

I-Bike Test Phase Report

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Program overview

In spring 2015, the Institute for Sustainability, Energy, and Environment (iSEE) was awarded an \$87,000 grant from the Student Sustainability Committee (SSC) for the purpose of implementing a bike share program for students on the University of Illinois at Urbana-Champaign (UIUC) campus. The grant was to provide funding for 50 bicycles and 50 Bluetooth-activated smartlocks. Program coordinators decided to implement a small-scale test phase during the fall semester in order to test out the BitLock system, identify any problems, and decide how best to structure the larger program launch in the spring with all 50 bikes.

Twelve bikes were purchased from Neutral Cycle, a local bicycle shop in Champaign, and twelve smartlocks were purchased from BitLock, a startup company based in San Francisco. The program was named “I-Bike” and an industrial design student created a logo for the program. A liability waiver and terms of use agreement were created in conjunction with the Contract Services Office and University Counsel.



Volunteer participants were recruited through the iSEE website and Facebook page, SSC meetings, the Office of Volunteer Programs (OVP) listserv, the Class of 2019 Facebook page, the Students for Environmental Concerns newsletter, the BikeFace newsletter, the Green Observer Facebook page, and word of mouth. The OVP listserv was the place where most volunteers learned about the program. 56 students initially signed up to be volunteers. 28 of those students completed a training session and 7 students rode the bikes on a regular basis. The low levels of participation can be partially attributed to the cold weather and to the fact that some students were unable to download the BitLock app on their smartphone. There was also a number of volunteers who already owned bikes on campus and who continued to use those bikes instead of the I-Bikes.

All volunteers were required to attend one of two training sessions. They were given instructions about how to use the BitLock system as well as basic safety information. All participants reported that the training session was sufficient. Additionally, participants were required to take the Ride Illinois [bike safety quiz](#) online and sign the liability waiver/terms of use agreement before gaining access to the fleet of bicycles. The test phase officially started November 13th, 2015 and ended December 18th, 2015. Eleven volunteers responded to the test phase exit survey and provided valuable insight about the user experience. Their responses are included throughout this report in addition to data gleaned from the BitLock fleet management system.



Overview of BitLock system

BitLock is a company founded a few years ago with funding from the online-grant community, Kickstarter. They produce Bluetooth-activated smartlocks that users can activate from their smartphones. Once a user starts a “Ride”, they can lock and unlock the BitLock (pictured on right) by clicking one of the two buttons on the U-Bar. When the user ends their ride, the bike and lock will reappear as available to all other users on the Bitlock application.

Stations

One of the decisions to be made during the design phase of any bike share program is the location of pickup and drop off locations. Since the location of the bikes is visible on the BitLock app, we theoretically could have allowed users to lock up the bikes anywhere on campus. However, we decided that it would be easier to create “stations”, or bike racks that were designated as places where users could pick up a bike and drop it off at the end of their ride. These stations were located at Altgeld Hall to serve students at the Union, Weston Hall to serve Ikenberry Commons, Illinois Street Residence Halls, Pennsylvania Avenue Residence Halls, Krannert Center, the Undergraduate Library, and CRCE.

Participants were asked whether they would prefer to have designated stations or the ability to leave the bikes wherever they wanted. Several participants responded that while they thought would be convenient to have the ability to lock up bikes anywhere on campus, they felt that it would be more practical to have designated stations to facilitate program management. Participants would especially like to see additional stations near Grainger Library, Engineering Hall, ECE building, Armory, ACES library, Green Street, and off-campus apartments, all of which would be included for the larger program launch. Since there were only 12 bikes in circulation and a small number of users, it was difficult to predict bike distribution issues that may appear after the program is scaled up.

During the test phase, participants virtually always followed our rules and locked their bikes up to one of the designated stations. The exceptions were when participants were in the middle of a ride (i.e at class, grocery shopping, etc.) or if the bike had malfunctioned.

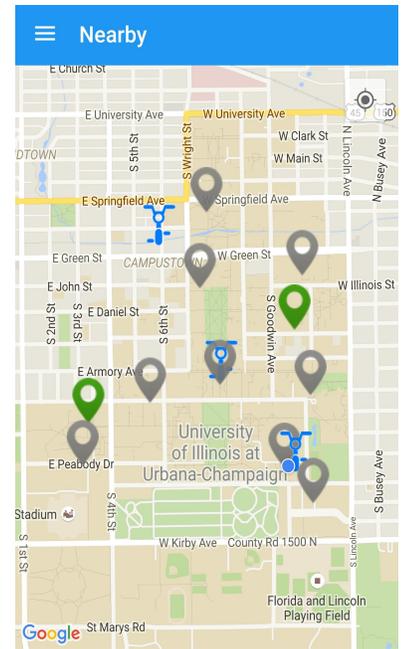
Ride time

Throughout the three-week long test phase, participants took a total of 63 rides. There was significant variability in the amount of time per ride throughout the test phase. Some rides took between five to ten minutes, while others lasted several hours. The average ride time during the silent test phase was 1:25:16. The shortest ride was three minutes and 27 seconds long, while the longest ride was just under six hours and 28 minutes long.

In response to the question, “What do you think would be a reasonable time limit per ride?” there was not a clear consensus among test phase participants. Four volunteers said that two hours would be sufficient, two volunteers opted for 2.5 hours, one said three hours, and two said four hours. Only one participant thought that a ride time less than two hours would be preferable. For the full program launch, we would suggest a ride time limit of three hours, which would allow participants to use the bike at multiple locations while still encouraging bike turnover.

Ride distance

BitLock uses the rider’s phone GPS to measure distance. However, if the connection is interrupted at any point during the ride, BitLock will just measure the shortest distance between where the ride started and where it ended. The inaccuracy of the GPS also prevented us from

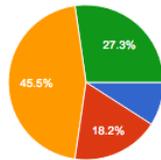


knowing the exact start and end locations. Thus, the ride distance data is not entirely reliable and is not included in this report.

User fees

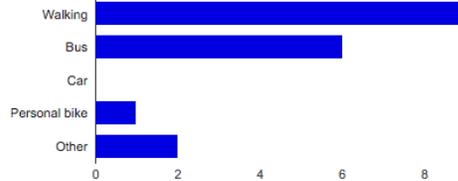
Riders were not charged for their participation in the test phase due to the fact that the BitLock system is quite new and we couldn't guarantee reliability. We also wanted to encourage participation in the program. However, participants were asked what they would be willing to pay for a similar system at the university. Seven riders responded that they would be willing to pay \$15-30 per semester, while four said that they would pay \$31-45.

How often did you use I-Bike?



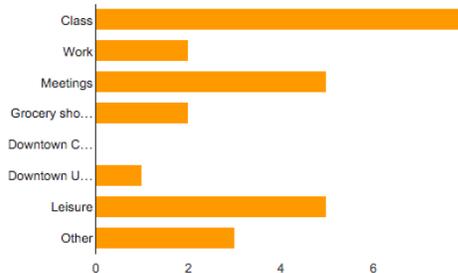
2 or more times per day	1	9.1%
Once per day	2	18.2%
1-2 times per week	5	45.5%
Never	3	27.3%

What form of transportation did I-Bike replace for you?



Walking	9	81.8%
Bus	6	54.5%
Car	0	0%
Personal bike	1	9.1%
Other	2	18.2%

Where did you travel with I-Bike?



Class	8	72.7%
Work	2	18.2%
Meetings	5	45.5%
Grocery shopping	2	18.2%
Downtown Champaign	0	0%
Downtown Urbana	1	9.1%
Leisure	5	45.5%
Other	3	27.3%

Issues with BitLock

Unfortunately, we encountered several issues with the BitLock software and the locks themselves throughout the planning process and the duration of the test phase. The relevant issues encountered in the fall are enumerated and summarized below.

- Two of the BitLocks were completely defective--a few days after they were placed at their stations, the blue LED wouldn't even start flashing after pressing the button on the lock. They had to be manually removed with the help of Neutral Cycle.
- Other locks were occasionally defective. Sometimes they would unlock successfully, while other times the blue light would flash slowly but would never turn green and unlock. Three participants reported that a BitLock unlocked and fell off during the ride. One was never able to successfully open a BitLock.

3. Several volunteers had older model smartphones on which the BitLock app was not available. This could potentially exclude a sizable portion of the student population. We learned from BitLock that phones without “Bluetooth 4.0” would not be able to download the application and use the BitLock software. iPhones 4S and higher and Androids made three years ago or more recently will work.

4. GPS accuracy was another concern. Several participants reported frustration that the map on the BitLock app did not accurately reflect the location of the bikes. The app took too long to “find” the user and the BitLock they were using on the map. By the time the app has recorded an accurate location for the user, they had often already left.

5. BitLock has an issue reporting system that allows users to create a “maintenance ticket”. These tickets indicate the specific bike that is having issues, and gives the user the opportunity to report specific problems. We learned about most of the aforementioned issues through the reporting system or from calls and emails from the participants.

Other feedback from test phase participants

Stations should be more clearly designated with signage near the bike racks. One participant suggested a pay-per-use option, which probably isn’t feasible with the current BitLock software, but would be worth looking into for the future. Multiple people mentioned the need for adjustable seats, which is definitely something that will be installed for the large-scale launch. Two participants requested a basket for carrying the BitLock and other gear. One participant suggested that we offer a trial run of the program--let students try out the system for a few days “to get a feel for how much they'd use an I-Bike and assess the worth, it'll help give people a bit more confidence into how much they're paying and what they'll use it for.”

Only one person mentioned that the app drained the battery on their smartphone. We’re not sure how much of a problem the battery life will be in the long run. Almost all participants said that they love the idea of the program and would recommend it to friends as long as problems with BitLock were fixed.



Conclusion

In the end, we achieved our goal of implementing a test phase bike share program at UIUC. There were quite a few technical issues with the BitLock software and hardware that were detrimental to the reliability of the program, and it is not yet clear if the next software and hardware updates for the BitLock system will sufficiently improve the system. Despite the technical issues, the test phase was successful. We have laid the groundwork for a bike share program, learned valuable lessons that will inform a larger-scale program launch, and started to spread the word about the program. It’s clear that students are excited about the program and think it will be a valuable addition to our campus, and we hope to provide them with a reliable system in the near future.

Next Steps

After speaking to BitLock in late January, they informed us that they will make it a higher priority to improve GPS accuracy in the next couple of weeks. Improving GPS accuracy will resolve user phone issues and ensure that bicycle locations as reported on the phone application are accurate. BitLock is also releasing an updated version of their smartlocks in late

February. These new locks will have more accurate GPS, better waterproofing materials, and overall improved reliability. With these upcoming changes in mind, I-Bike coordinators will continue to test the BitLock system. After the software is updated and the new batch of BitLocks is received, another short test phase will likely be implemented toward the end of February. A successor will soon be chosen to shadow the program coordinators and take over management of the program during the summer or fall.