FACULTY OF ELECTRICAL ENGINEERING

POLITEKNIK SEBERANG PERAI

PULAU PINANG

FINAL REPORT

AUTOMATIC DOOR LOCK SYSTEM FOR CLASSROOM

NUR FATIHAH BINTI HASHIM

10DTK13F2031

MORNIY MENON A/P RAMU

10DTK13F2011

KUGUNESWARY A/P SUBRAMANIAM

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SUPERVISOR:

TUAN HAJI SHOHAIMI MAT ISA

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By :

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ABSTRACT

Security plays a prime concern in our day-today life. Everyone wants to be as much secure as possible and why not the place we study. So we planned to create a project which is helpful to our classroom. Our department JKE uses keys to lock our classroom door after the class hour. We found that it is less secured and keys may lose easily. The Arduino based Door locker is an access control system that allows only authorized persons to access the classroom in restricted time and day. The system is fully controlled by the Arduino for the program memory. We able to use the classroom from 8am to 5pm where usually class occurring time. AT 5pm the admin have to on the system .Once the system is turned on there will be a notify in LCD "ENTER PASSWORD" .The users have to insert the password to access in. When they entered password equals with the passwords to reading the memory then the Arduino gets on and send signal to solenoid so that the door is opened. The password is stored in the EPROM so that we can change it at any time. The system has a Keypad by which the password can be entered through. We can enter a password according to the user. We have set 3 users with different password. When user 1 entered the right password then the access is approved by showing User 1 and door is open in LCD. If we entered a wrong password the system will not open the door and it Show in LCD "PASSWORD IS INCORRECT" And buzzer is on and make sound. Only a successful password can be accessed in. Apart that, once the door is open then the after few seconds the buzzer will make sound and there will be a notify in LCD "please close the door "which give alert to the users to not forget to close the door.

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CHAPTER

1

Chapter 1

1.1 INTRODUCTION

Automatic Door lock system for classroom is created to complete the deal of qualification of Electronics Engineering Diploma studies for EE module. The main purpose of EE601 module is to produce a student who are not only good in theoretical but in also practical work too. It's also important to train our students to be skill full in their course.

Automatic door lock system for classroom that we created is one of the technologies that are able to secure and protect the classroom from misbehaving and misusing by the students. This project is built to give facilities to user in the use automatically. This process doesn't use manpower as being seen in each evening and night, a person (Admin) busy looking and checking on the keys from missing to open the classroom at the specified time. This Automatic door lock system can economise safety and energy.

This project will be very helpful for the polytechnics management to monitor and taking care of their classroom without facing much problem

1.2 BACKGROUND RESEARCH

Key plays an important role in a security system. People usually get confused where did they kept the key and it easily can be lose. The Automatic door locks to provide solutions in a lock as a safety system better. Based on the above, we think of to create automatic door safety in maintaining the security of the classroom. Even admins can make it easier to control lock the door when you forget to lock the door. Automatically controlling the highly complex and requires various components integrated with the reading ability of feedback, Data processing and control output simultaneously and programmed. In the development of the current control technology, this can perform instruction Such as an IC chip with various features and advantages of the ordinary called by the Arduino. With the above explanation, We wanted to rise with the final project entitled "SYSTEM SECURITY AUTOMATIC DOOR LOCK SYSTEM FOR CLASSROOM"

1.3 PROBLEM STATEMENT

Security is one of the important factor in our polytechnics. The safety in the class room is quite crucial because lack of safety awareness among the student and the staff. Besides the traditional method door that used a key can be easily open by not authorized person or burglar if they have the right key. This lead them to steal the entire valuable thing in the classroom room and misbehaving (vandalism) in the classroom. Besides that, So the major reason to build this project is to reduce usage of the key when opening the door

1.4 OBJECTIVE

Overall, the objectives that we had achieved for our project are:

- To prevent the vandalisms in the classroom by increasing the security level which prevent an unauthorized person unlocking the door.
- Flexible to the user to change or reset the password in case the user forgets that combination.
- Reduce the manpower
- Reduce the usage of key
- Friendly user

1.5 RESEARCH QUESTION

- How to design an automatic door lock as identification classroom security, so that admin find it more practical in its use?
- How to design a system that can replace a key, so admin will not have to carry keys and unnecessary house keys duplicated worry?
- How to do programming for the security?

1.6 SCOPE OF PROJECT

Project scope of "Automatic Door Lock system for classroom" is to make sure this project not out of the limit that had been invariable.

i. Use hardware and software tools to identify and control the Automatic door system.

ii. Automatically lock the classroom once the switch is on.

iii. No access when enter password wrongly .

iv. Buzzer will start when enter the Wrong password.

v. More than a password can be stored .

vi. Notify to close the door after few seconds.

vii. The project will, have software and hardware work implementation.

1.7 Importance of project

- To design an automatic door locking security system, so as to make it easier for admin unlocking the doors with the password.
- Utilize LCD and keypad system is designed to be used microcontroller to replace a key as open access automatic doors.
- Make the project simple, easy to use and useful system

1.8 The definition of the term

- IC component characteristics and other supporting components.
- Planning Hardware (Hardware) Designing devices with components of the door locking device other support.
- Planning Software (Software) Designing a program using a software application.
- Testing the Hardware and Software. Testing of the hardware and software made, in accordance with the objectives of this project

1.9 Summary

In summary, from chapter 1 we learn and able to write about our project "Automatic door lock system" and learn more about it.Security system nowdays has become an importance aspect to human life.As the need was demanding nowdays, this system was build in order to meet the demand in security system. The automatic door lock system in order to help users opening thier door without using the key.

CHAPTER
2

Chapter 2

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, we did our research about the components that involved in these systems. We have stated the each components functions and operations.

2.2 SUMMARY OF THE WHOLE SYSTEM

Security plays a prime concern in our day-today life. Everyone wants to be as much secure as possible and why not the place we study. So we planned to create a project which is helpful to our classroom. Our department JKE uses keys to lock our classroom door after the class hour. We found that it is less secured and keys may lose easily. The Arduino based Door locker is an access control system that allows only authorized persons to access the classroom in restricted time and day. The system is fully controlled by the Arduino for the program memory. We able to use the classroom from 8am to 5pm where usually class occurring time. AT 5pm the admin have to on the system .Once the system is turned on there will be a notify in LCD “ENTER PASSWORD” .The users have to insert the password to access in. When they entered password equals with the passwords to reading the memory then the Arduino gets on and send signal to solenoid so that the door is opened. The password is stored in the EPROM so that we can change it at any time. The system has a Keypad by which the password can be entered through. We can enter a password according to the user. We have set 3 users with different password. When user 1 entered the right password then the access is approved by showing User 1 and door is open in LCD. If we entered a wrong password the system will not open the door and it Show in LCD “PASSWORD IS INCORRECT” And buzzer is on and make sound. Only a successful password can be accessed in. Apart that, once the door is open then the after few seconds the buzzer will make sound and there will be a notify in LCD “please close the door “which give alert to the users to not forget to close the door.

2.3 ARDUINO UNO

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

The Arduino hardware and software was designed for artists, designers, hobbyists, hackers, newbies, and anyone interested in creating interactive objects or environments. Arduino can interact with buttons, LEDs, motors, speakers, GPS units, cameras, the internet, and even your smart-phone or your TV! This flexibility combined with the fact that the Arduino software is free, the hardware boards are pretty cheap, and both the software and hardware are easy to learn has led to a large community of users who have contributed code and released instructions for a **huge** variety of Arduino-based projects.

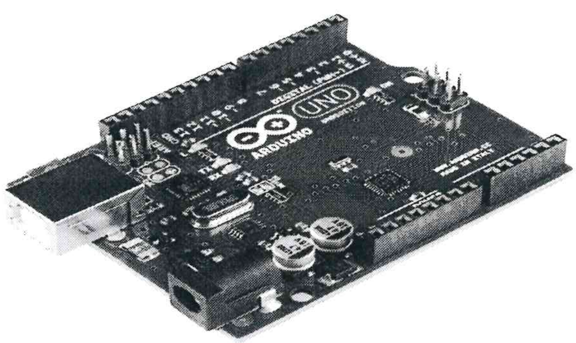


Figure 2.3 ARDUINO UNO

2.4 VOLTAGE REGULATOR

A voltage regulator generates a fixed output voltage of a preset magnitude that remains constant regardless of changes to its input voltage or load conditions. There are two types of voltage regulators: linear and switching.

A linear regulator employs an active (BJT or MOSFET) pass device (series or shunt) controlled by a high gain differential amplifier. It compares the output voltage with a precise reference voltage and adjusts the pass device to maintain a constant output voltage.

A switching regulator converts the dc input voltage to a switched voltage applied to a power MOSFET or BJT switch. The filtered power switch output voltage is fed back to a circuit that controls the power switch on and off times so that the output voltage remains constant regardless of input voltage or load current changes. A voltage regulator is designed to automatically maintain a constant voltage level. A voltage regulator may be a simple "feed-forward" design or may include negative feedback control loops. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

Electronic voltage regulators are found in devices such as computer power supplies where they stabilize the DC voltages used by the processor and other elements. In automobile alternators and central power station generator plants, voltage regulators control the output of the plant. In an electric power distribution system, voltage regulators may be installed at a substation or along distribution lines so that all customers receive steady voltage independent of how much power is drawn from the line. A simple voltage/current regulator can be made from a resistor in series with a diode (or series of diodes). Due to the logarithmic shape of diode V-I curves, the voltage across the diode changes only slightly due to changes in current drawn or changes in the input. When precise voltage control and efficiency are not important, this design may work fine.

Feedback voltage regulators operate by comparing the actual output voltage to some fixed reference voltage. Any difference is amplified and used to control the regulation element in such a way as to reduce the voltage error. This forms a negative feedback control loop; increasing the open-loop gain tends to increase regulation accuracy but reduce stability. (Stability is avoidance of oscillation, or ringing, during step changes.) There will also be a trade-off between stability and the speed of the response to changes. If the output voltage is too low (perhaps due to input voltage reducing or load current increasing), the regulation element is commanded, *up to a point*, to produce a higher output voltage–by dropping less of the input voltage (for linear series regulators and buck switching regulators), or to draw input current for longer periods (boost-type switching regulators); if the output voltage is too high, the regulation element will normally be commanded to produce a lower voltage. However, many regulators have over-current protection, so that they will entirely stop sourcing current (or limit the current in some way) if the output current is too high, and some regulators may also shut down if the input voltage is outside a given range (see also: crowbar circuits).

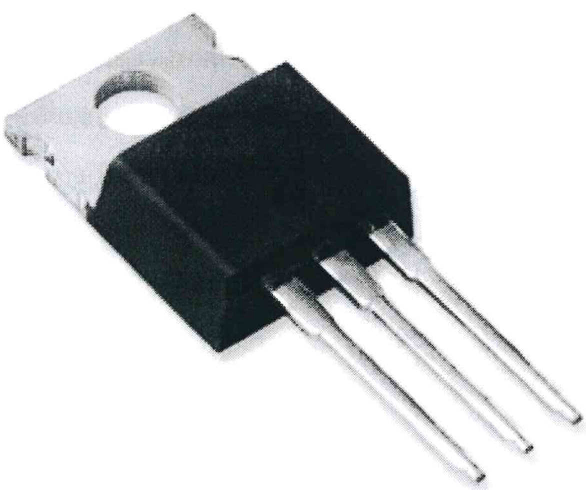


Figure 2.4 Voltage Regulator

2.5 RESISTOR

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. The current through a resistor is in direct proportion to the voltage across the resistor's terminals. This relationship is represented by Ohm's law: where I is the current through the conductor in units of amperes, V is the potential difference measured across the conductor in units of volts, and R is the resistance of the conductor in units of ohms.

The ratio of the voltage applied across a resistor's terminals to the intensity of current in the circuit is called its resistance, and this can be assumed to be a constant (independent of the voltage) for ordinary resistors working within their ratings. Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment.

Practical resistors can be made of various compounds and films, as well as resistance wire (wire made of a high-resistivity alloy, such as nickel-chrome). Resistors are also implemented within integrated circuits, particularly analog devices, and can also be integrated into hybrid and printed circuits.

The electrical functionality of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than nine orders of magnitude. When specifying that resistance in an electronic design, the required precision of the resistance may require attention to the manufacturing tolerance of the chosen resistor, according to its specific application.

The temperature coefficient of the resistance may also be of concern in some precision applications. Practical resistors are also specified as having a maximum power rating which must exceed the anticipated power dissipation of that resistor in a particular circuit: this is mainly of concern in power electronics applications.

Resistors with higher power ratings are physically larger and may require heat sinks. In a high-voltage circuit, attention must sometimes be paid to the rated maximum working voltage of the resistor. While there is no minimum working voltage for a given resistor, failure to account for a resistor's maximum rating may cause the resistor to incinerate when current is run through it.

Practical resistors have a series inductance and a small parallel capacitance; these specifications can be important in high-frequency applications. In a low-noise amplifier or pre-amp, the noise characteristics of a resistor may be an issue. The unwanted inductance, excess noise, and temperature coefficient are mainly dependent on the technology used in manufacturing the resistor.

They are not normally specified individually for a particular family of resistors manufactured using a particular technology. A family of discrete resistors is also characterized according to its form factor, that is, the size of the device and the position of its leads (or terminals) which is relevant in the practical manufacturing of circuits using them.

Figure 2.5 Resistor

2.6 DIODE

In electronics, a diode is a two-terminal electronic component that conducts primarily in one direction (asymmetric conductance); it has low (ideally zero) resistance to the flow of current in one direction, and high (ideally infinite) resistance in the other. A semiconductor diode, the most common type today, is a crystalline piece of semiconductor material with a p–n junction connected to two electrical terminals.[5] A vacuum tube diode has two electrodes, a plate (anode) and a heated cathode. Semiconductor diodes were the first semiconductor. The discovery of crystals' rectifying abilities was made by German physicist Ferdinand Braun in 1874. The first semiconductor diodes, called cat's whisker diodes, developed around 1906, were made of mineral crystals such as galena. Today, most diodes are made of silicon, but other semiconductors such as selenium or germanium are sometimes used.

The most common function of a diode is to allow an electric current to pass in one direction (called the diode's forward direction), while blocking current in the opposite direction (the reverse direction). Thus, the diode can be viewed as an electronic version of a check valve. This unidirectional behaviour is called rectification, and is used to convert alternating current (AC) to direct current (DC), including extraction of modulation from radio signals in radio receivers—these diodes are forms of rectifiers.

However, diodes can have more complicated behaviour than this simple on–off action, because of their nonlinear current-voltage characteristics. Semiconductor diodes begin conducting electricity only if a certain threshold voltage or cut-in voltage is present in the forward direction (a state in which the diode is said to be forward-biased). The voltage drop across a forward-biased diode varies only a little with the current, and is a function of temperature; this effect can be used as a temperature sensor or as a voltage reference.

A semiconductor diode's current–voltage characteristic can be tailored by selecting the semiconductor materials and the doping impurities introduced into the materials during manufacture. These techniques are used to create special-purpose diodes that perform many different functions. For example, diodes are used to regulate voltage (Zener diodes), to protect circuits from high voltage surges (avalanche diodes), to electronically tune radio and TV receivers (varactor diodes), to generate radio-frequency oscillations (tunnel diodes, Gunn diodes, IMPATT diodes), and to produce light (light-emitting diodes). Tunnel, Gunn and IMPATT diodes exhibit negative resistance, which is useful in microwave and switching circuits.

Diodes, both vacuum and semiconductor, can be used as shot-noise generators

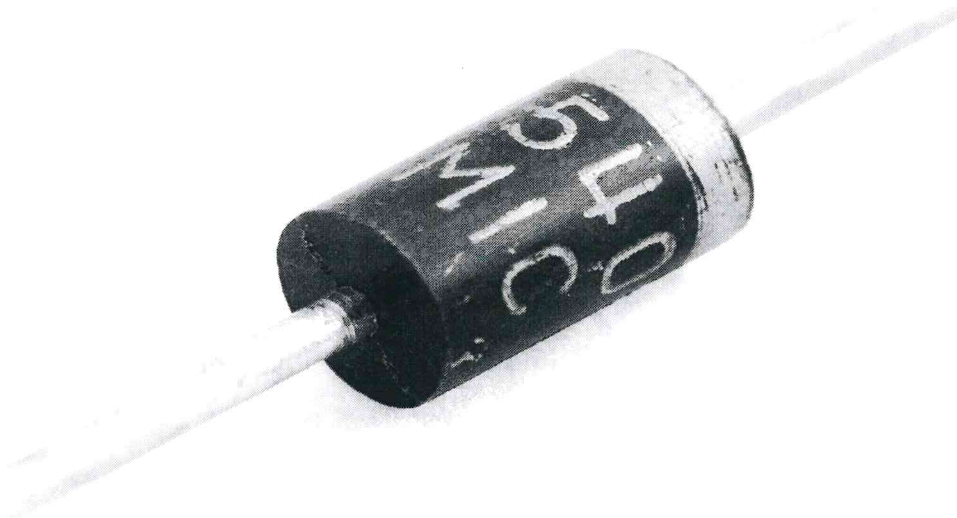


Figure 2.6 DIODE

2.7 3 PIN MALE CONNECTER

The most common is the 3-pin XLR3, used almost universally as a balanced audio connector for high quality microphones and connections between equipment. XLR4 (with four pins) is used for Clear Com and Telex intercom headsets and handsets, some DC power connections and the older AMX analog lighting control. XLR5 is the standard connector for DMX512 digital lighting control and is also used for dual-element microphones and dual-channel intercom headsets. XLR6 is used for dual channel intercom belt packs.

Many other types exist, with various pin numbers. Most notable are two now obsolete 3-pin patterns manufactured by ITT Cannon. The power Cannon (also called the XLR-LNE connector) had shrouded pins and red insulation, it was intended as a mains power connector, but has been superseded by the IEC mains connector and increasingly, more recently, the PowerCon connector developed by Neutrik.

The loudspeaker Cannon had blue or white insulation (depending on its gender), was intended for connections between audio power amplifiers and loudspeakers. At one time XLR3 connectors were also used extensively on loudspeaker cables, as when first introduced they represented a new standard of ruggedness, and economic alternatives were not readily available. The convention was that a 2-conductor loudspeaker cable had XLR3F connectors on both ends, to distinguish it from a 3-conductor shielded signal level cable which has an XLR3F at one end and an XLR3M at the other. Either pin 2 or 3 was live, depending on the manufacturer, with pin 1 always the 'earthy' return. This usage is now both obsolete and dangerous to equipment but is still sometimes encountered, especially on older equipment. For example, some loudspeakers have a built-in XLR3M as an input connector. This use was superseded in professional audio applications by the Neutrik Speakon connector.

The female XLR connectors are designed to first connect pin 1 (the earth pin), before the other pins make contact, when a male XLR connector is inserted. With the ground connection established before the signal lines are connected, the insertion (and removal) of XLR connectors in live equipment is possible without picking up external signals (as it usually happens with, for example, RCA connectors).

Lighting control for entertainment applications is widely connected using five pin XLRs. While only three pins are used to carry the DMX512 signal, the design allows expansion with the remaining two pins considered for use with Remote Device Management (RDM) and Architecture for Control Networks (ACN) and also prevents users from confusing lighting with common XLR3 audio cables. Unfortunately, five pin XLRs still allow the use of lower-grade (non-110 Ohm) microphone cable for transmission of signals. Some manufacturers of DJ lighting and professional lighting are still using three-pin connectors as their standard. Manufacturers such as Leviton and Light ronics have even established new protocols not compatible with DMX512 that use three pin XLR to control lighting devices (primarily dimmers made by the same manufacturer). Non-DMX512 protocols using three pins are not generally accepted as a professional standard and are used primarily to promote consumers to buy multiple products from the same company. Any protocol using control or management on pins 4 & 5 is against the stated use in the USITT DMX512 standard, and all of its later revisions. Their stated use is for a second universe of DMX512 (thereby allowing two universes to pass down one cable.

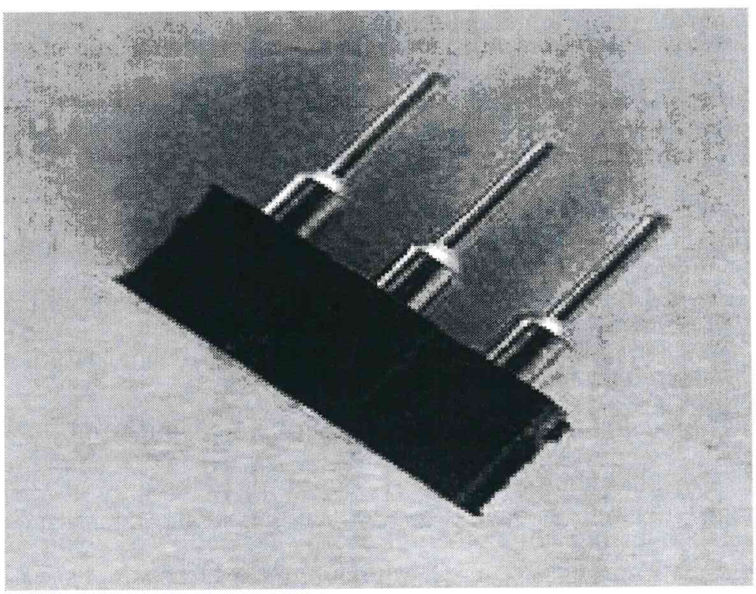


Figure 2.7 3 Pin Male Connector

2.8 Solenoid

A solenoid (from the French solénoïde, derived in turn from the Greek solen "pipe, channel" + combining form of Greek eidos "form, shape") is a coil wound into a tightly packed helix. The term was invented by French physicist André-Marie Ampère to designate a helical coil.

In physics, the term refers to a coil whose length is substantially greater than its diameter, often wrapped around a metallic core, which produces a uniform magnetic field in a volume of space (where some experiment might be carried out) when an electric current is passed through it. A solenoid is a type of electromagnet when the purpose is to generate a controlled magnetic field. If the purpose of the solenoid is instead to impede changes in the electric current, a solenoid can be more specifically classified as an inductor rather than an electromagnet. Not all electromagnets and inductors are solenoids; for example, the first electromagnet, invented in 1824, had a horseshoe rather than a cylindrical solenoid shape.

In engineering, the term may also refer to a variety of transducer devices that convert energy into linear motion. The term is also often used to refer to a solenoid valve, which is an integrated device containing an electromechanical solenoid which actuates either a pneumatic or hydraulic valve, or a solenoid switch, which is a specific type of relay that internally uses an electromechanical solenoid to operate an electrical switch; for example, an automobile starter solenoid, or a linear solenoid, which is an electromechanical solenoid. Solenoid bolts, a type of electronic-mechanical locking mechanism, also exist.In short: the magnetic field inside an infinitely long solenoid is homogeneous and its strength does not depend on the distance from the axis, nor on the solenoid cross-sectional area.

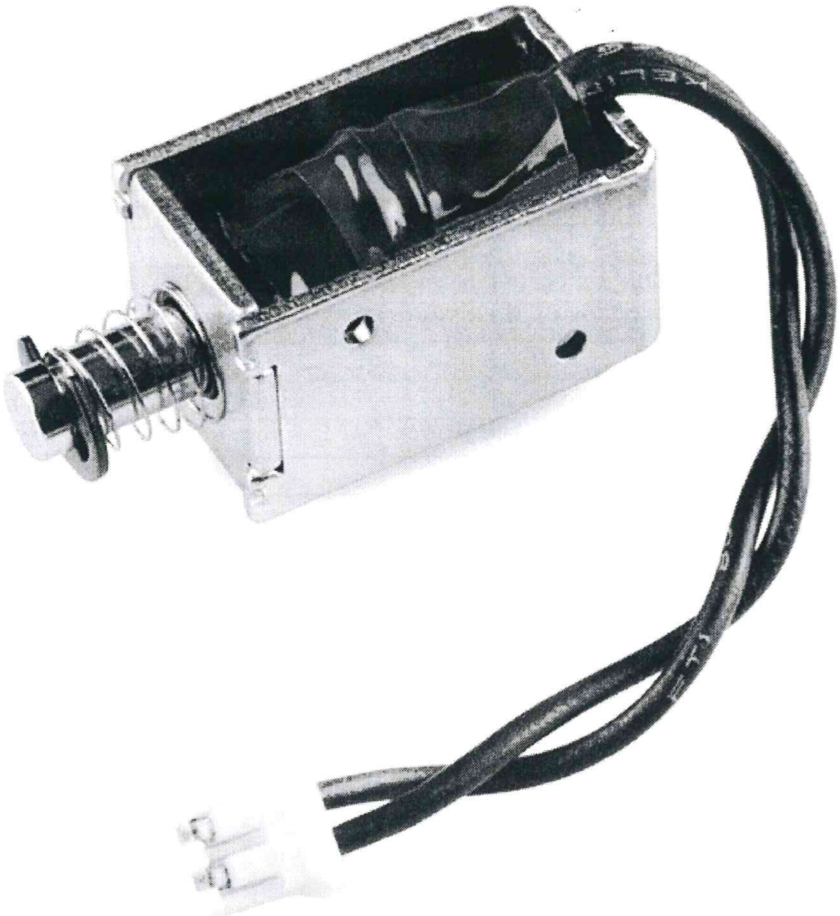
This is a derivation of the magnetic flux density around a solenoid that is long enough so that fringe effects can be ignored. In Figure 1, we immediately know that the flux density vector points in the positive z direction inside the solenoid, and in the negative z direction outside the solenoid. We see this by applying the right hand grip rule for the field around a wire. If we wrap our right hand around a wire with the thumb pointing in the direction of the current, the curl of the fingers shows how the field behaves. Since we are dealing with a long solenoid, all of the components of the magnetic field not pointing upwards cancel out by symmetry. Outside, a similar cancellation occurs, and the field is only pointing downwards.

Now consider the imaginary loop c that is located inside the solenoid. By Ampère's law, we know that the line integral of B (the magnetic flux density vector) around this loop is zero, since it encloses no electrical currents (it can be also assumed that the circuital field passing through the loop is constant under such conditions: a constant or constantly changing current through the solenoid). We have shown above that the field is pointing upwards inside the solenoid, so the horizontal portions of loop c do not contribute anything to the integral. Thus the integral of the up side 1 is equal to the integral of the down side 2. Since we can arbitrarily change the dimensions of the loop and get the same result, the only physical explanation is that the integrands are actually equal, that is, the magnetic field inside the solenoid is radially uniform. Note, though, that nothing prohibits it from varying longitudinally, which in fact it does.

A similar argument can be applied to the loop a to conclude that the field outside the solenoid is radially uniform or constant. This last result, which holds strictly true only near the centre of the solenoid where the field lines are parallel to its length, is important in as much as it shows that the flux density outside is practically zero since the radii of the field outside the solenoid will tend to infinity.

An intuitive argument can also be used to show that the flux density outside the solenoid is actually zero. Magnetic field lines only exist as loops, they cannot diverge from or converge to a point like electric field lines can (see Gauss's law for magnetism). The magnetic field lines follow the longitudinal path of the solenoid inside, so they must go in the opposite direction outside of the solenoid so that the lines can form a loop. However, the volume outside the solenoid is much greater than the volume inside, so the density of magnetic field lines outside is greatly reduced. Now recall that the field outside is constant. In order for the total number of field lines to be conserved, the field outside must go to zero as the solenoid gets longer.

Of course, if the solenoid is constructed as a wire spiral (as often done in practice), then it emanates an outside field the same way as a single wire, due to the current flowing overall down the length of the solenoid.



2.8 Solenoid