



Final Report – April 10, 2014
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1. Introduction

Smartphones enable us to be constantly connected, but ironically can cause us to neglect those physically around us. *“Critter”* addresses this new social problem along with an old one: how to start a conversation with a stranger.

Critter is a mobile application that transforms your device into your pet animal. As you walk your Critter, it interacts with other Critters in its vicinity.

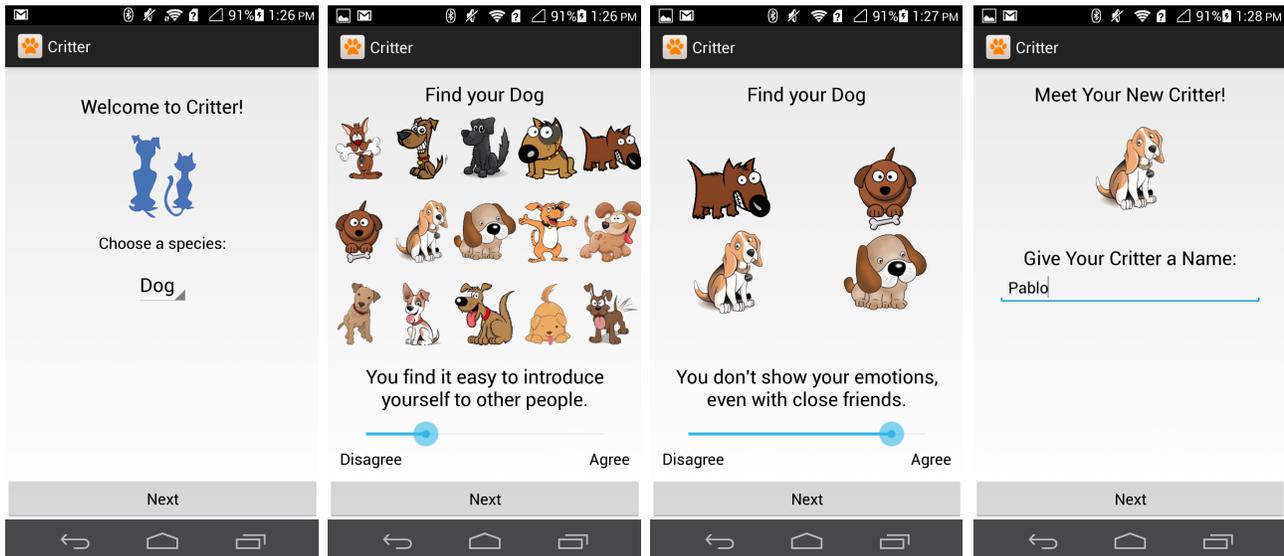


It is known that interaction between dogs catalyses social interactions between their owners[1]. Our hypothesis is that conversations between Critters will similarly catalyse conversations between the phones' owners.

Critters have distinct personalities, and dynamic moods based on environmental conditions. Personality and mood influence how Critters behave and interact with each other. These interactions are independent of the agency of the user and are intended to be humorous. Humour is a known social lubricant[2].

2. Functionality

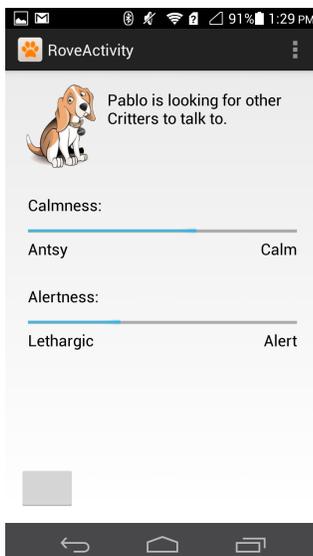
2.1. Finding a Critter



Critter comes loaded with 16 dogs and 16 cats, each with its own image, personality, and set of vocalizations. 4 distinct personalities and sets of vocalizations have been implemented in the prototype.

The user chooses a species and is presented with a selection of Critters. Each Critter has a personality profile that is unknown to the user though may be inferred from the image of the Critter.

The user is presented with a series of statements and is asked to indicate the extent to which they agree or disagree. This is used to eliminate Critters who are least compatible with the user's personality. Additional questions are asked until there remains a single Critter, which the user then names.



The Critter name, image, and personality are now set from this point on. The user will return to this component of the app only if they choose, via the settings menu, to get a new Critter.

This process allows user customization while maintaining the impression that the Critters are beings that exist autonomously.

2.2. Critter Mood

After finding and naming a Critter, and on subsequent launches of the app, the Critter's current mood is displayed as a measure of calmness and alertness. The more you walk, the calmer your Critter becomes; the more exposure to light, the more alert it becomes. The mood is dynamic and the mood status bars reflect this in real time.

2.3. Detecting Other Critters

Detection works reliably when there are two nearby Critters with internet connections. User intervention is not required to initiate communication, unlike communication via Bluetooth which requires user input to “pair” devices. This is key to the Critters appearing to act autonomously.

Critter detection sometimes occurs when they are in adjacent rooms. If there are more than two Critters within the same vicinity, a conversation may fail to initialize. We plan to address this undesirable behaviour in the future. For the prototype we chose not to focus on improving detection and conversation initialization since we anticipate that more applicable technology, such as low-energy bluetooth and “iBeacon”, will soon become widely available on the Android platform.

2.4. Critter Conversations

When a Critter detects another Critter, it initiates a conversation. The messages that Critters send to each other include a text component and an “intent”. The intent is the underlying objective of the message understood by the other Critter. The text component is displayed to the user.

Each Critter has approximately 100 possible output text messages, each of which is tagged with one of 16 intents. The message a Critter sends depends on the received intent, their personality, and mood.

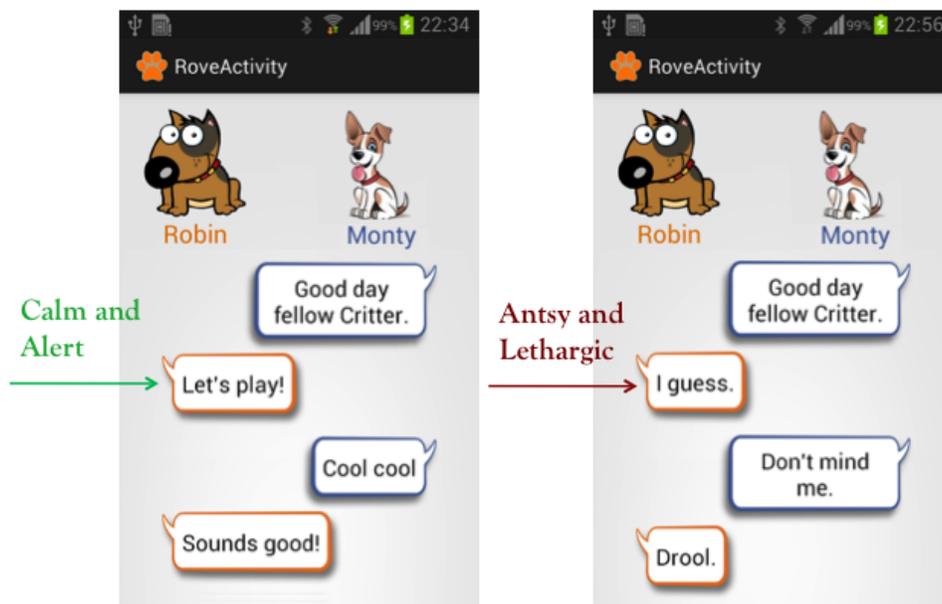


Figure 1: mood in conversations

Figure 1 shows how conversations depend on mood. Everything is identical in the two conversations except for Robin's mood. Robin colludes with Monty in his first message when he is calm and alert, but resists when antsy and lethargic. The conversations then pan out differently since every message depends on the intent of the previous message.

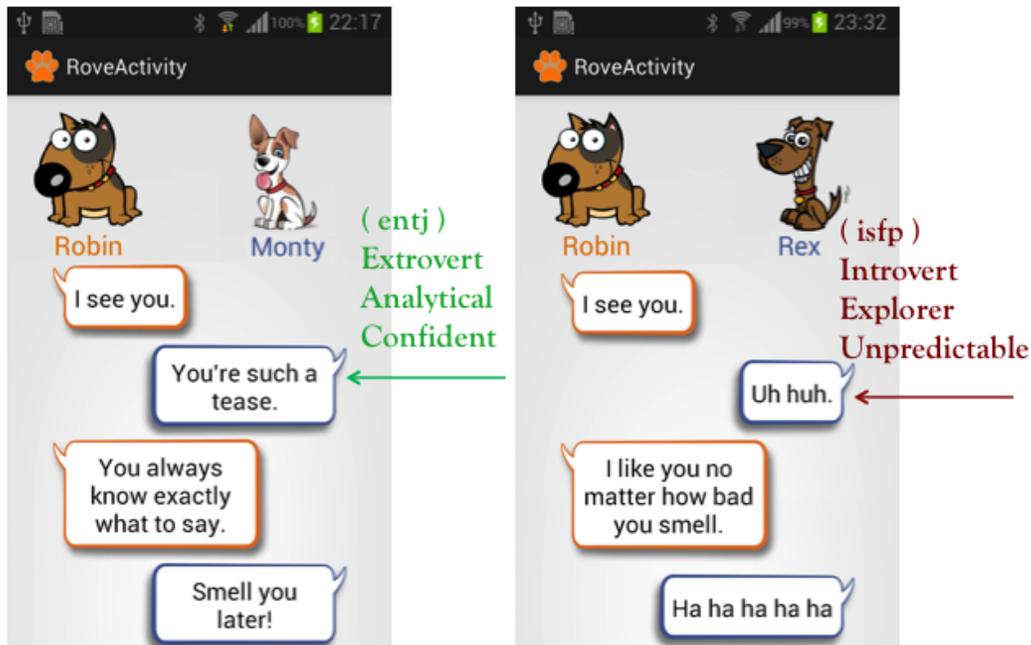
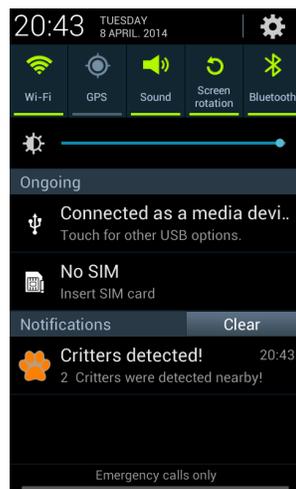


Figure 2: personality in conversations

Figure 2 shows how conversations depend on personality. The Critters' moods and Robin's opening message are identical in the two conversations. The intent of Robin's message "I see you" is to tease. Monty, being an intuitive extrovert, calls him on this and responds with "You're such a tease", the intent of which is to flirt. On the other hand, Rex is a sensing introvert who responds with "Uh huh", the intent of which is to resist.

The variety and dynamic nature of the conversations, along with the sense that the user can affect the outcomes of these conversations by walking their Critter and by giving them sunlight, all contributes to the humour, unpredictability, and lifelike charm of the app.

2.5. Background System Processes and Notifications



We have included a menu option that allows your Critter to continue searching for other Critters when the app is not open. You can use other applications while Critter continues looking to initialize conversations.

When a Critter sees another Critter, a notification appears in the notification bar. Tapping on this notification will open Critter so you can view the ensuing conversation as it takes place.

3. Design

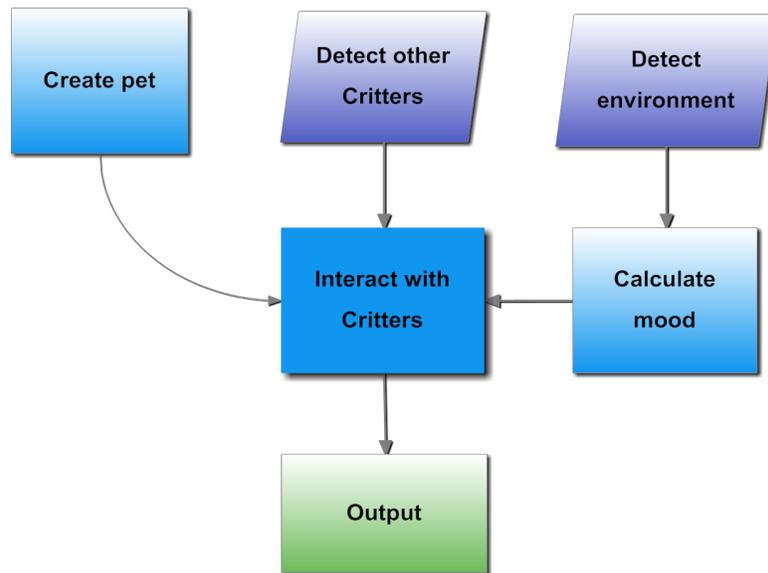


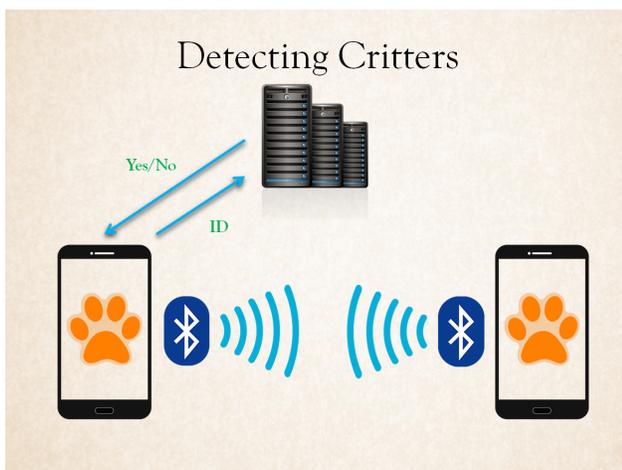
Figure 3: block diagram

3.1. Create Pet

As described in a previous section, users take a personality quiz to find a Critter with a matching personality.

The Critter personalities are encoded using the Myers-Briggs scale. Myers-Briggs defines four personality axes: extroverts(E), who focus on their outer world, versus introverts(I), who focus on their inner world; sensors(S), who take information at face value, versus intuitors(N), who infer meaning within information; thinkers(T), who rely on logic to make decisions, versus feelers(F) who consider people and circumstances; and perceivers(P), who prefer to stay open to options, versus judgers(J) who prefer to make decisions[3].

Critters have a score ranging from 0 to 99 for each Myers-Briggs personality trait, giving a potential of 100 million unique personalities. In the current prototype each Critter has a score of either 0 or 99 for each trait, giving 16 possible personalities per species.



3.2. Detect

In order to perform detection of nearby Critters, we use Bluetooth signals and an external server.

Bluetooth signals have a good approximation of the range we want. Using Bluetooth means we could implement this from scratch, allowing us to be flexible and independent of a third party library.

We avoid requiring user intervention to pair Bluetooth devices by having all communication

occur through a server.

The steps of the detection process are:

1. Enable Bluetooth and make it discoverable by other devices
2. Discover Bluetooth devices and store their MAC addresses (an ID number unique to a device)
3. Send these addresses to the external server
4. The server responds whether these addresses belong to other Critters.

3.3. Environment

The wide selection of sensors that are available in most devices gave us the opportunity to include interaction with the environment. We focused on two factors: ambient light and motion.

Ambient light is detected using the ambient light sensor. Motion is detected using a Google Play Library called ActivityRecognition. Using that library and several low power sensors, we are able to detect if the user is still, walking, or running.

3.4. Mood Calculation

Environment affects the mood of the Critter in real time. Calmness correlates with the amount of recent motion, and alertness correlates with the amount of ambient light. Dynamic mood allows for a variety of interactions with other Critters.

3.5. Critter Conversations

Critters send messages to each other via the server. These messages include a text component and an intent component.

The message intents were inspired by real animal communication. Animals don't communicate to transfer information; they communicate in an attempt to influence each other[4]. We used the following message intents: amuse, badger, charm, collude, distract, encourage, flirt, goad, humour, impress, placate, resist, rouse, soothe, surprise, and tease.

Each Critter has an “intent map” unique to its personality which it uses to generate response messages. On receiving a message, the input message intent and the Critter's current mood are mapped to an output message. If a message is tagged with a “null” intent it indicates to the other Critter that the conversation is over.

Since the intent vocabulary is universally understood by all Critters and each message is tagged with a known intent, there is no limit to the new text messages that can be created as we introduce new Critter personalities into the wild.

3.6. Output

When your Critter is engaged in a conversation you are shown images of both Critters along with their names. As each Critter speaks it emits an audio vocalization. Additionally, English translations of the messages are displayed in speech bubbles. The choice of output is inspired by the fact that animal vocalizations carry emotional information for humans[5].

4. Key Learning

We discovered that detecting nearby devices is not supported natively on the Android platform. Our Bluetooth implementation proved extremely challenging to implement and we faced many hurdles on both the server and app side to achieve reliability.

In retrospect, this prototype would have been easier to implement for the iPhone which is equipped with low energy bluetooth and the ability to broadcast its presence to nearby devices (i.e. iPhone devices can be “beacons” whereas Android devices can not). A library like iBeacon would have greatly reduced the amount of work that was necessary to develop our prototype.

5. Future Work

We plan to improve the Critter detection functionality as new technology becomes available.

We plan to become production-ready by creating Critter images and sounds for which we have commercial rights. We will create more personalities with corresponding intent maps and messages, and add new Critter species. These species options will be downloadable for a price while the basic app comprising cats and dogs will be free.

Finally, we plan to create an iPhone version of the app in order to appeal to a broader market.

6. Apper Context: Akash

I am currently a Master of Information student at the iSchool in the University of Toronto, pursuing a concentration in Information Systems and Knowledge Media Design. My previous academic background is in Computational Psychology. I also have a strong research interest and industry experience in User Experience Design.

My chosen ‘field’ is where the two overlap: broadly speaking, this includes altering or even ‘engineering’ behaviour via mobile app design.

I think what might have changed from the motivations I described in the initial Apper description is a distinct focus on attempting to change some aspect of human behaviour, to create social value. With Critter we’ve decided to design an application that encourages people to participate in face-to-face interactions. As social networking technology becomes more and more ubiquitous, we, as a society, have become increasingly ‘addicted’ to or even dependent on mobile phone devices for engagement. The hope is to enable people to technologically ‘detox’ and facilitate real conversation. I think that this can create some positive social impact. Also we can trigger positive behaviours in users by having these actions affect Critters favourably. For example, going for a walk/jog or getting more light is healthy for the user and also puts their Critter in a good mood.

For the Critter project, I have been the keeper of our hypotheses/heuristics and rooted our product feature ideas in the scientific literature. I looked into literature on personality assessment and personality-type interactions, animal communication, humour as catalyst for conversation and tried to integrate these with the computational psychology concepts I have some expertise in.

I was also able to conduct some small scale user testing in order to gauge initial reactions and feedback.

I found that people found the idea to be an exciting prospect and were eager to try it out ‘in the field’. The humour element of the Critter responses resonated strongly with them. Regarding the ability of the app to trigger a real-world conversation, the general consensus was that it would be context and environment dependent. There are certain settings where they said they would likely engage in a conversation as opposed to simply acknowledge the owner of the other Critter. We will get a better understanding of these nuances with future usability testing experiments and product iteration based on our results. I have devised scenarios for us to test in and I am in the process of recruiting participants to perform a more controlled experiment.

I’ve learnt a great deal about mobile application development in general, both in terms of smartphone capabilities but also software development/engineering practices such as version control (Git). I found block diagramming and organizing our project plan by ‘spirals’ to be really useful. I obtained a certain degree of familiarity with the Android OS and its components and libraries. I also learnt the basics of interface design, and experimented on Moqups and with XML (for our Android application UI).

7. Individual Contributions

7.1. Kiran

Kiran conceived of the Critter app, its functionality, and the name “Critter”. He assumed a managerial role that involved proposing division of tasks, scheduling and running meetings, and creating the team's workflow using Git/Github versioning software allowing each team member to develop concurrently.

Kiran programmed the Critter creation, personality quiz, display of mood, conversation generation and display, and the user interface. He helped to debug various aspects of the app, edited Critter images, and sourced and edited the audio clips for Critter vocalizations.

Kiran conceived of and created the conversation logic involving mapping input message intents to response messages and intents, based on personality and mood. He implemented a framework that allowed these intent maps to be encoded in spreadsheets, thus streamlining the integration of the intent maps for the various personalities. He created the set of intents, and the first set of messages and intent mappings (ISFP dog). This served as a template for Akash to complete the intent maps for the remaining Critter personalities. Kiran tested conversations and tweaked messages to ensure that the conversations were coherent and humorous.

7.2. Kristian

Kristian focused mostly on the technical aspects of the app. These included:

- the detection of nearby Critters using Bluetooth
- gathering raw data from various sensors and using them to calculate the Critter's mood
- implementing the server scripts that synchronized the conversations between the Critters
- services that run in the background and produce notifications while the app is not active

7.3. Akash

As alluded to earlier, the apper was the keeper of our hypotheses/assumptions and providing a scientific framework in which to situate our product features. The apper selected the questions for the personality quiz and also chose the Critter types and images that were used in order to obtain a match. The apper was also primarily entrusted with drafting the Critter responses and creating the logic for how these were selected; Responses were tagged with particular intents and these intents manifested differently for various combinations of personality and mood as well as the position of a message in a conversation.

Word Count

Report excluding Apper Context: 1983

Apper Context: 497

References

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