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Chandkheda, Ahmedabad

Affiliated

G.H.PATEL COLLEGE OF ENGINEERING & TECHNOLOGY,

VALLABH VIDYANAGAR

A

Project Report

On

IOT IMPROVED SHARED LOCK

Prepared as a part of requirement for the subject of

Project-I

B.E IV, semester-VII

Submitted By

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2016

CERTIFICATE

This is to certify that the Design engineering canvases entitled **"IOT IMPROVED SHARED LOCK**" has been carried out by **RAHUL SHAH(130110107049), HEMANT SUTHAR (130110107058)** under my guidance and supervision for the award of the degree of Bachelor of Engineering in Computer Engineering(Semester - VII) at G H Patel College of Engineering & Technology, Vallabh Vidyanagar during the academic year **2016-17**.

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Index

List of Figures

List of Tables

Abbreviations

IoT	-	Internet of Things
M2M	-	Machine to Machine
iOS	-	iPhone Operating System
GPS	-	Global Positioning System
API	-	Application Programming Interface
SMS	-	Short Message Service

1. INTRODUCTION

The Internet of Things (IoT) can be defined as a global infrastructure which combines intelligent services with situational awareness, and allows mutual communication between one thing and another, and between people and intelligent things over a network. Machine to Machine (M2M) communication is different from IoT because a person does not directly control the equipment or intelligent instruments; they are responsible for communicating on behalf of people. More recently, a variety of communication technologies have been fused to receive and provide information about things. Especially, IoT technologies have been enabled to communicate by the fusion of home appliances and mobile devices.

Recently, digital cycle locks have been widely used in Smart-Cities. However, in many cases, a thief has tried to steal a cycle by circumventing the lock. In this study, we design and implement an IoT-based digital cycle lock to reduce the damage of digital cycle lock tampering and to enhance the various security and monitoring functions with share access using IoT technologies.

1.1 Problem Summary

IOT improved shared lock is a lock having keyless entry and have an access through android/iOS mobiles. It also shares the location and access to your bike with friends and family. And phone GPS can also track the cycle location at every second.

1.2 Aim and Objectives

Aim of project is to develop a IoT based digital locking system for cycles having shared access provide for cycles. Objectives towards goal are having keyless access to lock using mobile phones having android/iOS application. Other objective is tracking activity using GPS technology for security purpose.

1.3 Problem Specifications

IOT improved shared lock is a lock having keyless entry (good bye to keys, and no need to search them in pocket, purse etc.) and have an access through android/iOS mobiles, simply walk up to your bike and press a button on Lock to lock/unlock in less than a second. It also shares the location and access to your bike with friends and family. Lock app remembers your bike location under the hood as you lock/unlock your bike using your phone GPS. This way you will never forget the last parked location of your bike. Lock uses encryption found in online banking systems, so bike thieves are better off going after banks than to mess with your bike.

1.4 Literature Review

- "The Internet of Things: An Overview Understanding the Issues and Challenges of a More Connected World", by Karen Rose, Scott Eldridge, Lyman Chapin. This paper talks about how IoT provides automation solutions to real world problems.
- "A Digital Door Lock System for the Internet of Things with Improved Security and Usability", by Ohsung Doh, Ilkyu Ha at Kyungil University, Republic of Korea. This paper talks about existing IoT door locking systems.
- "Vehicle Tracking and Locking System Based on GSM and GPS", by R. Ramani, S.Valarmathy Department of ECE, V.M.K.V.Engineering College, TN, India. This paper talks about vehicle locking and tracking using traditional technologies.

- "Smart Management of Next Generation Bike Sharing System using Internet of Things", by M. A. Razzaque, Siobhan Clarke, School of computer science and statistics, Trinity college Dublin, Ireland. This paper is about sharing of vehicles based on IoT technology.
- "BikeTrack: Tracking Stolen Bikes through Everyday Mobile Phones and Participatory Sensing", Ted Tsung-Te Lai, Chun-Yi Lin, Ya-Yunn Su, and Hao-Hua Chu, Department of Computer Science and Information Engineering National Taiwan University. This paper talks about how bike tracking system works.
- "Smart lock for bike sharing in corporate environments", This report talks about smart locking system with bike sharing feature.

1.5 Plan of Work

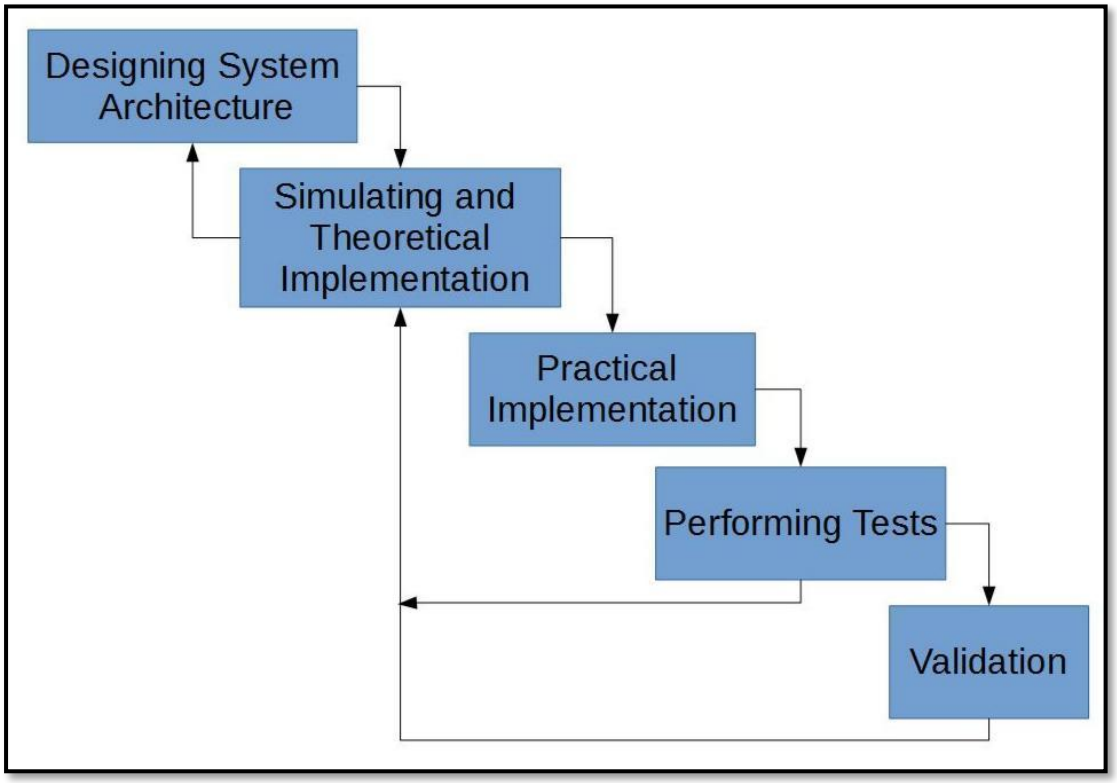

Fig. 1: Plan of Work

1.6 Materials / Tools Required

- Android Studio for developing android applications.
- Google Map API
- GSM Module for SMS services
- Bluetooth for Wireless Communication
- GPS chip for tracking system
- Cloud for messaging services
- Webserver for hosting web interface
- Database Server for storage of information

2. Design: Analysis, Design Methodology and Implementation Strategy

2.1 Canvases

2.1.1 Empathy Canvas

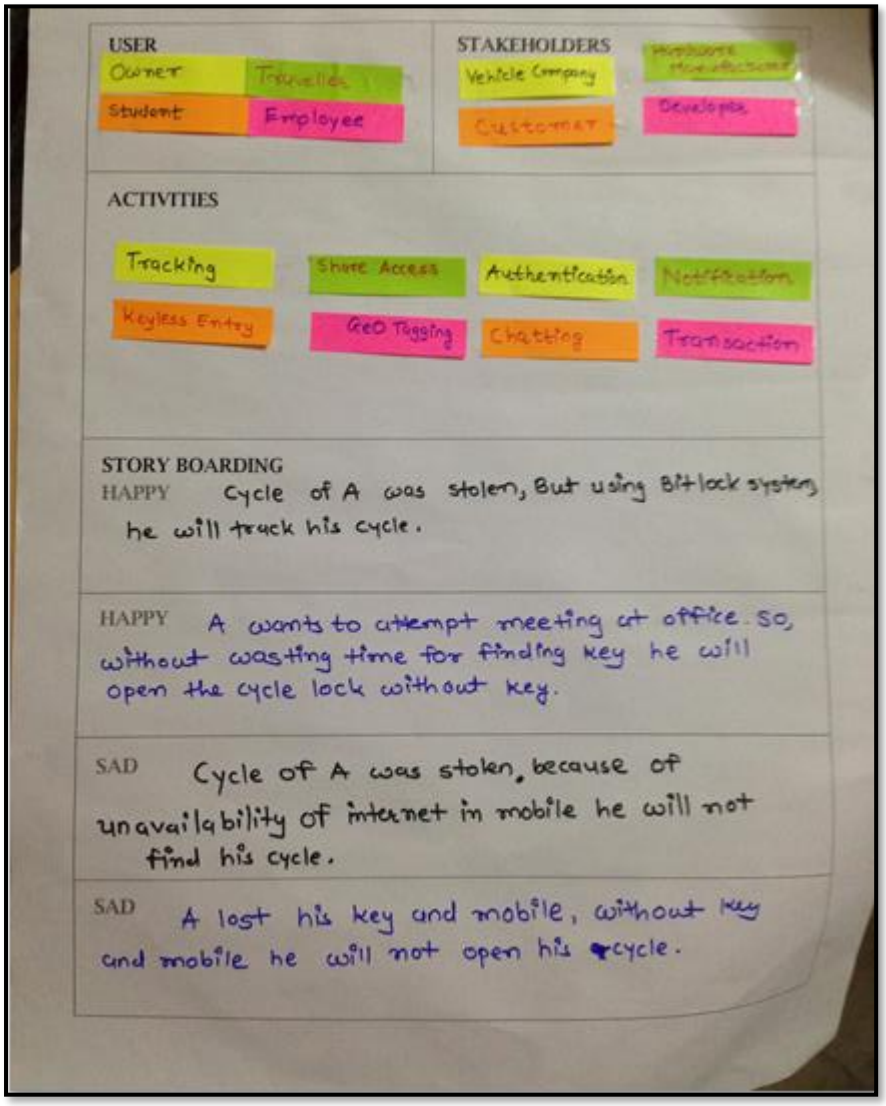

Fig. 2: Empathy Canvas

Empathy canvas helps in empathizing and identification of the potential users and stakeholders of the system this will help the developers to approach for customer validation.

Our Potential Users and Stakeholders are Owners, Travellers, Students, Employees; Vehicle Companies, Hardware Manufacturers, Customers, Developers.

And Activities they perform are Tracking, Share Access, Keyless Entry, etc.

2.1.2 Ideation Canvas

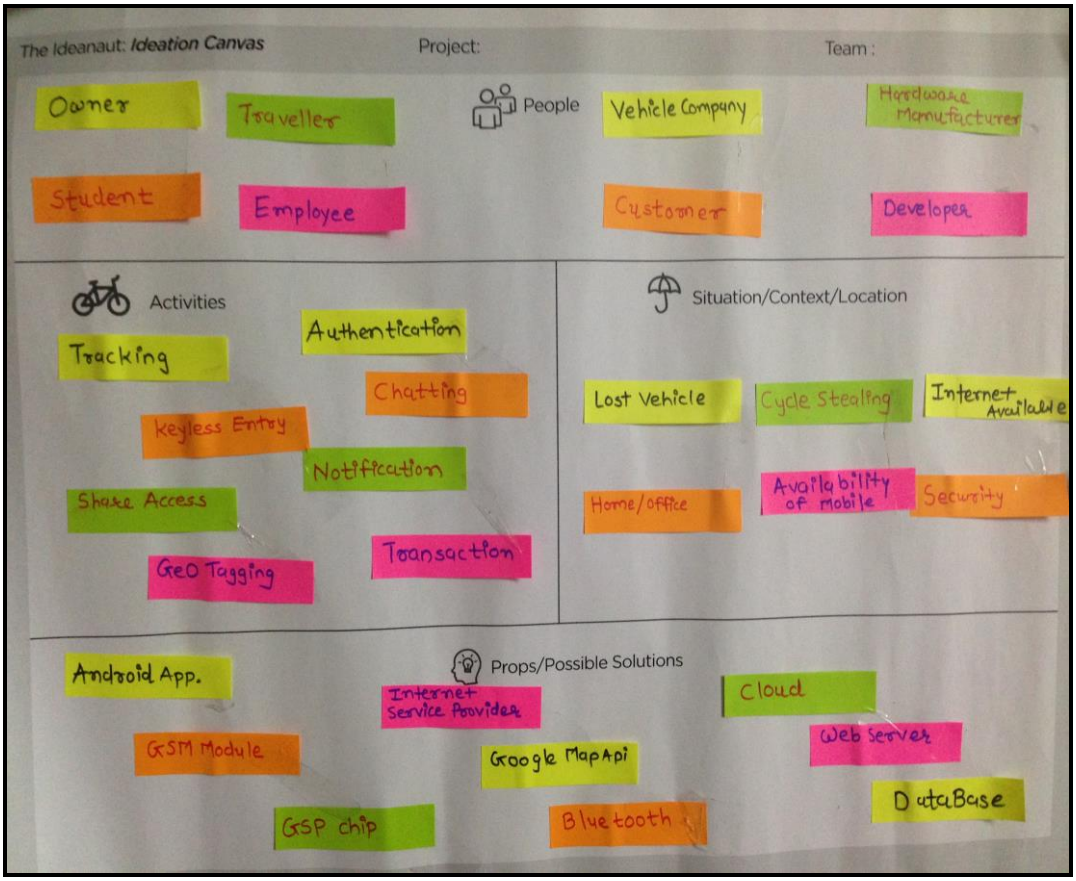

Fig. 3: Ideation Canvas

Ideation canvas is a result of the combination of the requirements, observation of the previous canvases and Brainstorming sessions of the developers. It builds the relation between the requirements, the functions of the product and the context in which it is to be used.

2.1.3 Product Development Canvas

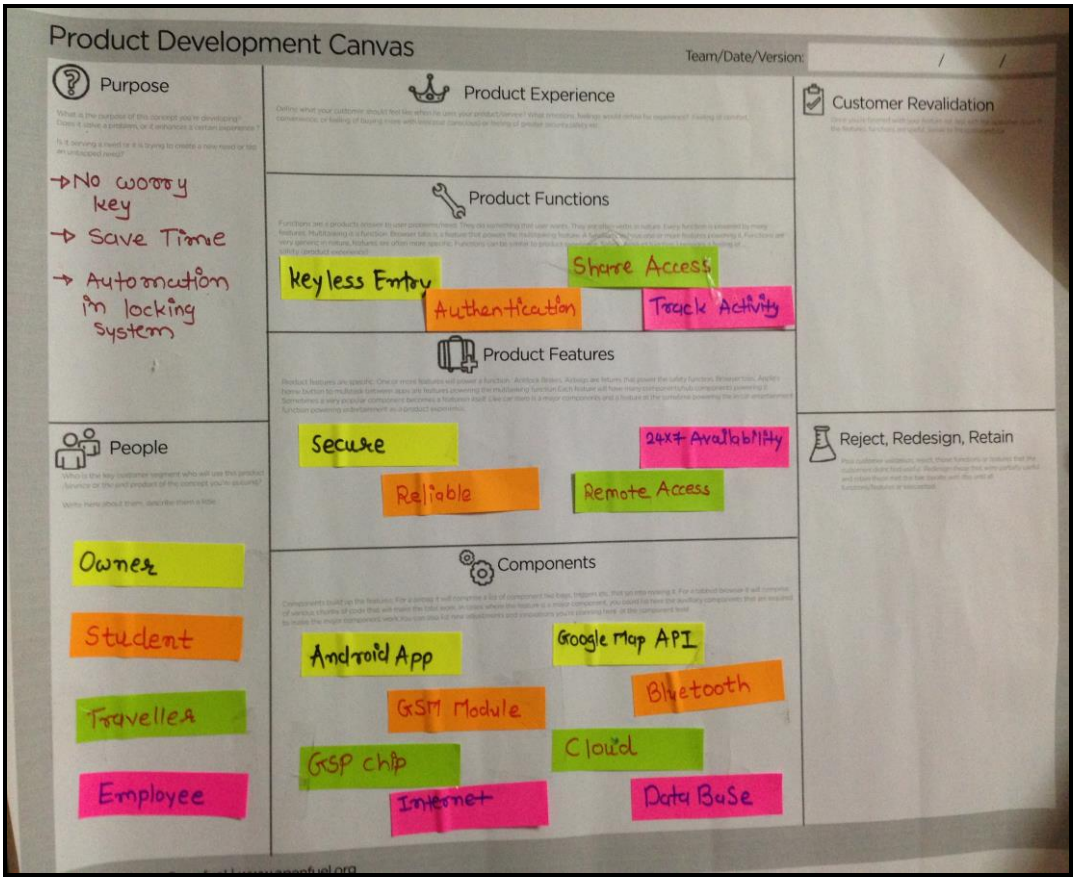

Fig. 4: Product Development Canvas

This canvas is the result of the theoretical simulation of the product, show that simulation to the consumer and who gives input about the design and changes as per their need.

2.1.4 AEIOU Summary

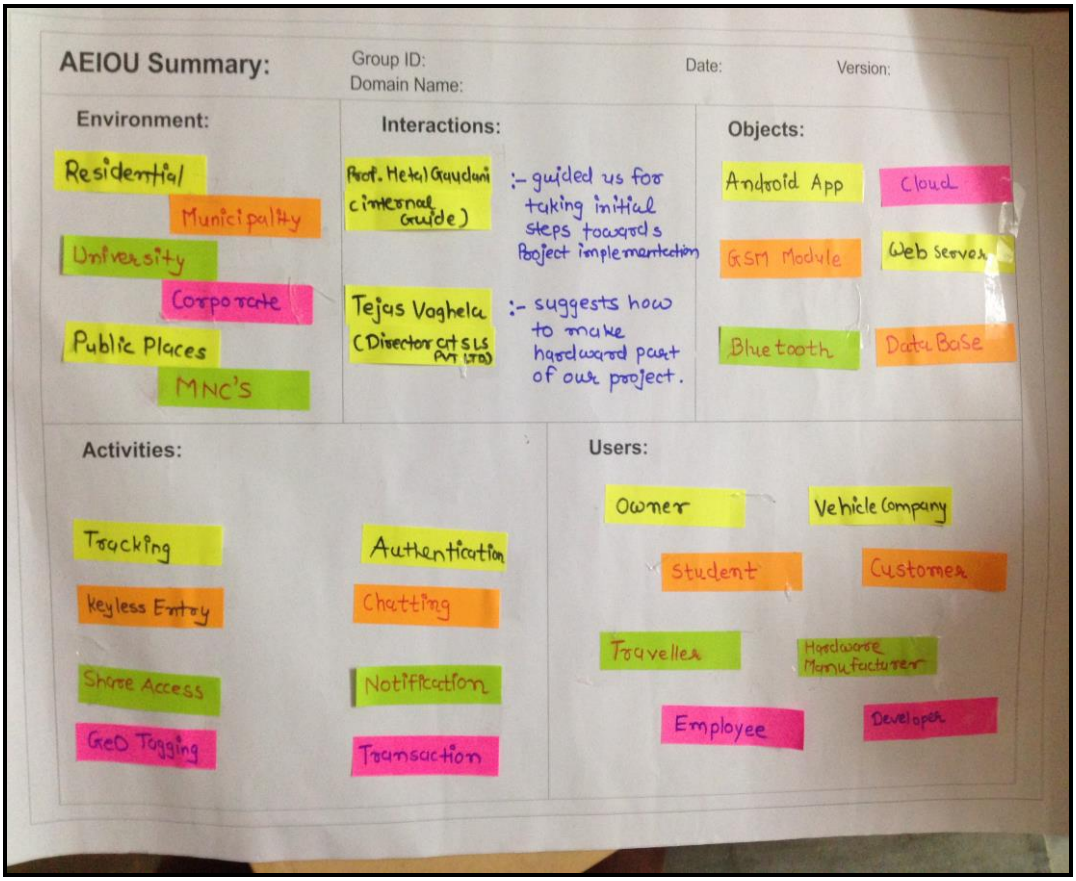

Fig. 5: AEIOU Canvas

AEIOU (Activities, Environment, Interactions, Objects, and Users) these observations make a base of the Empathy mapping. This Study is done by field survey and interaction with the potential users of the system which is to be developed.

2.2 System Design

Our Project Design will be as per shown in Fig. 6. We will use 3-tier architecture for our System Implementation. Application Server will consist of Android phone application which will provide secure wireless access to lock.

Web Server will use JAVA JSP and Servlet technology for web computations and sharing the results with Application Server. Application Server will communicate with web server for computational data (e.g. Randomly generated key etc.) exchange using JSON Object and Java Rest API.

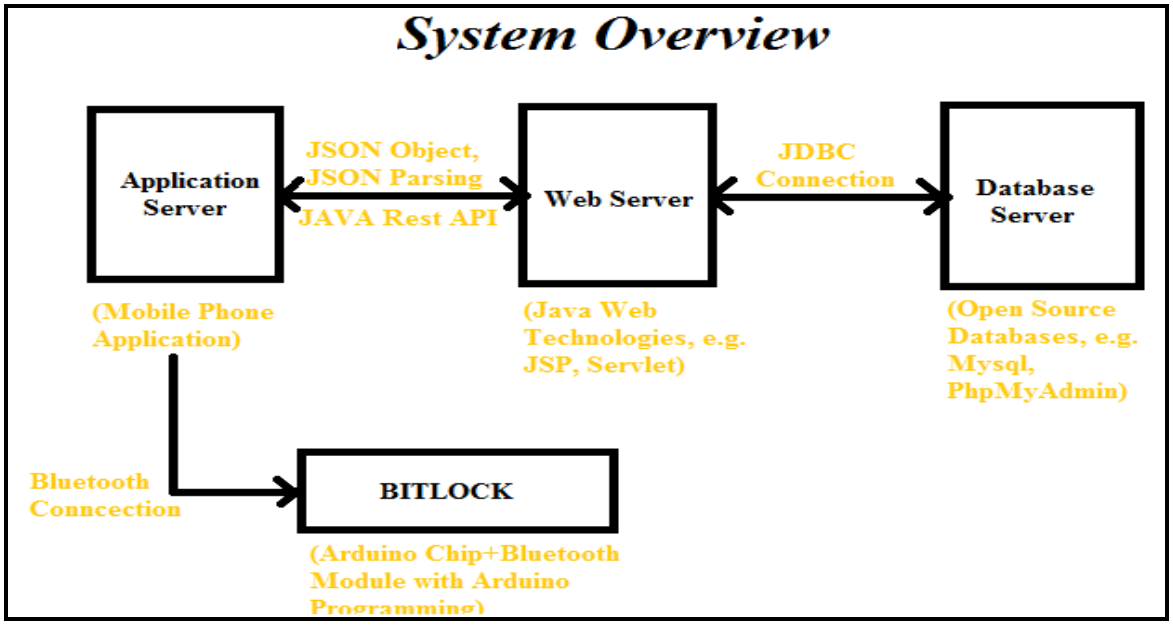

Fig. 6: System Overview

Database Server will contain the all-important data stored in relational tables form. Database Server will be having data like user's registration id with his information and current location. Web Server will fetch these data and store new data using JDBC API.

3. Implementation

3.1 System Modelling

We implemented system which provides communication between mobile phone and Arduino microcontroller using Bluetooth. Here are the steps we followed:

We first download ARDUINO IDE 1.0 software which decide the function of microcontroller.

So here we learnt to use of Arduino ide 1.0 software and how can we upload the programs in microcontroller. First we started making simple programs i.e. led blinking, buzzing of buzzer and so on.

In this software it required C language regarding to micro controller.

Here is **CODE** loaded in Arduino for the implemented System:

```
// This program is for control arduino from PC Via Bluetooth

// Connect ...

// arduino>>bluetooth

// D11   >>>  Rx

// D10   >>>  Tx

//Written By Hemant Rahul

// you will need arduino 1.0.1 or higher to run this sketch


#include <SoftwareSerial.h>                  // import the serial library

SoftwareSerial Genotronex(10, 11);         // RX, TX

int ledpin=13;                  // led on D13 will show blink on / off

int BluetoothData;                      // the data given from Computer

void setup() {

  // put your setup code here, to run once:
```

```
  Genotronex.begin(9600);
  Genotronex.println("Bluetooth On please press 1 or 0 blink LED ..");
  pinMode(ledpin,OUTPUT);
 }
 void loop() {
  // put your main code here, to run repeatedly:
   if (Genotronex.available()){
   BluetoothData=Genotronex.read();
   if(BluetoothData=='1'){   // if number 1 pressed ....
   digitalWrite(ledpin,1);
   Genotronex.println("LED  On D13 ON ! ");
   }
  if (BluetoothData=='0'){// if number 0 pressed ....
  digitalWrite(ledpin,0);
   Genotronex.println("LED  On D13 Off ! ");
  }
 }
 delay(00);//if u want then enter delay and  prepare for next data ...
 }
```

The simple **diagram regarding connection between components** is given below:

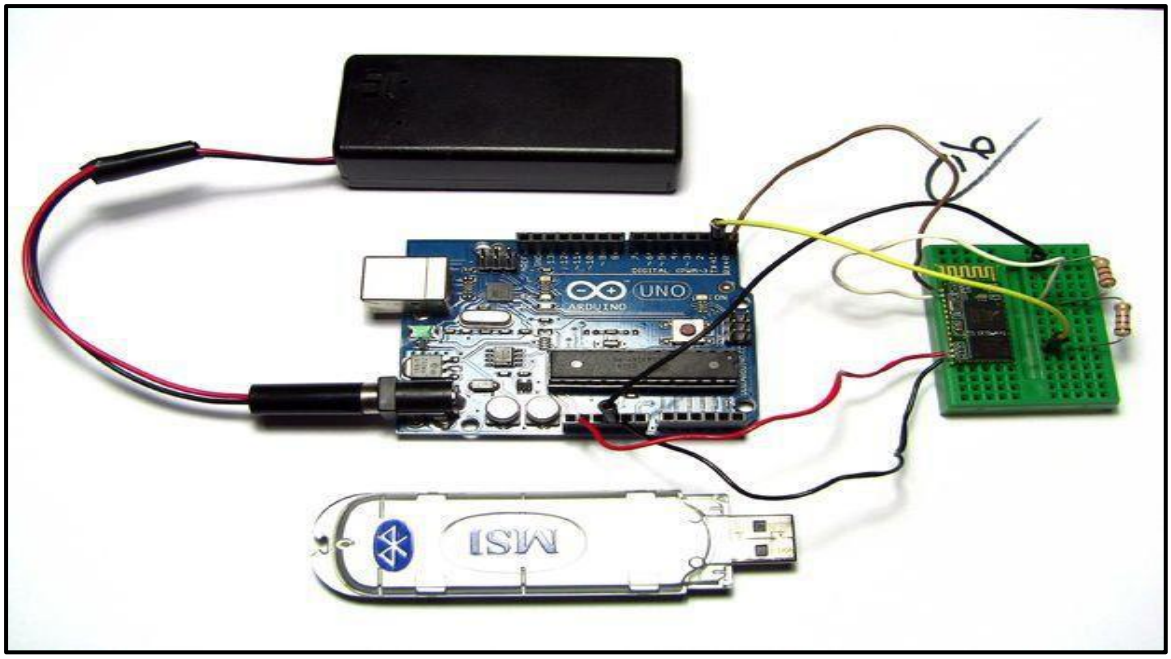

Fig. 7: System Implementation

3.2 Testing

The design is environmental friendly as it contains Bluetooth modular and Arduino which is electronic device and the Bluetooth application which is also can run at any environment as it is run by android phone.

As Bluetooth range is we can operate under 20 feet so one can easily operate the bike lock by standing at some far distance from the lock, no need to always be in touch of lock.

3.3 Cost

Cost is the most important aspect anywhere, so we should look after it. Here we are having the price list for our implemented System.

Arduino Microcontroller is easily available anywhere nearby so we are not calculating it cost.

Sr.No.	Component	Cost (INR)
1	Bluetooth Module	330
2	Jumper wires (10)	35
3	Resistances (3)	3
4	LEDs (2)	2
5	Equipment (Buzzer)	30
	Total	**400**

Table 1: Cost

4. Summary

4.1 Summary

With the mentioned technologies and resources developed a product which will take over the traditional system. The product will provide share access which is not there in conventional systems, and will has keyless entry so there will not be worry about losing keys. Product will also contain tracking mechanism so there will be very rare chances of stealing cycles. Thus our product will provide security, availability etc. features.

4.2 Future scope

We will continue my work in this domain and will develop a product which will be able to work efficiently and sustainable to any environment irrespective of any outsider attacks, also we will try to make our key sharing mechanism secure using various cryptographic methodologies to make it safe to use without violating the privacy of the users' and their data.

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