

LOCKOMATIC

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Abstract—The project LOCKOMATIC basically deals with the automatization of the bicycle lock that will lead to the comfort of both owner and user. This design of our lock will permanently decrease the need of presence of owner while issuing the bicycle. The theory behind making this project is explained further.

I. INTRODUCTION

It is a device which will work on combined functionality of GSM Module and Arduino,in order to transmit and receive the SMS by GSM Module it transfer particular command to Arduino.

TABLE I
COMPONENTS USED IN THE AUTOMATIC CYCLE LOCK

Sr No.	Components	Quantity
1	Arduino MEGA 2560	1
2	GSM Module	1
3	DC Motor	1
4	DC Motor Driver L298	1
5	Jumper Wire	Approx.40
6	Buzzer	1
7	SIM Card	1
8	LIPO Battery	1
9	Breadboard	1
10	Arduino Cable	1

A. Components Description

We are working on Automatic Cycle Lock so here we are introducing some major components in our project.

1) *Arduino MEGA 2560*: Arduino MEGA 2560 is a microcontroller board based on ATmega2560. It has 54 digital input/output pins, 16 analog pins, 4 UARTs, a 16 Mhz crystal oscillator, usb connection, a power jack and a reset button. It is compatible with most shields designed for arduino. It operates at 5v. In our project it is used to read inputs from messages through GSM Module and operates the buzzer according to input.

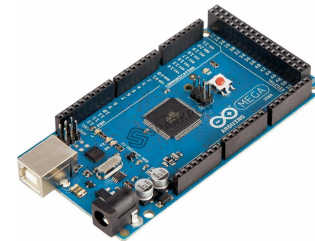


Fig. 1. Arduino MEGA 2560

2) *GSM Module*: The SIM800A modem has a SIM800 GSM chip and RS232 interface which enable us to connect it easily with our laptop or computer using Arduino and a connection can be open to COM port at a fixed baud rate. It features embedded AT and microcontroller can start sending the AT commands once it connected to a network. In our project it is used to send and receive messages and SMS from owner to Arduino and vice-versa.



Fig. 2. GSM Module

3) *LIPO Battery*: LIPO stands for lithium polymer battery, these are chargeable battery with many benefits like lightweight, have large capacities, high discharge rate and very low internal resistance.

The LIPO which we are using in our project is standard LIPO of 12V and 2amp.

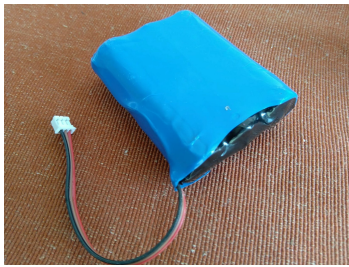


Fig. 3. LIPO Battery

4) *Buzzer*: It is an audio signalling device, which can be used for different purposes like timer, alarms etc. In our project we are using it to alert the user by setting timer.

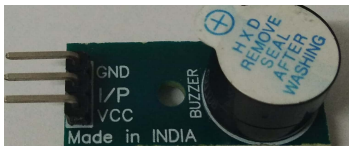


Fig. 4. Buzzer

5) *DC Motor*: A DC Motor is a rotary electrical machine that converts electrical energy to mechanical energy. Their working relies on the forces produced by changing magnetic fields. In a typical DC Motor there are permanent magnets on outside and spinning armature inside. We have used 12v high torque DC Motor as to provide high strength and stability to our whole mechanism.



Fig. 5. Dc Motor

6) *Motor Driver*: This dual bidirectional motor driver is based on the very popular L298 Dual H-Bridge Motor Driver IC. This module will allow you to easily and independently control two motors of up to 2A each in both directions.

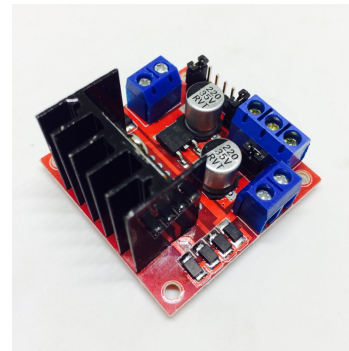


Fig. 6. Motor Driver

B. Motivation behind the Idea

The motivation behind our idea is to achieve the following aims :

1) *Automation of traditional locking systems* : We tried to make automatic locking system rather than using the traditional key and lock system. In key and lock system someone always has to be there to provide key to the user but in our system we made the process automatic.

2) *More facilitated system for user and owner*: In this automatic system the owner of the bicycles need not to be there every time to unlock the bicycle. He can give all the commands to the bicycles from anywhere. And user need not to be worried about the presence of owner at the time of issuing the bicycle.

3) *To get some improvement in our college*: Firstly, we get this idea from bicycle issuing system in our college. We often face the problem while issuing cycles from MTB (Mountain Biking) Club because of absence of coordinator many times.

II. IMPLEMENTATION OF LOCKOMATIC

A. Making of the device

1) First of all, Arduino is connected to GSM Module such that RX pin of Arduino with TX pin of GSM and TX pin of Arduino with RX pin of GSM.

A 2G or 3G SIM card is inserted into the GSM Module.

2) A 12V LIPO battery is used to give input voltage to GSM, Arduino and L298 DC Motor Driver, now pin 6 and 7 of Arduino are connected to pin IN3 and IN4 of Motor Driver respectively. After that, connect pin 13 (PWM) of Arduino with pin enB of Motor Driver and connect the Motor with Motor Driver.

3) Now connect the Buzzer with Arduino such that Gnd pin of Buzzer is connected with Gnd pin of Arduino and Vcc of Buzzer with 5V pin of Arduino. Connect I/P pin of Buzzer with pin 2 of Arduino.

4) Join the locking arm (arc shaped) with the gear of the DC Motor.

5) Feed the code to the Arduino by connecting with laptop using USB cable.

Finally, the outer body of locking system is made by cutting metal sheet and cardboard into the required

shape.

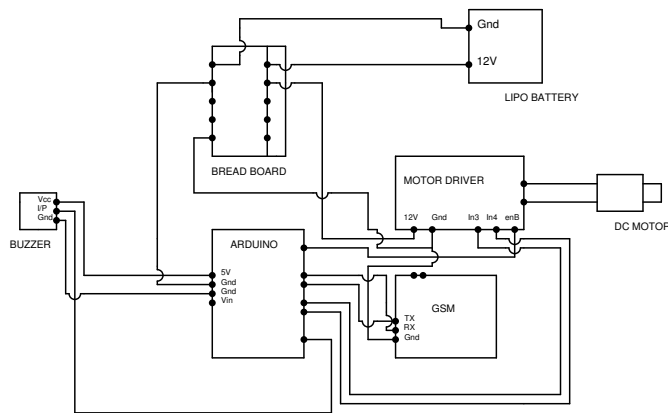


Fig. 7. Circuit Diagram

B. Working of the device

1) : If the user want to hire a cycle then he/she has to transfer some money to owner as per the time duration with cycle details in description, then the owner will send time duration through SMS to the GSM Module of respective cycle.

2) : Every GSM Module have a SIM card and only the owner have its details and Arduino connected to the GSM will read the SMS and command the motor to open the lock.

3) : As the lock open the timer will start and after the half time the Buzzer will buzz for 10 second to alarm the user that half time is over.

And the Buzzer will buzz again just 1 minute before the finishing time for a longer duration of 20 seconds to alert the user that cycle is going to be locked.

4) : The user can repeat the process if he/she has not reached the destination by transferring some money to the owner.

In case the user has reached the destination before time than an analog switch is provided to lock the cycle before time.

III. CONCLUSION

A. Advantage of this mode of locking

Some of the advantage of using this device are :

1) *Secure Device*: Password based authentication is required. Hence, it is secure for the owner because only the owner have database or ID of respective SIM Card.

2) *Offline Working*: No Internet connection is required for the operation of the device as the whole working depends on the sending and receiving of SMS.

3) *Convenient*: Operating the device is as easy as sending a SMS.

4) *Decreases theft tendency*: The fact that the process of issuing the cycle is not possible without the permission of owner. There are some organisations/companies which are using QR code printed on cycle for issuing the cycle but in LOCKOMATIC only the owner have database of SIM Card. So, this kind of procedure of issuing the cycles will decrease the theft tendency.

B. Future Implementation in the project

Some of the restrictions which currently exist in the device, can be removed. These are :

1) *Restoring the lost device*: A GPS based tracking system can be introduced in the device, in case the cycle is lost or stolen.

2) *Reduction in Cost*: The cost per device can be greatly reduced by compacting the size of device and by using reasonable cost of Arduino, GSM Module, DC Motor, Motor Driver and Buzzer.

3) *Using it in MTB Club*: It can be implement in MTB (Mountain Biking) Club.

IV. ACKNOWLEDGEMENT

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