The field trial indicates that Hocman is able to add to the *enjoyment of driving*. It was evident that the bikers did not think that using Hocman would rationalize overly biking; however hearing the sound icon, inspecting logs and browsing contact information etc. would add something positive. Moreover, the feedback we received also indicates that the requirements we derived are complete i.e. there were no other important issues that we overlooked, and valid i.e. they made sense to bikers.

Fundamentally, all bikers recognized that the sound icon alerted co-location of other Hocman users i.e. motor bikers. About half of the subjects could also account for where and when it was heard, which indicates they had plenty of time to react, look around, and let the experience sink in. More importantly, almost all of the bikers enjoyed hearing the sound icon to an extent that was surprising to us. For instance, some bikers changed their driving behaviour, i.e. waving more or less as what is custom when otherwise passing a biker. Besides remembering where they heard the sound icon, most users were also able to associate a particular log entry to it. In one case an entry and the associated web page was helpful when recognizing an acquaintance. The feedback we got on hearing the sound icon and being able to inspect the log, indicates Hocman was able to *enrich traffic encounters*.

The users found it interesting to read the information on the downloaded pages we prepared for them. Collectively they also had many suggestions on what other data the pages could contain, which acknowledges that Hocman provides ways for bikers to *express identity*. On the other hand, there was no consensus on the matter of sharing pages with all users or a limited group. However, all agreed that some sort of user defined filtering or sorting mechanism would improve the concept.

Most bikers we interviewed claimed that they took interest in which bikers they ride together with. They found it plausible that they could contact somebody on the premise of reading a page someone shared. Moreover, a few users recognized that

Hocman also could be used for a variety of other purposes, such as ads or dating. This tells us that Hocman may *increase the likeliness of interaction* among bikers.

Finally, we are confident that Hocman meets the requirement of *simultaneous activities*, however some details could be improved. Lowering the volume of the sound icon playback, a less bulky device, and more comfortable earphones perhaps integrated with the helmets, would have been better appreciated.

7 Conclusion

We have demonstrated that field trials are an effective approach to get feedback on how well a prototype service fulfils the design requirements derived from an ethnographically informed study of motor bikers. The field trial was performed in two runs with a total of six bikers. The bikers used Hocman, a HTTP peer-to-peer application for handheld computer capable of wireless ad hoc networking, in a constrained however naturalistic setting. We gathered the feedback through parallel interviews. Our results indicate that we could improve on our choice of hardware. However, Hocman was appreciated, especially hearing the sound icon when encountering another biker.

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