“BugBytes” Mobile App
User’s Need Report

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The following report discusses the user needs from potential users of the BugBytes application through introducing the application and its potential users, and scenarios in which the application could be used.

Description

The “BugBytes” app could be used to quickly identify an insect or other animal after being bitten, stung, or otherwise harmed by it. An intuitive, visual question based system (styled after the “20 Questions” concept) would be presented to quickly identify the animal. Example questions would include what kind of creature it is (spider, snake, mosquito, jellyfish...), what colors it is, what patterns are on it (stripes, dots, hourglass marking...), its size, characteristics of the bite mark and other simple questions. As these questions are answered, the app would display an ordered queue of creature images based on how closely it matches the questions, as well as using the user’s cation (via GPS coordinates) relative to the creature’s known habitat. Each creature would be associated with an information page describing the seriousness of the bite, any medical treatment that could be applied immediately in the field, and whether or not to contact emergency medical services. It could also include helpful information to relay to the emergency contact, such as if an anti-venom is available that should be on hand for the victim’s arrival at the ER.

Potential Users

Potential users/stake holders range from medical professors like doctors and emergency medical technicians to teachers and students interested in outdoors and wildlife. The specified groups’ user needs can be divided between professional and amateur.

Professional Needs:

Potential users of the BugBytes application include professionals in the medical, and outdoor
and recreation fields. This application is most useful to those fields as a quick reference tool. Individuals in medical professions, such as doctors, nurses, emergency medical technicians (EMTs) currently have computers with access to large databases of information, however it is impossible to carry a bulky desktop or laptop around in an emergency situation. A similar situation is presented for individuals working in outdoor and recreation fields, such as camp advisors, troop leaders, and trip leaders. Bulky laptops are not always the best thing to have along on your camping or hiking trip. A solution is to create a tool that can be used on a small transportable or mobile device (i.e. tablet, mobile phone), so in the event of a medical crisis, the medical or outdoors and recreation professional can pull it out and input the necessary descriptions for an output of possible causes. BugBytes addresses this issue for animal and insect bites by providing an interface for medical and outdoor and recreational professionals to symptoms to determine the best treatment at a fast pace.

Amateur Needs:

While professionals often exposed to emergency medical situations would be considered the primary audience for this application, it will also be designed for a less experienced crowd exposed to dangerous animals in less serious environments. Such an audience could use the application for informational and entertainment purposes, as well as in response to select emergency situations. Potential user groups include recreational outdoor enthusiasts, users with an educational or informational need, and the general public.

Outdoor enthusiasts typically consist of people who frequent the outdoors for sport, such as hikers or rock climbers. Like professionals who lead trips, they are in the wilderness where Emergency Medical Service (EMS) is not immediately available. They can use the application before or after being bitten to identify a risky creature in the field, and use that information to better inform the emergency workers who will assist them. While they are not directly involved in the medical process, having this application personally can be useful to the rescue team that responds to their call. People who would benefit from this application on an informational level might include members of a scouts or other outing club. The application could be used as a learning tool to help identify what species of snakes and insects are dangerous in the wild, so they can better identify them later on. General users of this application don’t have any specific need for the application, but may find it handy in everyday life. For instance, a strange insect could make it into the house, and someone with the application could attempt to identify so they know how to get rid of it. Similarly, a family could be in the park for a picnic when someone is bitten or stung and has a slight allergic reaction, in which case the app could be used to identify what insect they are allergic to. They may be indoors, outdoors or wherever, and find a use for the application.

From a technical standpoint the common requirements that our users would need from our
mobile application is an interface that is fast, professional looking, and accurate. An additional constraint is added by the need to use the application in outdoor settings, where access to wireless Internet or other networks may be unavailable.

**User Scenarios**

_Prologue:_

It is assumed for the purposes of this application that users are within the Northern United States. This limits the scale of the application so that we can focus on interface design instead of database compilation. These user scenarios will also limit encounters to inspects and reptiles in case we decide to further narrow our coverage of animals. Additionally, the application is this only available for people with android phones and tablets.

_Scenario 1:_

This scenario is based on a real experience by an outdoor trip leader at University of Maryland College Park excluding the actual usage of the application (which coincidentally would have come in quite handy). A group of 10 university students embarked on a caving trip to Pennsylvania on a weekend in October, 2010. Leading the group were three student trip leaders, who all had been to the cave previously. After arriving and spending a few hours in the cave exploring the various caverns, the group arrived at a passageway dotted with several small spiders that had not been seen in the cave before by any of the trip leaders. Upon looking at the specimens, one of the participants claimed that it looked noticeably similar to the “black widow”, a spider known to be highly venomous, except that it did not have the characteristic hourglass marking. As the group became uncomfortable and nervous because of the remark made and the lack of expertise to determine if this really were a dangerous spider, the trip leaders decided not to continue forward. This cut out a significant amount of exploration from the trip, and left the group feeling underwhelmed. Upon arriving home and doing some research on the internet, it turns out the spider was a harmless cousin of the black widow, and posed no danger to the students.

This result could have been avoided with the use of the BugBytes application. Let’s assume that one of the trip leaders brought a mobile device into the cave. Upon discovering the spider and hearing the fearful remark from the participant, the trip leader begins to identify it using BugBytes. The participant loads the application and selects the feature for identifying a bug and then spider. After answering several questions about the color of the spider and the hourglass marking, the application displays the closest matches based on the user input. The closest match displayed is not the black widow, but the harmless cousin. Just to be sure, the trip leader flips through various photos provided by the application, and compares them to the spider. The trip leader is now confident that the spiders are not venomous, reassures the participants, and the group continues further into the cave. While this would be considered a professional use, there
is no immediate medical emergency. In this way, the application can be used in a preventive manner before any bite takes place.

Scenario 2:

A young couple is out on a trail in the mountains for a weekend of backpacking. The man is an avid hiker, and has been in this area several times before. Upon walking over a log, the man is bitten by a snake, which quickly scatters a few yards away. His companion immediately gets out her first aid kit and starts treating the wound. The man remarks that the snake is harmless, having encountered one before. He identifies it as a “milk snake” by the distinctive red, yellow, and black stripes. He assures the woman he will be fine, and that they can continue after he rests some. The woman wants to be sure, and pulls out her mobile device, which has the BugBytes application installed. She quickly selects to identify a snake, and is asked to provide the colors (red, black, and yellow) and the pattern (horizontal stripes). The application provides her with the closest matches, and it turns out there is more than one snake with these traits. While the milk snake is harmless, the similarly looking “Coral snake” is one of the most venomous in North America and can be found in the region the couple are hiking in. After looking at the picture, the couple determine that the snake could possibly be the venomous species. The woman then contacts emergency medical services to evacuate the man, informing them of the species of snake they suspect caused the bite. She also applies some immediate first aid, as suggested by the application, while they wait for advanced care.

In this emergency scenario, the application is not necessarily used to perfectly identify the snake, but to inform the user that it could be a very dangerous variety. Several venomous species attract mimicry, which can make identifying which ones are dangerously difficult. Even if the identification was inconclusive, the couple learned about the venomous snake and decided to act on the safe side, potentially saving the man’s life. Especially with venomous snake bites, getting advanced medical treatment as fast as possible is of the utmost importance. The application enabled the women to quickly identify what species matched the man’s description, and may have further accelerated the access to treatment by instantly providing EMS with the suspected type of snake. The woman did not have to waste time describing it over the phone, and EMS could leave immediately to meet them with the appropriate anti-venom. Through these ways, the application decreases the victim’s delay to proper treatment by a small but crucial amount.

Scenario 3:

On a lazy Sunday afternoon at home, a mother and her daughter are watching television. Suddenly, they hear the toddler in the house crying in the other room. The mother thinks that the child must have stumbled and hurt itself, and tries to console the child. Her daughter notices a nasty looking spider near the crib. Using her mobile phone, she loads the BugBytes application
and attempts to identify it. After answering questions about its color, size, and any other distinctive markings, the closest match is the Brown Recluse spider, which is often found indoors and has a very venomous bite. Sure enough, the toddler turns out to have a rash on its leg which matches the picture shown by the application. They then call an ambulance and relay the type of spider to assist the EMT’s with treatment.

In this example, we see how the app can have uses even when indoors. Not all dangerous animals are always found outside, and having an app to quickly identify one instead of searching for it on the browser is an added convenience. Even someone who has no interest in the outdoors or dangerous bugs can make use.

**Scenario 4:**

At a nature-focused summer camp, a counselor has the duty of training kids on how to handle minor injuries. As part of the lesson, he’s playing a game with the kids to recognize bites of different kinds. The counselor has a tablet that is running the BugBytes application. After providing some initial information about the characteristics of certain bites, the kids form a line up to the counselor. While in line, each kid reads information that the counselor has prepared on common bites.

When a kid reaches the counselor, the counselor names a certain creature, and the kid has to guess the correct traits of the bites, stepping through each category (markings, pain type, colors, etc.) If the correct set of characteristics is guessed, and the application displays the desired animal’s information, the kid gets a prize. As the contest continues, kids continue to get more & more informed about the sorts of bites they might encounter while recreating outdoors.

In this example, we see how the application can be used for educational purposes.

**Scenario 5:**

An ambulance is rushes to the scene of a lone hiker, who has just been found after a few days of being lost in a large national park. A search team had found him badly bruised after a bad fall, which left him in poor condition as well as breaking his GPS and phone. The team had brought him to the nearest road and called for the ambulance. After a quick evaluation, it is determined that he is sick and in need of medical attention. They load him into the back of the ambulance and start on their journey to the hospital. En route, the EMTs perform a preliminary evaluation, noting a few broken bones and a possible infection. Finishing up, one EMT still feels uneasy about their diagnoses, as none explain a swollen and red left ankle. He feels it is inconsistent with a simple sprain, and examines further. He notices some strange markings around the ankle.

Quickly thinking, he pulls out his work phone and loads BugBytes. He starts entering the characteristics of the bite, including the location in which they found the hiker. Meanwhile, another EMT reports that the hiker’s temperature is slowly climbing. The EMT, then, enters
this information into BugBytes. Due to the large, sequential interface, the EMT is able to enter this information in as they bounce over uneven roads. BugBytes displays the most likely result: a bite from a relatively rare snake. The EMT finds that the built-in description of the bite is consistent with the patient’s symptoms. The EMT is able to phone ahead to the hospital and have the proper anti-venom prepared ahead of their arrival.

Scenario 5 serves as an example of how designing an application for mobile devices allows for fast paced and smooth data retrieval in times of emergency.

Scenario 6:

At the National Zoo, an interactive display is installed near the reptile and insect exhibits. Surrounding the display are videos, photos, and descriptions of various insect and snake bites. A touchscreen, connected to a small computer running Android, is running BugBytes. After learning about the relative severity and various symptoms of bites from different animals, visitors can experiment with BugBytes. The display would allow for others to watch the progression from choosing different symptoms to a likely diagnosis. Users can easily start over and end at different diagnoses by varying certain symptoms. This would make it easy to see which bites were similar in effect as well as possibly demonstrating the importance of recognizing and treating certain kinds of bites.

In this example we see how BugBytes can be used for educational and recreational purposes within an exhibit setting.

Epilogue:

Internet Connection. These scenarios demonstrate the need for program functionality that works without a connection. After being bitten, users must be able to document animal characteristics immediately after initial first aid concerns. We will determine what information is possible to store on the device. We may find that only a description of the bug can be entered when there is no Internet coverage. Then later when the mobile device connects to the internet the application will display a list of possible matches. If enough space is allowed we may store the entire database on the device allowing full usage with our without internet coverage (updates to the database would still require a connection).

No Animal Description Possible. There is an additional concern with functionality not brought up in these usage scenarios. Most bug bites are discovered hours after the bite occurs. In these cases the
application will provide helpful descriptions of what to look for in the wound site. Perhaps additional statistics should be gathered to determine which area would provide the most use. We should determine the most statistically common animal bites.

Classification. In the following scenarios there is the need for a classification system that presents how dangerous the animal is. One system may include a series of icons next to the bug description / image that indicate certain traits (i.e. a “poison symbol” if the animal is poisonous or a skull and crossbones if the animal is considered highly dangerous).

The Importance of Accuracy in Medical Information. In some cases we are giving life or death medical advice. A disclaimer should be displayed to every user.

References


"Data Storage." Android Developers. Web. 30 Sept. 2011. <http://developer.android.com/guide/topics/data/data-storage.html>. Our application will involve storing databases of animal information on the device, most likely in sqlite format. The application would need to download an sqlite file that is hosted remotely and would be available wherever the user is.

A user interface guide for existing applications in our genre of development will help lay the foundation for a more consistent and professional looking interface.


The application needs sample data that is appropriate for demonstration. This book should allow us to come up with a few sample question paths that suit the needs of a test audience.


This book explores the benefits of using modern technology to allow faster and more accurate diagnosis and treatment of diseases and afflictions. Smartphones and their implications are explored along with other innovations in the context of the future of healthcare.


Mednieks covers the basics and intricacies of Java programming on the Android platform. From setting up the Android SDK to designing dynamic interfaces that fit any Android device, *Programming Android* is a vital resource when seeking android development advice outside of the documentation.


Because android applications use sqlite as a storage system, understanding it will be helpful to the success of our project. Ideally we would have a web application where content can be generated, stored in an sqlite format, and later pushed out to the mobile device.


The official developer guide for user interfaces will be one of the first steps towards designing a basic interface for our application. Android documentation can be consulted throughout the entirety of the project.