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**Lazy Lock Mechanism**



Figure 1: Side View of Cable Housing With Retracted Cable



Figure 2: Photograph of Bicycle Locked to a Bike Rack

## Summary

For years, bicycle owners have deemed it necessary to own a bike lock in order to protect against theft. Since bicycles aren't inherently stationary, a pertinent requirement of the bike lock is that it must travel everywhere along with the bike. The goal of this design project was to reduce both the time and the effort required to lock and unlock the bicycle as well as develop an improved storage system for the lock.

By implementing the final design, the average time required by a capable person to lock their bike upon reaching their destination or unlock their bike prior to departure is estimated to be less than five seconds. The bike lock is held completely immobile while not in use, and does not interfere with or require special attention from the rider. These design requirements were made possible without compromising any factors that are generally expected from bike locks, such as resistance to theft and reasonable price.

In order to expedite the locking process, several concepts were developed in which the locking cable was attached, (with varying amounts of permanence), to a member of the bike frame. Fixing the cable to the bike itself was thought to eliminate the time that the user would spend situating the cables through the frame of the bike manually. As a matter of convenience to the rider, placing the cable in an enclosed housing, (either a frame member of the bike, or an externally attached housing), was found to reduce the annoyance to the rider due to the cable as well as provide a framework for incorporating an automatic retraction system for the cables into the storage location. The various concepts provided several different combinations of housing and retraction systems for the cables, the most preferable of which is outlined below.

The final design, (which is able to be modified to fit a large size range of bikes), consists of a pvc housing attached to the underside of the top most bike frame member with a pair of hose clamps. The hollow housing is then fitted with a cable doubled back on itself so that the midpoint of the cable is positioned at the back end of the housing. A cable spring reel which is fixed to the underside of the housing, also at the back, is attached to the bike cable. This ½ lb. torsional spring provides an adequate amount of force to keep the cable in the retracted position. Accessing the lock cable can be done simply by pulling on the front ends of the cable which are fitted with components that allow the two sides to lock together, and are positioned near the front steering shaft. The cable itself is positioned in a way such that it makes a continuous loop through the bike frame. This orientation of the single cable eliminates the need for the cable housing to be permanently attached to the bike in any way, since the housing is not directly involved in the locking process. Locking the bike can be done merely by extending the cables and setting the lock.

The unlocking procedure is complimentarily simple. Once the lock, (which can either be a combination lock or key lock) is unlocked, replacing the cables into the housing can be done very quickly assisted by the mechanical spring reel. Once the cables have been disconnected, they are practically already stored which means that the time normally spent storing the cables is completely eliminated.

In summary, this design provides an efficient, safe, and inexpensive way to manage the security of ones bicycle.