

Article

Not peer-reviewed version

Motor Cycle Security System Using Arduinoprocessor And Gsm Module

Tauseef Ahamad , [kamil khan](#)*, Sardar Nabi

Posted Date: 13 January 2024

doi: 10.20944/preprints202401.1043.v1

Keywords: Arduino UNO; GSM Module; Voltage regulator; Switch; Jumper wire; 12V Power supply; DC Jack; Arduino to Laptop Connector; SIM Card; Mobile phone



Preprints.org is a free multidiscipline platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Disclaimer/Publisher's Note: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

Review

Motor Cycle Security System Using Arduino Processor And Gsm Module

Authors: Tauseef Ahmad ¹, Kamil khan ^{*1} and Sardar Nabi ¹

Affiliations: ¹Department of Physics, Government Post Graduate College (506620) Mardan affiliated with Abdul Wali Khan University, Mardan23200, Pakistan

Email address: kamilpgcm.edu.pk23200@gmail.com (Kamil Khan)

Tauseef ahmad ORCID IS <https://orcid.org/0009-0009-9527-2431>

Kamil khan ORCID IS <https://orcid.org/0009-0001-7309-287X>

Sardar nabi ORCID IS <https://orcid.org/0009-0002-4763-5372>

ABSTRACT: In many developing countries of the world including Pakistan motorcycle stealing is one of the main issue that needs to be dealt with an iron hand as it leads to economic losses as well as crime increase in the society, according to the DOWN REPORT there were 28609 motorcycle stolen in 2019 and this number has been increased to 34908 in 2020. Now due to the increasing motorcycles stealing crime what measures can we take to reduce the number of motorcycle theft the rule of technology is enormous in this regards specially information technology (IT) , information technology can play an important role in the security of motorcycles from being theft by the thieves, Information technology provide us the GSM based control system which can be very help full to construct a security system for motorcycle in order to make it antitheft.

Keywords: Arduino UNO; GSM Module; voltage regulator; switch; jumper wire; 12V power supply; DC jack; Arduino to laptop connector; SIM Card; mobile phone

INTRODUCTION

In many developing countries of the world including Pakistan motorcycle stealing is one of the main issue that needs to be dealt with an iron hand as it leads to economic losses as well as crime increase in the society, according to the DAWN REPORT there were 28609 motorcycle stolen in 2019 and this number has been increased to 34908 in 2020. [1] According to the newly crime rate log, bike larceny crime record were more compared with the criminal cases of other types of carriage such as cars. This were not a small number and the biggest concern is that this number is increasing every passing year which is alarming, Motorcycle is one of the property that thieves target.

[2] Motorcycle theft are increasing in many countries of the world , According to THE NATIONAL there are 40000 motorcycle stolen in the United State of America every year, so this is not a local issue of some specific countries but it is a global issue.

Motorcycle is one of the main type of transportation in the world specially in over populated countries like Pakistan India etc.[3] Transportation has a big rule of our daily life. Every year, people in the Philippines and more countries are heavily spend vehicles especially bikes as their usual means of transportation. Road jam is one of the major problem in these countries so using motorcycle can be very help full, the use of motorcycle is benefit full too as it is cheaper to purchase than a car people also try to use motorcycle because parking is Accessible and affordable it is also easier to navigate it consume less fuel than other vehicle so the middle class people can also afford to use motorcycle why using motorcycle one can interact with the environment it also enhances your reflexes and helps in reducing mental stress

Now due to the increasing motorcycles stealing crime what measures can we take to reduce the number of motorcycle theft the rule of technology is enormous in this regards specially information technology (IT) , information technology can play an important role in the security of motorcycles from being theft by the thieves

Information technology provide us the GSM based control system which can be very help full to construct a security system for motorcycle in order to make it antitheft,

The GSM is wireless cellular security system which are widely use for the security purposes,[4]: Basically this will be detect by an device that was be created specifically to these tools while adding some devices such as mobile phones and GSM as an intermediate that connects to a device micro Controller. This device well be provides the best possible level of safety for motorcycle owners. using this technology in motorcycles security can reduce the number of motorcycles stealing in the world, This technology is easy to construct and easy to buy and use as if we talk about Pakistan most of the population lives in rural areas where most people are uneducated and illiterate and it is difficult for them to understand complicated devices so as GSM is very easy to use so it could not be difficult for them to use this technology,

Now the purpose of our project to construct this device are define as,

- To identify and inform the owner of the vehicle (Motorcycle) through ARDUINO processor and GSM technology.
- To eliminate the worries of owner of being not physically interacted with the motorcycle.

Now the Security system for motorcycle that we are going to make is not an expensive one and everyone can easily use it, in this project we well developed a security system which well work on GSM based technology so that if any unauthorized person try to steal the motorcycle then the owner of the motorcycle well receive an instant call through his Mobile phone and in this way we can reduce the number of motorcycle theft.[2] The device or system can be installed in a bike at unseen place.

1.1. WORKING PRINCIPLE:

First of all we complete the connection of ARDUINO UNO Which are shown in the block diagram of given below,

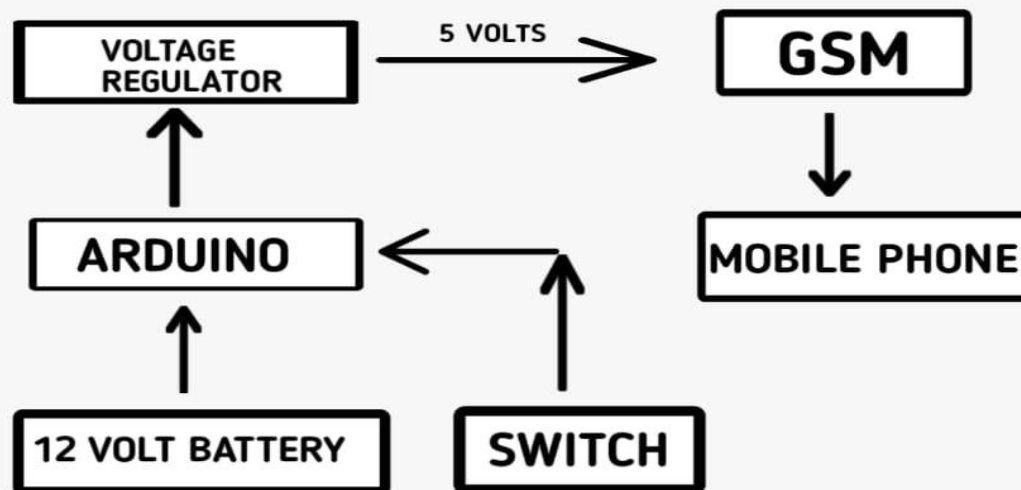


Figure 1. 1: BLOCK DIAGRAM OF THE DEVICE.

So the given diagram show that By the connecting GSM MODULE with ARDUINO UNO

And the GSM MODULE are connecting on 5V so we use the VOLTAGE REGULATOR between the ARDUINO UNO and GSM MODULE. Now we apply 12V power supply to ARDUINO UNO also connect the switch with ARDUINO UNO .Also connect the DC Jack with ARDUINO UNO and SWITCH KEY .Now we put the SIM in GSM MODULE and give the connection to the mobile. Also we give the information to the ARDUINO UNO that if they find switch key on so it well pass the info to GSM MODULE and the SIM present in them well automatically call to our mobile phone and thus we well get know about our Motorcycle so that we well detect stealing of the thief.

1.1. COMPONENTS

In our project bike security using ARDUINO UNO and GSM module .we need some component material .by using these component which are discuss below. The detail and working of these component are given,

1.1.1. DISCRIPTION OF COMPONENTS:

1.1.1.1. ARDUINO PROCESSOR:

The ARDUINO PROCESSOR is an unlock source micro controller board based on the microchip. The board consist of both digital and analogue set input and output pins. we can coded on that board and connect it to GSM module by using coded we can use this UNO by power cable or 9 volt battery in our project we use very easy method for using this UNO

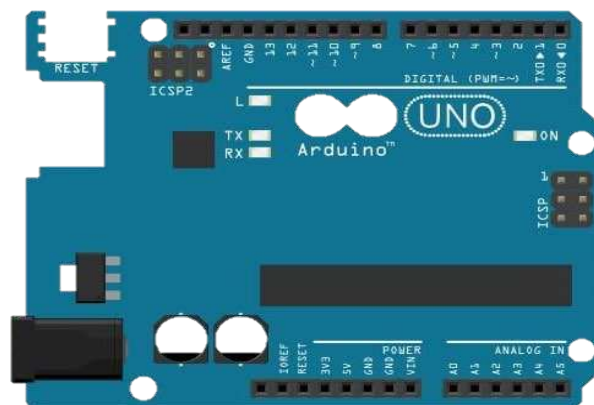


Figure 1. 2:

1.1.1.1. GSM MODULE :

GSM MODULE mean SIM is also used in this project by using GSM MODULE there is a SIM inserting it and it can receive send the message and call to owner of the bike .it is a device basically that used for to provide a wireless data link to a network.by using this when there is bike stolen by someone and when he switch on the bike then this GSM MODULE send call the owner and he come to take his bike.



Figure 1.3:

1.1.1.1. VOLTAGE REGULATOR:

Voltage regulator basically we use here for step down of Voltage.these voltage regulator take input 50V,100V ETC but it can step down to required voltage like our ARDUINO UNO work on 9 v so this voltage can minimize the current up to 9 v for ARDUINO UNO.



Figure 1.4:

1.1.1.1. SWITCH:

Switch play a very important role in our daily life .we can use switch in our project .We try to use the fingerprint or any other things but switch is easy method and not much expensive.



Figure 1.5:

1.1.1.1. JUMPER WIRE:

Due to jumper wires one thing may connect to other .like ARDUINO UNO also required a wire .other wire is also required to connect with GSM MODULE and for voltage regulator.so jumper wires are also we use in our project



Figure 1.6:

1.2.1.6.12. VOLT POWER SUPPLY:

These all things are work due to some current or some voltage power supply. for this purpose we use 12 v battery or any other current source due to which our whole system can work.



Figure 1.7:

1.2.1.7. DC JACK

A direct connector is an electrical connector for supplying direct current power. it is mainly used for direct current supply.



Figure 1.8:

1.2.1.7. ARDUINO TO LAPTOP CONNECTOR:

When we code the ARDUINO UNO we need a laptop and for connecting these two device we have required a Cable. So ARDUINO to Laptop connector also needed in our project.

Figure 1.9:



Figure 1.9

1.2.1.7. SIM CARD:

SIM card are also used in our project we have all network data and we can put this SIM Card in GSM MODULE and this SIM is open in every time. So when there is thief try to open the switch key so the SIM Card send signal to MOBILE PHONE.



Figure 1.10

1.2.1.7. MOBILE PHONE:

The important thing which is used in our project is MOBILE PHONE. We connect the SIM Card to this MOBILE PHONE and whenever there is someone want to theft the bike then we can easily receive call with a maximum range.



Figure 11

LITERATURE REVIEW

One of the systems that were previously proposed for the security of motorcycle is (Two wheeler security systems) in this project a security system has been proposed for motorcycle from being theft. That is (BIKE SAFETY SYSTEM USING FACE RECOGNITION FOR ENGINE IGNITION) .That device were constructed as the bike aggravation is linked with the system the voltage supply from 5 to 12V and the OPENMV CAMERA also connected. The OPENMV camera detect the face of the rider. The info collected by the OPENMV camera can be match with the data programmed the system detect a face recognize for engine ignition test. The picture of face of owner is already in the system programmer. First, he catch the combustion switch. Then he position his face regarding to the system in less than 30 inches. As the system grant the rider's face, the symptom is that the red LED light of the camera is blinking. At that time the system grant the face of the rider, the red LED lights up steadily. At the same time, the impartial measure and the signal lights light up as well. Then the rider well be able to start the bike. Otherwise when thief want to start the bike. If OPENMV camera doesn't recognize the face which is not the owner so it well closes the circuit so this system works as we explain above. This security system is not so much helpful for our security purpose so for this purpose we construct the one which are (Motor cycle Security System Using Arduino Processor and GSM Module)

One of the systems that were previously proposed for the security of motorcycle is (Two wheeler security systems) in the project a new security system has been proposed for motorcycle from being theft .That is fingerprint sensor for bike security system. The device that was used for motorcycle security purpose will catch your bike and you can never use your cue to start your bike. The aim of this project is to improve the security system, to relieve the combustion of the bike and make less the loss of bike in the current time. Primary, we are creating a new method to start motorcycles that is initially used opener. By using our method of making security system, they can start their motorcycle just by clicking their fingerprint. Here in that system already given the match of owner fingerprint so only the owner can access this bike through their fingerprint This method is more safer because the motorcycles owner only can be able to start their bike and no one can theft the bike easily whenever the thief want to stole the bike it can't be started because their fingerprint didn't be match which are already store in the device by owner just like take our mobile which have fingerprint unlock system. This project is very expensive and not so much helpful for us so for this purpose we construct the new one which is less expensive

In recent years, motorcycle theft has become a significant problem in many areas. To address this issue, researchers have proposed various motorcycle security systems that use different technologies such as One of the system that were previously proposed for the security of motorcycle is (Two wheeler security system) In the project a new security system has been proposed for motorcycle from being theft .That's Design Concept of a Motorcycle Secondary Electronic Lock . In this security system the device that were constructed for motorcycle security purpose are a secondary electronic lock The design and component were selected based on advance security and safety in term of high working this system was then converted in 3D design with commercial procedure and this actually work with electronic system and not a specific key so it keep bike secure with secondary lock as when the thief want to theft the bike he will face a lot of difficulty with from this security system as there is already one lock in bike if thief are successful in unlocking the already present bike lock but he can't unlock the bike with secondary electronic lock in this way the bike well be safe from stolen. As this security system is very expensive and now days most peoples are poor so in low budget this does not work for this we make the new one called (Motor cycle Security System Using Arduino Processor and GSM Module)

Another project that have been performed previously is (To secure your bike by this smart Arduino based GPS device this is also one of the system for motorcycle which is very helpful and secure, in this project they have used vibration sensor and GPS sensor, the aims of this system was to place all these small tool into 1 linked system which will help the owner of the motorcycle to control the security of his motorcycle. This system was divided into two parts one is hardware development in which all electronic components are connected through a circuit. In this part a vibration sensor a GPS receiver, switch LED, light, Bluetooth are connected through a special technique, the other role of this security system is the software part which control the

whole security system. In short this security system were proposed to strengthen the security of motorcycle and also find the location of motorcycle by using GPS receiver in Android app. As the prizes of everything is raising day by day, People are unable to buy motor cars end acquire into motorcycles further. there are many causes that why humans being are using motorcycles but one of them is that they want to save money, so in order to protect their assets they need a strong security system for their motorcycle which will help them to find their motorcycle by using GPS technology through which they can easily find the motorcycle through Android application. This security system has two benefits, first it has a vibration sensor and any external effect can be regarded as that somebody is trying to move motorcycle, now if somebody able to steal the motorcycle then the motorcycle can be finding by using GPS navigation system. Now this device is also very helpful to protect the motorcycle from being theft but this security system is much expensive because the components that are used in this security system are very expensive and are not easily available in the market so people with low budget will be unable to buy this security system and use it in their motorcycle, also this security System works through smartphone and an Android application So people who are illiterate or unable to use the smartphone will not use this security system so a more SIMple security system is required which will be not very expensive and can easily be available in the market for everyone.

One of the systems that were previously proposed for the security of motorcycle is (two Wheeler security systems). In this project a new security system has been proposed for motorcycle from being theft. The device they have constructed which works on GPS and GSM based technology, which can be easily access through smartphone or Android app. many security systems have been developed till now which can be very easily detected and hacked by the thieves. this device has the feature that if somebody try to steal the motorcycle the owner of the motorcycle will instantly get a phone Call or SMS also by using Android application we can find the location of the motorcycle, and in this way He/she can protect His/hers motorcycle from being theft, and in this way many economic losses can be overcome, because motorcycle is one of the largest sources of transportation and are used by people who are unable to buy a car, it means that motorcycle are used by middle and lower class people so if someone steal their motorcycle it can leads to economic losses as well as frustration. Now if we look at this security system it is very useful but there are some limitation to this system, motorcycles are mostly used in developing countries and in these countries most of the people does not have a smart Android phone in order to use GPS technology and also it is difficult for those people who are illiterate to use Android phone and find the location of the motorcycle so a more Simple system is required which will be easily usable for everyone.

As they said that necessity is the mother of inventions, due to the rising crime of motorcycle stealing in the world many security systems have been developed in which one of them is (advanced bike security system). This is also one of the system which is very effective part of the security of motorcycle This security system is depend on a GSM and GPS technology, a microcontroller processor is connected to the engine so if somebody tried to steal the motorcycle all the information is sent to the owner of the motorcycle through an SMS. This security system has also a GPS module through which the owner of the motorcycle will find the exact location of the motorcycle so by receiving the signals from the motorcycle the owner of the motorcycle can switch off the ignition switch and the person who stole the motorcycle will be unable turn on the ignition switch and the engine of the motorcycle will immediately off. As we have said that this security system consists of GSM based control system so the main purpose of this security system is to identify the bike through a short message service or SMS. A strong security system is very important part of the motorcycle, as the number of bike theft increase every passing year. there are many safety systems that are present in the market which provide different types of functions, but much of these security system are more expensive, Using this security system the owner of the motorcycle will get an SMS through his cell phone and also will get the require location of the motorcycle so by opening that message the owner of the motorcycle will be able to find the motorcycle. Now this security system is also very much expensive and people with low budgets are unable to use this security system ,also this security system has GPS technology which requires a smartphone so people who does not have a smartphone will be unable to use this security system also people who are unable to use smartphone will not be able to use

the GPS technology another disadvantage of this security system is that someone steal the motorcycle the owner of the motorcycle will get an SMS so people who are busy in their work will be unable to know about the SMS so a more effective and less expensive security system is the need of the time.

Another project that has previously been proposed for the security of motorcycle is (detection of automobile theft and engine locking using Arduino) this is also one of the projects which has an enormous amount of benefits and which strength in the security of motorcycle using GSM, GPS and RFID module. The main purpose of this project is to secure the motorcycle from being theft at parking places, this system can be very easily installed in any motorcycle, A lot of motorcycle are parked in streets and parking places which makes it very easy for the thieves to stole the motorcycle from there, So this system was developed to reduce the amount of vehicles theft at such places so this system can be installed in motorcycle and can easily be traced by GPS technology, the user of the motorcycle will get a text message as soon as there is theft then the user of the motorcycle can send back a unique code which will turn off the ignition engine of the motorcycle and the thieves will not be able to start the engine of motorcycle, and in this way the user can easily prevent the robbery of the motorcycle and protect his assets. This system is also very helpful but this system is much expensive and people with lower budget will not be able to use this security system, so we have to make a system which is less expensive and easily available for the ordinary people. [12] This paper is about motorcycle security by making the best use of advance technology there is a GSM module and GPS system in a bike by which we can track the location of the bike easily. The GSM module can send an alert message to owner of the bike and then they can easily safe their bike from threat .The tracker can show the location of the bike through Google map that where locate now. The tracker can also show the movement of the bicycle when it is stolen by the thief this is a very good step in the society due to which the crime cases of stolen bike can be minimized. If we see in today generation the technology are advanced .technologist work hard day and night to provide a unique thing which help the human being in every way. One of the big issues is security system. There is still stolen of motorcycle in everyday of life .We can minimize this problem by using GSM module, Adriano Uno and a SIM by using these. If a bike were stolen by someone then this GSM can send message to owner and then he come to his bike for safety. There are a lot of researcher who invented automatic motorcycle and a very advanced motorcycle but there is no such type of security system.so we can add the GSM module, Arduino Uno etc. to minimize the stealing of bike.

If the theft can stole the motorcycle then an alarm is also activated and an alert message is send to owner of bike .If the theft remove the system from bike then the tracker also in the bike by which we can locate the bike.

[13] In this paper a bike security model is discussed in which the finger print system in the motorcycle by using GSM module and GPS. This finger print can be also work from owner smartphone to off \on the bike. The anti-theft finger print is one of the advanced and easy security system due to this finger print the owner can also find the location of bike in few second. The arduous microcontroller. Uno, finger print sensor and four channel relay module are used in this security system .The owner can also control the ignition by his smartphone. It is the easy and a good security system. We see that if there is a cheap phone mean from 3k to 5k there is a finger print for their security but there is no bike in our society that it has a finger print system. The stolen of vehicle in India in 2018 are 44158 cases out of which there is some cases solved.

We can put the finger print sensor in the motorbike to minimize the threat. We can use a GSM module and GPS system in that security system. If someone other than owner can touch the finger print then an alert message will be send to owner of the motorbike. The GSM and GPS system are a good system by which the owner can also track the location by using GPS on google map. The purpose of our project is to put a finger print system in motorcycle due to which stolen of vehicle can be minimize. [14] The purpose of our project is to we can invented a new security system for our society by which the stolen of vehicle can be vanish. If this security system we can use an Arduino UNO based anti-theft noticing system which can apply on motorbike. When this system mean Arduino Uno based anti-theft apply on motorbike and someone stole the bike so a detection of accident is consider by the bike due to which an sms will be send to owner and react to stolen bike push the

GPS coordinate with SIM and GSM of the bike so the owner can also receive an alert message by which he can save his bike from thief. As in our society if the bike is stolen by someone so it's impossible to take back from theft because we don't know the theft and location of bike. The aim of our project is only to develop a low profile, low powered and a high coverage security system can be installed in the bike so the owner can easily find the location of our bike. An alert message will be send through GPS coordinate when someone stole the bike. There is also a track system by which the owner of bike can easily track the location using google map. The Arduinio Uno based anti-theft cum fall detection system is that system that it can detect the force of stolen human body and it can say about the position of the stolen. First it detect the accident and second it detect the stolen state of the bike so due to which the bike security system push the GPS CO ordinate in a certain interval. By this security system the crime of stolen bike will be vanish.

This system based with the method of a theft authority system for a wheels, which are used to make less the stolen of a bikes. This system makes use of a safety system depend on Global

System for Mobile communication (GSM) technology. The method of this system is used in the vehicle. Here also a mobile phone connected with microcontroller, which is linked to the engine. If the bike is theft by thieves, the info is used by the bike owner for finding the bike location or the bike thieves. In this security of bike safety system whenever the thieves want to stole the bike the signals or message send to our mobile phone which are connected with the phone and phone with the chips which are kept in the engine of bike so in this way the bike are safer from the thieves. The designed system is very simple & cost is low. The given made system is on a one chip.

Argade Geetanjali Arjun¹, Moresh Mukhedkar, made a controlling structure for vehicles which can be utilized to stop the thieves approach. They used GSM technology which is setup inside the vehicle and also connected to engine. The system is linked with Global Positioning System to provide exact location of car. The main theme of this work to fix mobile phone in system Communication.

In this paper a new system is made for the safety of motor bike from theft protection. This system is works on wifi system which can be approach able through a web or android app through mobile or laptop. Here many security systems present in the market, which are simply noticeable & hack by hacker's. now here we, introduce a bike safety security system which work on wifi system as we mentioned the name above. This system works on the remote control or GPS or GSM. Which are very secure and cannot be hacked easily for observing the location of the bike, we are using tilt observer which has been moving from their still or moving position. This paper had a controlling structure for two wheeler which can be used to stop thief's access. They used remote control GPS & GSM technology which is setup inside bike. This system has a GPS & GSM which can't be hacked by thieves. And so whenever thieves want to stole the bike they well is definitely failed because of our security system for bike safety so we can feel free about bike stolen. This device is very expensive, so we are going to make a cheap & best device having Mobile connection for thief's control.

The proposed of this system is regarded a bike anti thieves device process which assist the people save the bike from thefts & assists to path the sidle bike position using a cell phone where we put GPS tracking system in bike which are be easily Track through our mobile phone or laptop. This safety system of motorcycle uses two primary devices to keep the bike safer, the vibration sensor & GPS sensor. The total system can be separated into two main roles. The one bit is about the hardware, this part includes a vibration sensor, a GPS receiver, a switch, LED lights, Bluetooth signals & a buzzer. Wireless Bluetooth signals are used as the means of communication between cell phone & microcontroller. The second part is the software part which is being program & control the total system in abstract, this system is made as to enable the user to have access in safety of his or her bike. This project is a controlling system for bikes & bicycles which can be utilized to stop thieves approach to our bike stolen they had used vibration sensor, GPS, LED lights, Bluetooth signals & buzzer inside bike connected with engine. This system also linked with GPS to avail exact location of bike. Which are be access through our mobile phone or laptop. As this is so expensive so we use another security system for bike safety.

The proposed of this paper to protect the bike from stolen and from thieves as we studied many security system for bike safety here we studying one pf the bike safety security system which are (MOTORCYCLE TRACKING SYSTEM USING GPS VIA ANDROID BASED

PLATFORM) In this project Motorcycle Tracking System that act as a medium to detect the location Of motorcycle when stolen. In this system we make the motorcycle become Traceable and they did not need to worry about the motorcycle. In this system the android phone is connected with other devices for bike safety security system which we are using in this project the connection made between the android and other devices such as GPS and GOOGLE MAP are a smart system here the GPS receiver are used which are put in bike so we can access it though mobile phone easily so by this GPS connection with bike and phone bike can be easily Track and thieves cannot escape from our reach as when thieves want to stole our bike he didn't be known about our security purposes as we put GPS in bike so if he stole the bike we well be easily Track bike through the phone . As this is so expensive system for our security purposes of bike safety so we didn't use it and we choose the less expensive system which are we making in our project called BIKE SECURITY SYSTEM THROUGH GSM AND ARDUINO UNO?

COMPONENTS AND DESCRIPTION

In this chapter we well study in details the components of our project as well the working principle .The device which we are making, consist of the following components.

- ARDUINO UNO
- GSM MODULE
- VOLTAGE REGULATOR
- SWITCH
- JUMPER WIRES
- 12 VOLT POWER SUPPLY
- DC JACK
- ARDUINO TO LAPTOP CONNECTOR
- SIM CARD
- MOBILE PHONE

The motorcycle security system devices are very important in now days living because bike theft are increasing day by day in many countries of the world including our Country Pakistan. According to the national news there are 40k motorcycle stolen in the US of American every year so its mean this is not a local issue but also an international issue. [20]. the aim of our project is to develop such a system which should control the increasing factor of bike stealing.

WORKING PRINCIPLE:

First of all we complete the connection of ARDUINO UNO with GSM and other COMPONENTS. The arrangements are shown in below diagram.

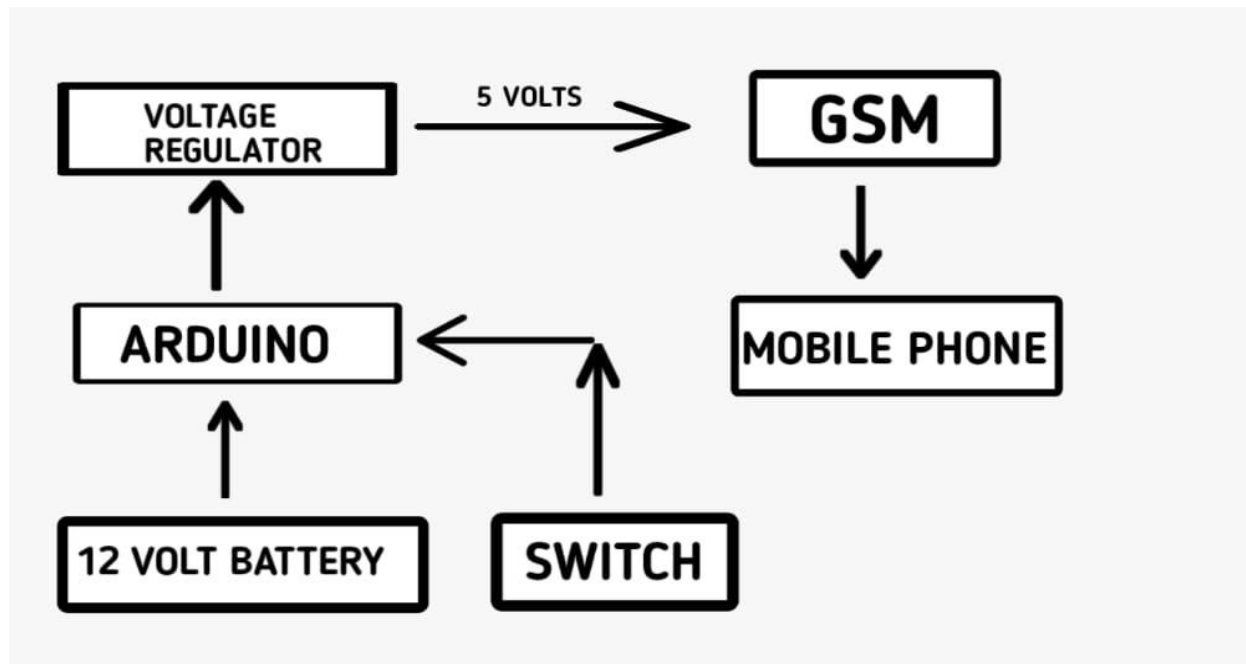


Figure 3.1: BLOCK DIAGRAM OF THE DEVICE

The working principle begins with the brain of our project i.e arduino. The battery provide the voltage to the arduino to stay it active. All the functions are carried out with the command of arduino. Now the task which the arduino will performe is already programmed in it. The action of the scene begins when switch of the motorcycle is turned on. The arduino receive the signals and then according to the prescribed programe it send a signal to the GSM module. But the GSM module work on 5v. so in between arduino and GSM, we make the use of voltage regulator. The voltage regulator despite of any signal recived from arduino, permit just the 5v signal to the GSM module. As the GSM module receive the signal, it comes in to action and according to the command of arduino, it make call to the prescribed mobile phone. The owner, as recives the call will get alert and than will go for the further necessary action.

3.1. COMPONENTS DESCRIPTION

3.1.1. ARDUINO PROCESSOR:

The ARDUINO PROCESSOR is an open source micro controller board based on the microchip [21]. The board consist of both digital and analogue set input and output pins. we can coded on that board and connect it to GSM module by using coded we can use this UNO by power cable or 9 volt battery in our project we use very easy method for using this UNO

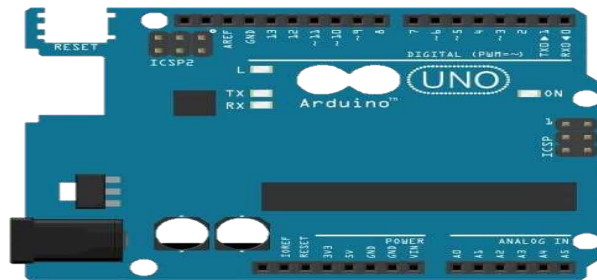


Figure 3. 2

3.1.1.1. WHAT IS ARDUINO UNO:

The ARDUINO is in SIMple word that it is an open source microcontroller board which is based on microchip .The ARDUINO UNO is a micro controller board which is based on and working with a microchip Atmega328p which is developed by ARDUINO cc and in 2010 it was released and can done for working .In ARDUINO UNO the board which is used is consist of both digital and analog Input\output .Its memory is in SRAM.

3.1.1.1. WHAT IS ARDUINO MICROCONTROLLER UNO?

The ARDUINO microcontroller UNO is a board which is based on a datasheet.it consist of 14 digits both Input\output pins [22] .In these Input\output 6 digits are used for input while 6 for output.

3.2.1.3. LANGUAGES USE BY ARDUINO UNO:

The language which is used in ARDUINO UNO is C and C++ .by these language we can put data and information to ARDUINO by which it can b work easily.

Function

The function of ARDUINO UNO is that it is very low cost and it is very easy method to use in programming open source microcontroller chip.it can control the LED ,servos ,and motors as an output .it is able to read the input and can gives the output result easily

Why we use ARDUINO in our project?

It is very SIMple and can be used by everyone .one of the advantage of ARDUINO is that it's very low in caste and purchased easily .we use ARDUINO UNO because it can allow a very SIMple way to create interactive things that can be taken Input\output from switches and sensors and can be control physically output like lights, motors, etc.

ARDUINO UNO is used in electronics its hardware and software make it a great tool for learning and building in a project.

The ARDUINO UNO is very best and one of the common ARDUINO UNO Board is available in each and Every where we also used it by the availability of that.it has some friendly feature including large 2.54mm pitched sockets for connecting to an external device.

The ARDUINO UNO used the technology of ARDUINO architecture .the processor of the ARDUINO UNO board use the Harvard architecture .In that technology the program codes and data having separate memory .it has different memory for processing. its consist of two type of memory .one is program memory and the other one is data memory .these two type of memory has also different function .the data memory stored the data while the codes are stored in flash program memory.

BEST ARDUINO UNO ARE:

There are five best ARDUINO boards which are given below

- 1) ARDUINO UNO for basic level project
- 2) ARDUINO UNO for breadboard project
- 3) ARDUINO mega 2560 Rev3 for advanced level project
- 4) ARDUINO due for big and complex project
- 5) ARDUINO MKR Zero which is used for Audio and for sound project.

These are five best ARDUINO UNOs which are used for different purpose and for different project and we can use the basic one ARDUINO because it's low cost and is easy to use [24].

3.1.1.1. Pins in ARDUINO

The digital pins in ARDUINO UNO are pins which is designed in that type in which to be configured as Input\output as according to the need of person .we can code and put the data in that pins and can fix the required function which we need .these digital pins are either off or on .both condition it can work like when it's on then they are in high Voltage state and when off then they are in low voltage state .mean it can work both in off or on condition.

3.1.1.1.1 TYPES OF PINS:

There are 3 types of pins which are used in ARDUINO UNO. They are following.

1. The pins A0 to A5 are used as an analog input and its range is of from 0 to 5 volt.
2. The other is digital pins form 0 to 13 and it can be used for input or output for ARDUINO board.
3. The third one is serial pins which is also known as UART pin

The ARDUINO UNO can control one thing at a time depending on the level of real-time mean you can handle you can control probably you need things at a same time one after each other so u can put data and control it

3.1.1.2. TYPES

There are a lot of types of ARDUINO UNO some of Following of ARDUINO UNO are given below

- a) ARDUINO UNO
- b) ARDUINO board
- c) ARDUINO due
- d) ARDUINO Mega
- e) ARDUINO Leonardo

There are some other types.

- a) ARDUINO Nano
- b) ARDUINO Pro mini
- c) ARDUINO Leonardo
- d) ARDUINO micro

3.2. GSM MODULE :

SIM is also used in this project by using GSM MODULE there is a SIM inserting it and it can receive send the message and call to owner of the bike [25].it is a device basically that used for to provide a wireless data link to a network.by using this when there is bike stolen by someone and when he switch on the bike then this GSM MODULE send call the owner and he come to take his bike.



Figure 3.3

3.3.1. GSM STATES FOR:

GSM (global system for mobile communication)

A GSM module is that type of device which is specialized by that type which accept the SIM Card mean we can put the SIM Card inside it due to which it work and that SIM is connected by a mobile phone to receive the call from SIM [26] .when there is theft to bike and someone switch the key then this SIM Card can do a great work mean call the owner of bike to his mobile phone and by that way he can save his bike.

This GSM module is look like a mobile phone .like mobile phone it can work and it's looking is like a mobile phone also.

It is basically a device which make a link to a network between the two things .A GSM module provide a wireless data link to a network .GSM modem or GSM module are use in a mobile phone or any other electronic devices which can receive the call like a Mobile. SIM Card is required in gem module by which it can communicate and identify the network

3.3.1. WHY WE USE GSM ?

We use GSM module on his project because it has developed and digits technology.it has more ability a lot of ability to data rates mean from 64 kbps to 120 Mbps of data. Recently time the GSM module was modern and can support more than one billion mobile subscribers in more than 210 countries in all over the world.

It is widely use in all over the world in mobile phone.it is easy and have low price .uses by Europe countries and other part of the world.

Best GSM module

The best GSM modem or module we can use in our project is SIM com SIM 800L.it work on maximum frequency but we try to use low frequency by minimizing the work.

3.3.2. How we connect to GSM:

Following steps are used to connect the GSM module.

1. We can obtain an account with your carrier of choice.
2. In next step we can put and install the SIM card in the device.
3. Power on the device.
4. We can go to mobile connectivity page and connect.
5. Then we can go the setting and enter the connection setting for the cellular modem in the device.

3.3.2. GSM to Arduino connection?

[8]Following steps are used to connect the GSM to ARDUINO UNO which are given below.

- 1 In first step we can put the SIM Card into the SIM Card tray on the GSM module and lock it .not to move.
- 2 The external antenna are connected by the module if we have not done first.
- 3 In last step we can connect the GSM module and ARDUINO.

3.3.2. Types :

There are three different types of GSM module which can give below

- 1 The switching system (SS)
- 2 The base station system (BSS)
- 3 The operation and support system (OSS).

The unit of GSM module is grams per square meter

3.2. VOLTAGE REGULATOR:

Voltage regulator basically we use here for step down of Voltage .these voltage regulator take input 50V,100V ETC but it can step down to required voltage like our ARDUINO UNO work on 9 v so this voltage can minimize the current up to 5 v for GSM.



Figure 3. 4..

3.4.1. WHAT IS VOLTAGE REGULATOR?

A voltage regulator is that type of system which is designed in that way which can control the voltage automatically and also step down the voltage which is required by the person .voltage regulator can use an electromechanical mechanism or in electronics.

The basic work of voltage regulator is that it can generate the fixed output voltage required by the person in project .the input may be high but it can control and come down the voltage to required value.

Types

Switching voltage and linear voltage

3.4.1. The three basic types of switching voltage are given below.

1. Step up
2. Step down
3. Voltage regulator.

The voltage regulator is needed in every place because it can step down or step up the voltage to required voltage within prescribed range. The voltage regulator are also called voltage stabilizer or tap changer have also been used in AF power lines.

3.2. SWITCH:

Switch play a very important role in our daily life .we can use switch in our project .We try to use the fingerprint or any other things but switch is easy method and not much expensive.



Figure 3.5

3.5.1. MOTORCYCLE IGNITION SWITCH:

A motorcycle ignition switch is one of the most essential parts of the motorcycle ignition system in order for a motorcycle to run its ignition switch must work properly. It is the starting point for a motorcycle. If any kind of issue occurs to it the motorcycle will not start or run its engine.

3 . 5 . 1 . WHAT IS MOTORCYCLE IGNITION SWITCH AND HOW IT WORKS?

Now we will explain that what exactly motorcycle switch is and how does it work a motorcycle ignition switch's main purpose is to create spark which is use to ignite the fuel inside the motorcycle engine. The spark needs to be occurs when the piston is close to the top of the compression stroke, so the compressed fuel mixture burn properly and the gas is expanded during the process. Apply a force on the piston to move down the cylinder. Not only this ignition switch produce high voltage which is needed to fire the spark plugs but it also needs to send the spark at the exact time. The ignition switch is one of the main electrical part of the motorcycle which control the spark delivery to the engine. It is also kind mechanical switch. A spinning can control the opening and closing of the switch.

3.5.1. SWITCH KEY

A key is required to start the switch. Every switch has a unique and specific key □. With the specific designed key the motorcycle engine will start properly. When key is switched on it, it provides spark to the engine. So ignition switch is the step in order to start your motorcycle. The switch needs to be at your fingertip in order to have complete control on the switch. By turning of the key you are sending a signal to the motorcycle ignition system to start the ignition process. The ignition switch is located on the steering or handle of the motorcycle. In order to start the motorcycle a key □ is inserted to let you turn the switch from off to on.

3.5.1. PURPOSE OF IGNITION SWITCH:

The main purpose of ignition switch is to supply spark to the engine at the correct time. The spark must be strong enough to a gap at the spark plug electrodes. In order to achieve this the voltage must be increased considerably from the bike electrical system 6 or 12 volt to around 25000 volts at the plug. In order to achieve this increase in voltage the system consists of two circuit, the primary and the secondary. In the primary circuit the 6 or 12 volt power supply charges the coil. During this period the contact points are closes. When the contact points are open the sudden drop in power supply causes the cool to release the stored energy in the form of high voltage. The high voltage current travel along a lead to a plug before entering the spark plug via central electrodes. A spark is created as the high voltage jumps from the central electrodes to the ground electrodes

3 . 2 . JUMPER WIRE:

Due to jumper wires one thing may connect to other .like ARDUINO UNO also required a wire .other wire is also required to connect with GSM MODULE and for voltage regulator.so jumper wires are also we use in our project



Figure 3.6:

3 . 6 . 1 . WHAT ARE JUMPER WIRES:

Usually, jumpers are small connectors made of metals used to close or open a part of circuit. They have connection points, which manage an electrical circuit board.

Their main function is to arrange the settings for computer, just like motherboard. Just imagine your motherboard helps intrusion detection. A jumper can be used to enable or disable it.

Jumper wires are electrical wires with connector pins at the end. They are used to attach two points in a circuit without soldering.

You can also use jumper wires to organize a circuit or identify problems in a circuit. Further, they are best used to detour a part of the circuit that does not contain a resistor and is suspected to be not good.

This comprise a stretch of wire or a switch. Let suppose all the circuits are good and the unit is not receiving power; then we need to find the switch. And then, bypass the switch with the help of jumper wire.

How much current (I) and voltage (V) can jumper wires manage? The I and V rating will depend on the copper and aluminum materials present in the wire.

For Arduino application it must be 2I or 250V. Solid-core wire can also be used, a

3.6.1. JUMPER WIRE TYPES:

There are three types of jumper wires:

- Male-to-male jumper
 - Male-to-female jumper
 - Female-to-female jumper
- And two types of shapes: square head and round head.

The end point of the wire is the difference between them. Male ends have a pin at the end and can be plugged to different things, while female ends do not have pins at the end but are also used for plugging.

Furthermore, a male connector is considered as a plug and has a solid pin for conduction. While, a female connector is considered as a jack and has a center conductor to accept the male pin.

The most commonly used jumper wires are Male-to-male jumper wires, you would like to use it most often, and For example, when connecting two ports on a breadboard, you will need a male-to-male wire.

3.6.2. How to select a jumper wire?

Now you know the three types of jumper wires and how they are used, from this you should be able to use which type of head. At times, you are connecting an Arduino Uno pin with a breadboard. A male-to-male jumper is suggested. But if you are connecting it directly to a sensor, then use male-to-female jumper.

3.212. VOLT POWER SUPPLY:

The 12V DC power supply is one of the most leading power supplies in the world today. Mainly because it is not that much expensive and easily Affordable be to everyone.it is also one of the most reliable source, and easy to use .Now we will discuss that what is 12 volt power supply and how does it works ,what is it's applications? , and how you can make it at home? In this article, we will discuss all these answers,



Figure 3.7

3 . 7 . 1 . What is a DC 12V power supply?

A DC 12 volt power supply is a device which supplies electrical energy to a load. In other words, a power supply's primary function is converting electric current from the source into the amount of required voltage or current, which provides power to the load. Regulated 12V power supplies

3.2. DC JACK:

A direct connector is an electrical connector for supplying direct current power. it is mainly used for direct current supply.



Figure 3.8:

3.8.1. WHAT IS DC JACK?

A DC connector (or DC plug, for one common type of connector) is an electrical connector for providing direct current (DC) power.

3.8.1. WHAT DC JACK DO?

A DC power jack is used for receiving power and is usually mounted on the PCB or chassis of an electronic device. DC power trash is also used to receive power but is found on the end of a power rope.

3 . 8 . 1 . TYPES OF DC JACK:

International standard IEC states that there are five DC power connectors:

1. Type A: 5.5 mm OD, 2.1 mm ID (with optional screw lock)
2. Type A: 5.5 mm OD, 2.5 mm ID (with optional screw lock)
3. Type B: 6.0 mm OD, 2.1 mm ID.
4. Type B: 6.0 mm OD, 2.5 mm ID.
5. Type C: 3.8 mm OD, 1.1 mm ID



Figure 3.9

3.8.1. HOW DOES DC JACK WORK?

The dc barrel plug or jack has two conductors, one each for power and ground. Assembly is for the middle pin to be power and the upper sleeve to be ground, but opposite the connections is acceptable. Some power jack models include a third conductor which forms a connection with the upper sleeve conductor.



Figure 3.10

3.2. ARDUINO TO LAPTOP CONNECTOR:

When we code the ARDUINO UNO we need a laptop and for connecting these two devices we have required a Cable.

So ARDUINO to Laptop connector also needed in our project.



Figure 3.11

3.9.1. WHAT IS CONNECTER:

A device (Cable) for keeping two parts of an electric circuit in contact Like Cable Connect the ARDUINO to Laptop.

3.9.1. HOW TO CONNECT ARDUINO TO LAPTOP:

The USB link with the PC is compulsory to program the board and not just to power it up. The UNO automatically draw power from either the USB or an external power supply. Link the board to your computer using the USB cable. The green power LED (labelled PWR) should go on.

3.9.1. CONNECTOR TYPES:

3.9.1.1. THERE ARE THREE TYPES BASICALLY:

Electrical connectors are classified into three types based on their termination ends:

1. board-to-board connectors,
2. Cable/wire-to-cable/wire connectors,

3. Cable/wire-to-board connectors.

Every connector has a male-end called plugs. And a female-end called jacks.

3.9.2. HOW CONNECTOR WORK ?

Electrical connectors are devices used to connect electrical ending. And complete a working circuit connector's work in pairs.

3.9.2. PROPERTIES OF GOOD CONNECTORS:

Some of the basic qualities for a good connector are genuine and low cost, high return and low putting losses, easy to operate and install and low reactivity for environmental conditions. These links also help in faster disconnection and connection and line up at the cores to allow light to pass through it.

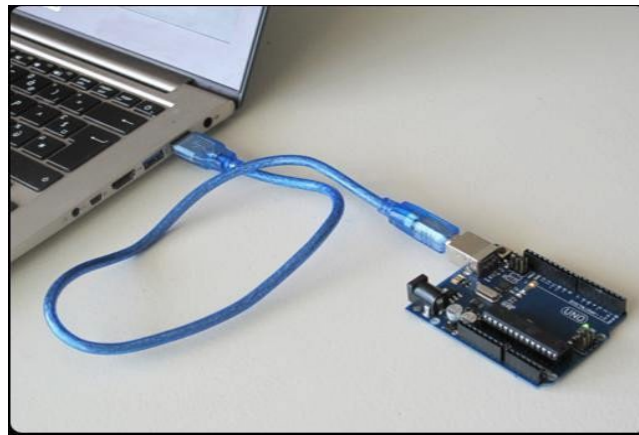


Figure 3.12

3.2. SIM CARD:

SIM card are also used in our project we have all network data and we can put this SIM Card in GSM MODULE and this SIM is open in every time. So when there is bike stolen try to open the switch key so the SIM Card send signal to MOBILE PHONE.



Figure 3.12

3.10.1. HOW SIM CARD WORK:

SIM cards link some account to a certain phone; they tell the phone network company which account is connected up to which person's phone. Phone network companies usually call customers "subscribers". A SIM card is a customer card that lets your phone connect to the network. These towers allow us to make phone calls.

3.10.1. SIZE OF SIM CARDS:

There are three basic sizes of SIM card:

- 1) The STANDARD,
- 2) The MICRO, &
- 3) The NANO,

Among these three the STANDARD is the original SIM and the largest. Today, these are mainly used on older phones. Such as older phones of NIKIA, SAMSUNG etc. while the NANO and MICRO are used in latest MOBILE PHONES, and among these two the NANO is most usable now days of 2022,

3.10.1. TYPES OF SIM CARDS:

According to the latest information by the GSMA, a trade association, there are currently **5.9 billion** such active mobile "connections", industry lingo for SIM cards (more if you count these used in payment terminals and other machine-to-machine links).

3.10.1.1. How many SIM are there in PAKISTAN:

On the basis of companies (Technology) there are five types of SIM Cards in PAKISTAN,

- 1) JAZZ
- 2) TELENOR
- 3) Ufone
- 4) ZONG
- 5) WARID

These SIM Cards are usually using in Pakistan for communications.



Figure 3.13

3.2. MOBILE PHONE:

The important thing which is used in our project is MOBILE PHONE. We connect the SIM Card to this MOBILE PHONE and whenever there is someone wants to theft the bike then we can easily receive call with a maximum range.



Figure 3.14

3.11.1. NAMES OF MOBILES PHONES:

Mobile phone has many names i.e

- ✓ Cell phone
- ✓ Smartphone
- ✓ Pocket phone etc.

A smartphone is easy Carrying device which is the greatest and easiest, & cheap way of communication throughout the world .it is the one of the most important inventions nowadays on earth .Due to its various best feature & ease, a lot of people use Smartphone throughout world. According to survey approximately

- 70% Japanese citizens &
- 62% US people used cell phone in 2005.

At that time 81% Australia inhabitants used portable phone. Cell phone is fast way of communication that's why life is impossible without Smartphone. Because it has a major role in every field of life,

RESULT AND DISCUSSION

According to the latest statistics motorcycle is the 2nd most used mean of transportation in the world, especially in developing countries Like Pakistan and Bangladesh etc., people use motorcycle because it is less expensive, now in order to protect their property and avoid financial loss we have developed a security system which could be very helpful.

Now our proposed model of motorcycle security using Arduino processor is not expensive and easily accessible to everyone It could be available in low price so that everyone could afford, The sole aim of this project is to strengthen the security of motorcycle in order to reduce financial losses of the middle class people because financial losses could lead to depression and chaos in society, This model can easily be prepared and every person that owns a motorcycle would be able to buy it, The component that we have used in this model is cheap and easily available in the market, as from statistics and different surveys the people of Pakistan are below the poverty line in great percent it could be very helpful for them to secure their property so this security system is very helpful in this regards, because the loss of motorcycle or any other public property could leads to depression and many sociological problems, that is why we have struck the idea of creating this system,

Although this security system is very much effective but it could be further enhance and upgrade to some level, the GSM module works very well and could be accessed from a large distance but it would require mobile balance in order to receive phone call so we have to deal with it, the code that we have installed in Arduino is kept as SIMple as possible, the wires and other components that we have used is of good quality and in low price, the connection that we have made is very SIMple that even an uneducated person would be able to use it.

The main and best advantage of our proposed model is that is does not require any skill of electronics and that is why it could be used by anyone on this planet earth, it's use is very SIMple in operation and needs only a couple of days to master the skill of using this system, I hope that this model would protect the important assets of people and would bring happiness to the world.

CONCLUSION

The conclusions obtained from the above material have two stages; one conclusion is from the survey that we have made and other is about the device and its outbreak. We will make bullet points to write these conclusions:

- The ratio of stolen Motorcycle in district Mardan is various from day to day however from survey we known that more than 200 bikes are stolen
- From survey we known that most of Bikes are stolen in Mardan is because of no handle lock or other lock also have no security safety system in Bikes.
- The most common reason of bike stolen is poverty, jobless, unemployed, illiterate, and many more causes.
- Our survey related studies show that mostly the bikes owners are in district Mardan are poor so they can't make proper security safety system.
- Also there is deficiency of parking in city places shop places etc.
- So in the light of above conclusions from the survey we made the following conclusions about our device.
- The designed model is an "MOTORCYCLE SECURITY SYSTEM" detector system for Bike stolen using Arduino processor and GSM Module.
- The most important about this is that it is kept as low as possible in price but no compromise is made on the quality.
- The device is kept as simple as possible. Everyone can understand the whole working principle with one or two time use.
- This security system is easily made and less expensive also it is very easy to understand.
- This system is less expensive than other which have using sensor etc.

FUTURE WORK:

In recent time many advance discoveries have been made in the field of science and information technology as to make slow down or remove the bike stolen in the in society. We also performed an effort which is in accordance with the requirements of bike security system in district Mardan. Some future recommendations that we prefer in our designed model is as follow.

- To obtain more accurate ratio of bike stolen in district Mardan and all its related rations more places may be surveyed and more fields may be added to it such as fingerprint system, sensor system, Camera keeping and more advance tools etc.
- Our designed model just detect the bike thieves, future work may ensure the safety along with the taking picture of thieves detecting fingerprint etc.
- Our designed is just for the detection of switch on or off the rest of bike touching alarm, future model main contain.
- More ever if we kept Camera, sensor, fingerprint detection system in bike it will be great.so it will be made in future

REFERENCES:

1. : Kesteren, J. V., Dijk, J. V., & Mayhew, P. (2014). The international crime victims surveys: A retrospective. *International review of victimology*, 20(1), 49-69.
2. : Bayley, D. H. (1976). *Forces of order: Police behavior in Japan and the United States*. Univ of California Press.
3. : K. Khan, A. Hamza, L. Ali, and S. Nabi, "Solar Wind interaction with the Atmosphere of Mars," *Saudi J. Eng. Technol.*, vol. 8, no. 11, pp. 274–282, Nov. 2023, doi: 10.36348/sjet.2023.v08i11.002.
4. : Nabia, S., & Khanb, J. Solar Wind Interaction with Venus Atmosphere.
5. __Narvios, W. M. O., Villegas, A. C., Batayola, F. F., Sadura, A. M. P., Piedra, A. D., & Nguyen, Y. Q. (2022, October). Motorcycle system using face recognition for engine ignition. In *AIP Conference Proceedings* (Vol. 2502, No. 1, p. 040005). AIP Publishing LLC.
6. Khan, Kamil & Shah, Muhammad & Nabi, Sardar & BiBi, Marwa & Khan, Hamza. (2023). Computational Approaches to Quark-Gluon Dynamics. 10.20944/preprints202312.0580.v1.
7. Khan, Kamil & Ali, Haseeb & Nabi, Sardar. (2023). Bridging Gaps in the Standard Model. 10.20944/preprints202312.1460.v1.
8. _Godfrey, D., & Song, M. H. (2016). Safe Bike: Secure your Bicycle with this smart Arduino based GPS device. *International journal of advanced smart convergence*, 5(3), 16-26.
9. __Sardroud, J. M., & Limbachiya, M. C. (2010). Effective information delivery at construction phase with integrated application of RFID, GPS and GSM technology. In *Proceedings of the World Congress on Engineering* (Vol. 1, pp. 425-431).
10. __Arjun, A. G., & Mukhedkar, M. Advance Bike Security System. *International Journal of Science and Research (IJSR)* ISSN (Online), 2319-7064.
11. _Sahai, A. K., & Francis, F. (2013). DETECTION OF AUTOMOBILE THEFT AND ENGINE LOCKING USING ARDUINO. *Technology*, 2(9).
12. _Ale, B. (2019). Oculus Aquila (Eagle Eye).
13. __Kiran, C. S. (2019). Anti-theft Fingerprint Security System for Motorcycles Using Arduino UNO, GPS/GSM Module. *Indian Journal of Science and Technology*, 12, 42.
14. __Artono, B., Lestariningsih, T., Yudha, R. G. P., & Bachri, A. A. (2020). Motorcycle security system using SMS Warning and GPS Tracking. *Journal of Robotics and Control (JRC)*, 1(5), 150-155.
15. _Singh, P., Sethi, T., Balabantaray, B. K., & Biswal, B. B. (2015, March). Advanced vehicle security system. In *2015 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS)* (pp. 1-6). IEEE.
16. __Narkhede, S. K., Tanwani, B. P., Borse, V. P., Jadhav, I. S., & Dhanke, M. M. D. (2017). Two Wheeler Security System. *International Research Journal of Engineering and Technology (IRJET)*, 4(5), 3058-3061.
17. __Godfrey, D., & Song, M. H. (2016). Safe Bike: Secure your Bicycle with this smart Arduino based GPS device. *International journal of advanced smart convergence*, 5(3), 16-26.
18. _TARMIZI, W. (2018). MOTORCYCLE TRACKING SYSTEM USING GPS VIA
19. ANDROID BASED PLATFORM. *Universiti Sultan Zainal Abidin*.
20. Kesteren, J. V., Dijk, J. V., & Mayhew, P. (2014). The international crime victims surveys: A re trospective. *International review of victimology*, 20(1), 49-69.
21. Godfrey, D., & Song, M. H. (2016). Safe Bike: Secure your Bicycle with this smart Arduino based GPS device. *International journal of advanced smart convergence*, 5(3), 16-26.
22. Kiran, C. S. (2019). Anti-theft Fingerprint Security System for Motorcycles Using Arduino UNO, GPS/GSM Module. *Indian Journal of Science and Technology*, 12, 42.
23. Sahai, A. K., & Francis, F. (2013). DETECTION OF AUTOMOBILE THEFT AND ENGINE LOCKING USING ARDUINO. *Technology*, 2(9).
24. Godfrey, D., & Song, M. H. (2016). Safe Bike: Secure your Bicycle with this smart Arduino based GPS device. *International journal of advanced smart convergence*, 5(3), 16-26.
25. Han, H. P., & Tun, H. M. (2014). Advanced car security system using GSM. *International journal of scientific and research publications*, 4(5), 1-5.
26. Arjun, A. G., & Mukhedkar, M. Advance Bike Security System. *International Journal of Science and Research (IJSR)* ISSN (Online), 2319-7064.
27. Janson, S., Helvajian, H., Amimoto, S., Smit, G., Mayer, D., & Feuerstein, S. (1998, March). Microtechnology for space systems. In *1998 IEEE Aerospace Conference Proceedings* (Cat. No. 98TH8339) (Vol. 1, pp. 409-418). IEEE.

28. Artono, B., Lestariningsih, T., Yudha, R. G. P., & Bachri, A. A. (2020). Motorcycle security system using SMS Warning and GPS Tracking. *Journal of Robotics and Control (JRC)*, 1(5), 150-155.
29. Takao, M., Takahashi, S., & Kitamura, M. (2009). Addictive personality and problematic mobile phone use. *CyberPsychology & Behavior*, 12(5), 501-507.
30. Arth, C., Grasset, R., Gruber, L., Langlotz, T., Mulloni, A., & Wagner, D. (2015). The history of mobile augmented reality. *arXiv preprint arXiv:1505.01319*.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.