

# Bike Touché System

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## Team Members

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### Problem Statement

Problems in using ordinary locks:

- A.** Keys are easy to lose.
- B.** The process of unlocking the bike with ordinary locks is annoying.

### Concept Generation

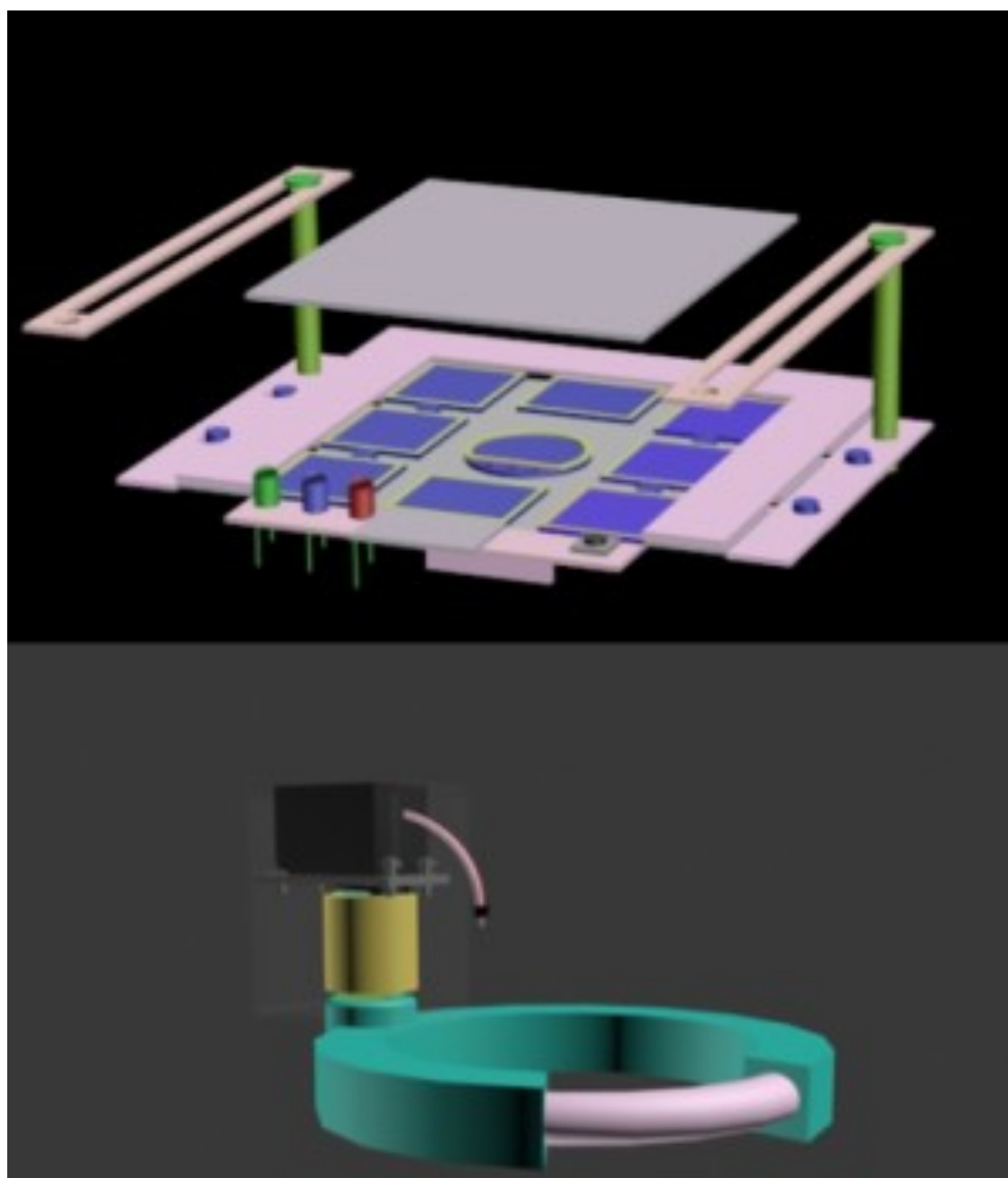
Electronic touch panel lock can solve the first problem, and using servo to control the kickstand can solve the second problem.

### Design Description

After analyzing and discussing the problems , we decided to use a combination of touch sensors and a servo system to take over traditional key lock, and use an another servo system to control the stand.

#### Part 1:The touch panel

There are nine touch sensors, three LED indicators , one button and one GSM shield integrated on a board. The board is made up of acrylic, and it is hidden under the saddle. The system's power comes from a solar cell. Password can be any arbitrary shapes in 3X3 touch sensors.



**Fig .1** 3Ds Max plot of touch panel and modified lock



**Fig. 2** Prototype of touch system

Every time you have 5 chances to input your password , if the wrong times is more than 5, the GSM shield will send a message to tell you your bicycle is dangerous now.

#### Part 2: Modified lock

The modified lock consists of a small rounded lock, a key closed by a cylinder and a servo.

#### Part 3: Modified kickstand

The new kickstand system consists of a servo, a button switch and a wooden kickstand. We fixed the button on the handlebar.

### Modeling and Analysis

We mainly analyzed the three aspects of our prototype:

**A. Security:** We required seriously the high security of our lock, so we need to make something seal the core part of the improved lock. Thus, we use 3D printer to make a suitable cylinder to pack the key, and use mental shell to seal touch panel.

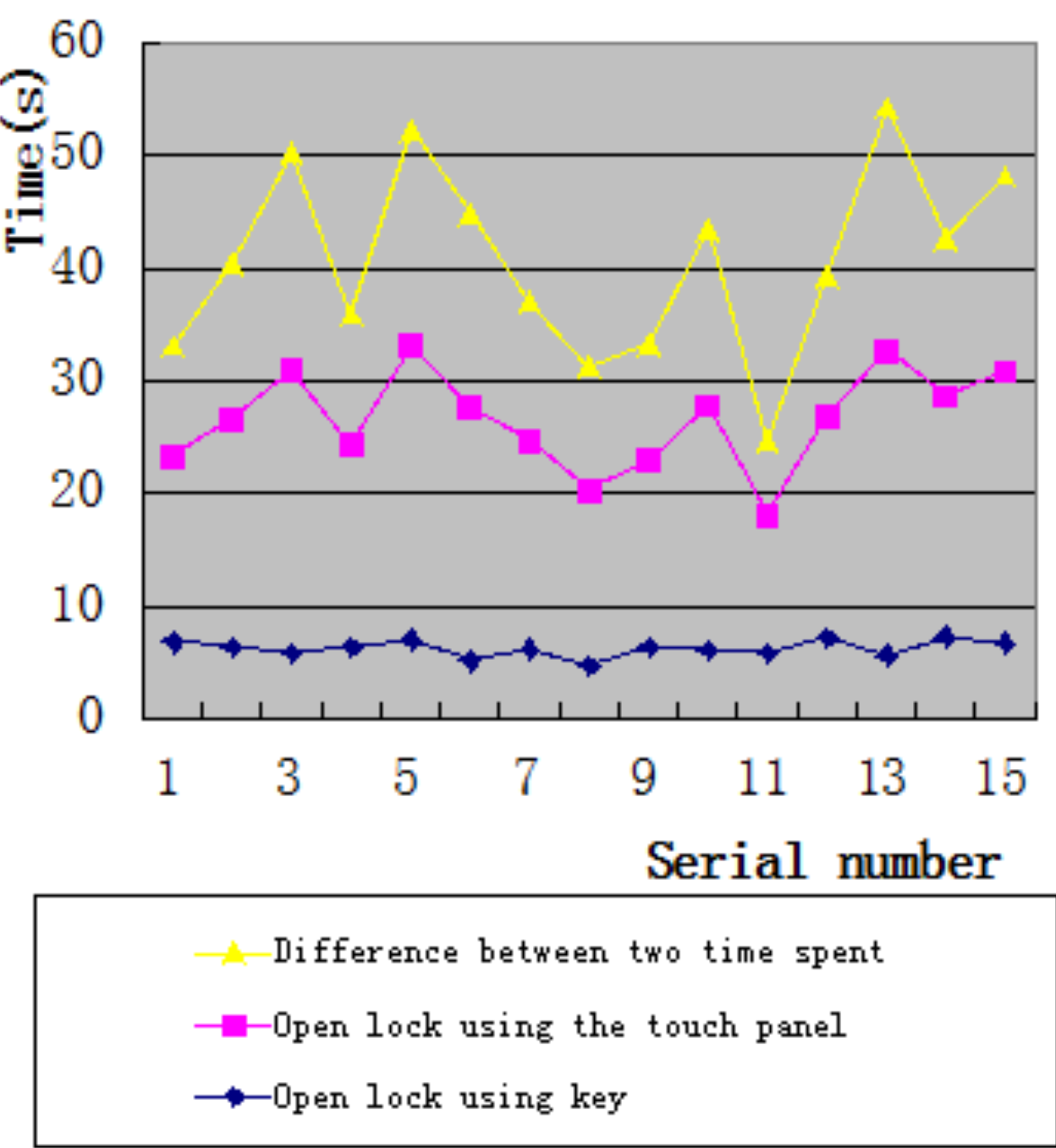
**B. Stability:** Touch sensor, servo, LED, solar cell are likely to be damaged by high temperature, rain water, or collision. Thus, we have to protect them from the damage with some protective covers.

**C. Appearance:** We try to make our design concise and compact. Thus, we did many soldering, cutting work to decrease our design's volume and make it look more beautiful.

### Validation

At final stage, We did 15 experiments for recording how much time the improved bike touché system can save. Besides, we have recorded the feelings of triers.

#### Time spent test



**Fig. 3** Line chart of test result

### Conclusion

Eventually, we completed our project successfully after the work-hard period. We gained lots of knowledge, and everyone enjoyed the manual operation including component assembly , soldering, processing acrylic board, etc.

### Acknowledgement

Professor Roberto Dugnani.  
Professor Rockwell Clancy.  
Administrators of mechanical laboratory at fourth floor JI building.