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Embedded c controlled security door with hand-operated password

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Abstract-*Our project aims at far-flung password based door opener system through an android application. The system tends to make a protected door opening mechanism such that the door only unlocks when a security personnel opens it by entering the right password. The authorized personnel need to be present within Bluetooth range of the door but need not open the door manually. He just needs to introduce the right password through his android application in order to unlock the door. This is a useful concept in places where the surveillance needs to open gates quite usually or need to operate a door from a vehicle without needing to get down.*

Key Words*: Android application, user friendly GUI, Bluetooth, Microcontroller, Password, etc.......*

1.INTRODUCTION TO EMBEDDED SYSTEMS

What is Embedded system?
An Embedded System is a sequence of computer hardware and software, and perhaps additional mechanical or other parts, devised to perform a specific function. An embedded system is a microcontroller-based, software driven, decisive, real-time control system, autonomous, or human or network interactive, operating on diverse physical variables and in diverse environments and sold into a ambitious and cost conscious market.

1.1.SYSTEM DESIGN CALLS

An embedded system is not a computer scheme that is used primarily for processing, not a software system on PC or UNIX, not a conventional business or scientific application. High-end embedded & lower end embedded systems. High-end embedded system - mostly 32, 64 Bit Controllers used with OS. Examples Personal Digital Assistant and Mobile phones etc .Lower end embedded systems - mostly 8,16 Bit Controllers used with an minimal operating systems and hardware layout devised for the specific purpose. Examples Small controllers and devices in our everyday life like Washing tool, Microwave Ovens, where they are embedded in.

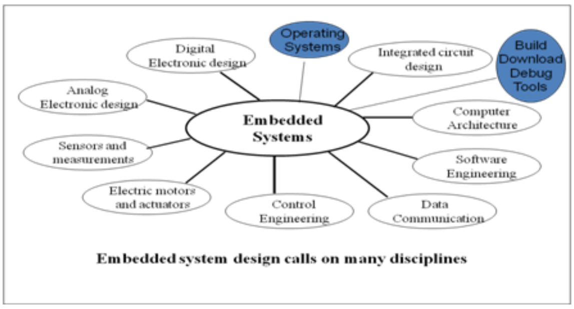
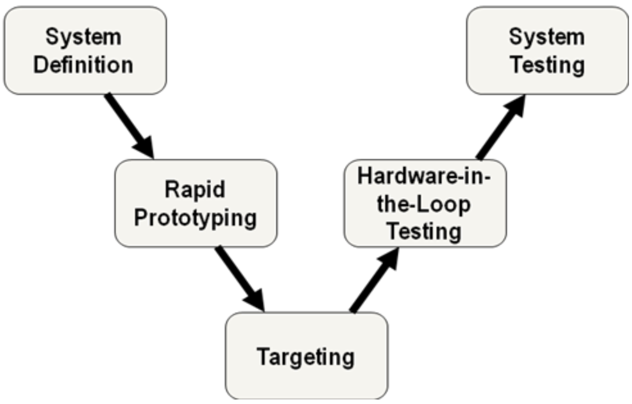


Fig-1: System Design cycle

1.2.EMBEDDED SYSTEM DESIGN CYCLE



"V Diagram"

Pecularity of Embedded Scheme

- An embedded system is any computer scheme hidden inside a product other than a computer.
- They will confront a number of difficulties when writing embedded system software in addition to those we encounter when we write applications.

Throughput – Our scheme may need to handle a lot of data in a short period of time.

Response–Our system may need to react to events quickly.

Suitability–Setting up equipment to test embedded software can be difficult.

Debugability–Without a screen or a keyboard, concluding out what the software is doing wrong (other than not working) is a troublesome problem.

Authenticity– embedded systems must be able to handle any situation without human intervention.

Recollection space – Memory is limited on embedded schemes, and you must make the software and the data fit into whatever memory exists.

Program accession – you will need special tools to get your software into embedded systems.

Power consumption – compact systems must run on battery power, and the software in these systems must conserve power.

Processor hogs – computing that requires enormous amounts of CPU time can complicate the response problem.

Cost – Reducing the cost of the hardware is a burden in many embedded system projects; software often operates on hardware that is barely adequate for the job.

Embedded scheme have a microprocessor/ microcontroller and a memory. Some have a serial port or a network connection. They commonly do not have keyboards, screens or disk drives.

1.3.CLASSIFICATION

- Real Time Schemes.
- RTS is one which has to respond to events within a specified deadline.
- A right feedback after the dead line is a wrong answer

RTS CLASSIFICATION

- Hard Real Time Schemes
- Soft Real Time System

HARD REAL TIME SYSTEM

- "Hard" real-time systems have very narrow response time.
- Example: Nuclear power system, Cardiac pacemaker.

COMFY REAL TIME SYSTEM

- "Soft" real-time systems have reduced constrains on "lateness" but still must operate very hastly and repeatable.
- Example: Railway reservation system – takes a few extra seconds the data remains valid.

2.PROJECT BLOCK DIAGRAM

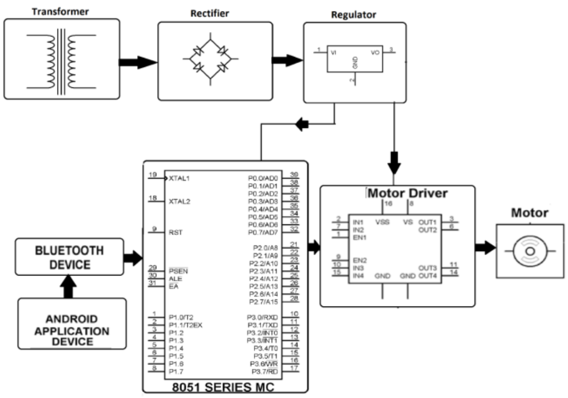


Fig-2: Block Diagram

HARDWARE COMPONENTS:

1. TRANSFORMER (230 – 12 V AC)
2. VOLTAGE REGULATOR (LM 7805)
3. RECTIFIER
4. FILTER
5. MICROCONTROLLER (AT89S52/AT89C51)
6. LED'S
7. MOTOR DRIVER(L293D)
8. DC MOTOR
9. BLUETOOTH MODULE
10. 1N4007
11. RESISTOR

12. CAPACITOR

3.TRANSFORMER

Transformers cloaked AC electricity from one voltage to another with a little loss of power. Step-up transformers escalates voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high voltage to a safer small voltage.

Fig 3: A Typical Transformer

The instruction coil is called the primary and the output coil is called the secondary. There is no electrical connection between the two coils; instead they are associated by an alternating magnetic field created in the soft-iron core of the transformer. The two lines in the intermediate of the circuit symbol represent the core. Transformers waste very few power so the power out is (almost) balance to the power in. Note that as voltage is stepped down and current is stepped up.

The ratio of the number of turns on each coil, called the turn's ratio, determines the ratio of the voltages. A step-down transformer has a large number of turns on its primary (input) coil which is connected to the high voltage mains supply, and a small number of turns on its secondary (output) coil to give a low output voltage.

TURNS RATIO = (Vp / Vs) = (Np / Ns)

Where,

Vp = primary (input) voltage.

Vs = secondary (output) voltage

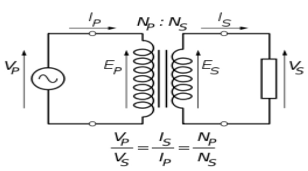
Np = number of turns on primary coil

Ns = number of turns on secondary coil

Ip = primary (input) current

Is = secondary (output) current.

IDEAL POWER EQUATION



The ideal transformer as a circuit element

If the secondary coil is attached to a load that allows current to flow, electrical power is transmitted from the primary circuit to the secondary circuit. Ideally, the transformer is perfectly efficient; all the incoming energy is transformed from the primary circuit to the magnetic field and into the secondary circuit. If this condition is met, the incoming electric power must equal the outgoing power:

$$P_{\text{incoming}} = I_p V_p = P_{\text{outgoing}} = I_s V_s,$$

Giving the ideal transformer equation

$$\frac{V_s}{V_p} = \frac{N_s}{N_p} = \frac{I_p}{I_s}.$$

Transformers normally have high efficiency, so this formula is a reasonable approximation.

If the voltage is increased, then the current is decreased by the same factor. The impedance in one circuit is transformed by the *square* of the turns ratio. For example, if an impedance Z_s is attached across the terminals of the secondary coil, it appears to the primary circuit to have an impedance of $(N_p/N_s)^2 Z_s$. This relationship is reciprocal, so that the impedance Z_p of the primary circuit appears to the secondary to be $(N_s/N_p)^2 Z_p$.

4.VOLTAGE REGULATOR 7805

Appearance

- Output Current up to 1A.
- Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V.
- Thermal Overload Shelter.
- Short Circuit Shelter.
- Output Transistor Safe Operating Area Protection.

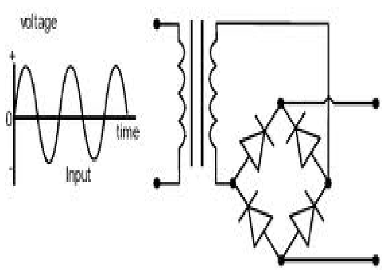
Parameter	Symbol	Value	Unit
Input Voltage (for V=5 to 18V)	V1	35	v

4.1Description

The LM78XX/LM78XXA array of three-terminal positive regulators are available in the TO-220/D-PAK package and with several hooked output voltages, making them useful in a Wide range of applications. Each type employs internal current hinding, thermal shutdown and safe operating area protection, making it essentially indestructible. If adequate heat sinking is contributed, they can deliver over 1A output Current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to secure adjustable voltages and currents.

5.RECTIFIER

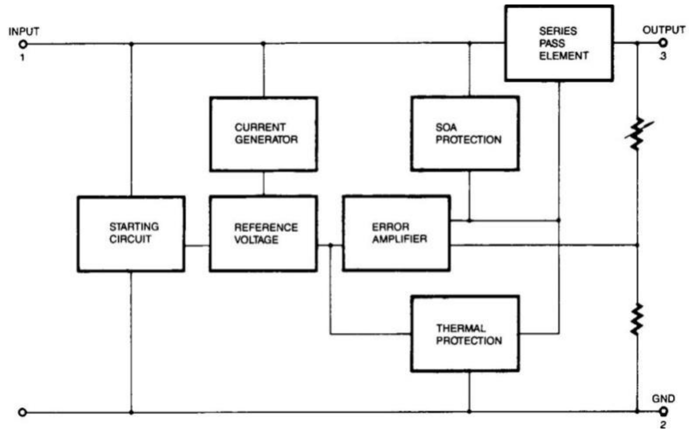
A rectifier is an electrical device that disciples alternating current (AC), which periodically reverses direction, to direct current (DC), current that discharges in only one direction, a process known as rectification. Rectifiers have many uses including as components of power stores and as detectors of radio signals. Rectifiers may be made of solid case diodes, vacuum tube diodes, mercury arc valves, and alternate components. The output from the transformer is fed to the rectifier. It converts A.C. into fluctuate D.C. The rectifier may be a half wave or a full wave rectifier. In this case, a bridge rectifier is used because of its dignity like good stability and full wave rectification. In positive half revolution only two diodes(1 set of parallel diodes) will conduct, in negative half cycle remaining two diodes will conduct and they will handle only in forward bias only.



MICROCONTROLLER AT89S52

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density non volatile memory technology and is compatible with the industry standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non volatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware



reset.

Features:

- Compatible with MCS®-51 Products
- 8K Bytes of In-System Programmable (ISP) Flash Memory

– Endurance: 10,000 Write/Erase Cycles

- 4.0V to 5.5V Operating Range
- Fully Static Operation: 0 Hz to 33 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Full Duplex UART Serial Channel

- Low-power Idle and Power-down Modes
- Interrupt Recovery from Power-down Mode
- Watchdog Timer
- Dual Data Pointer
- Power-off Flag
- Fast Programming Time
- Flexible ISP Programming (Byte and Page Mode)
- Green (Pb/Halide-free) Packaging Option

Block Diagram of AT89S52:

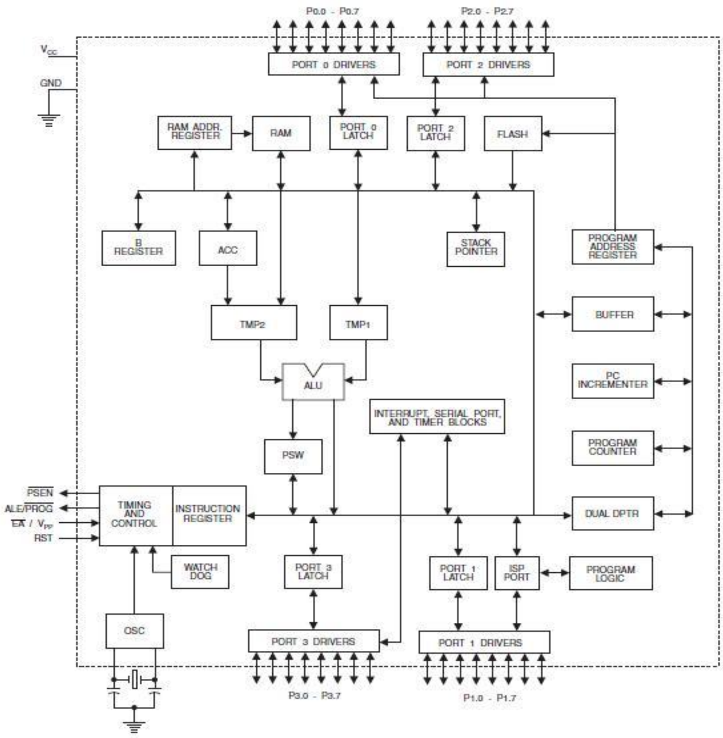


FIG 4.5(A): BLOCK DIAGRAM OF AT89S52

Pin Configurations of AT89S52

In this mode, P0 has internal pull-ups. Port 0 also receives the code bytes during Flash programming and outputs the code bytes during program verification. External pull-ups are required during program verification.

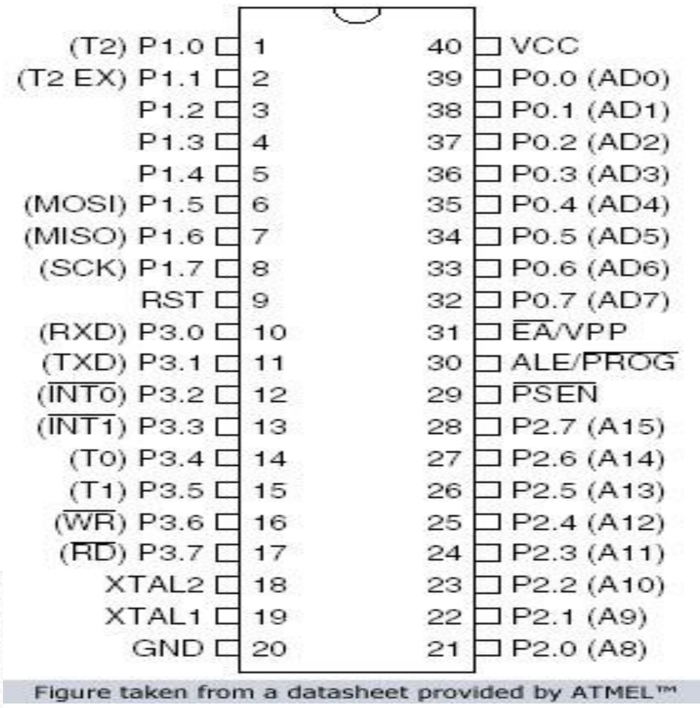


FIG 4.5(b): PIN DIAGRAM OF AT89S52

Pin Description:

VCC:
Supply voltage.

GND:
Ground

Port 0:
Port 0 is an 8-bit open drain bidirectional I/O port. As an output port, each pin can sink eight TTL inputs. When 1s are written to port 0 pins, the pins can be used as high-impedance inputs. Port 0 can also be configured to be the multiplexed low-order address/data bus during accesses to external program and data memory.

Port 1:
Port 1 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 1 output buffers can sink/source four TTL inputs. When 1s are written to Port 1 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 1 pins that are externally being pulled low will source current (IIL) because of the internal pull-ups. In addition, P1.0 and P1.1 can be configured to be the timer/counter 2 external count input (P1.0/T2) and the timer/counter 2 trigger input (P1.1/T2EX).

Port 2:

Port 2 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 2 output buffers can sink/source four TTL inputs. When 1s are written to Port 2 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 2 pins that are externally being pulled low will source current (IIL) because of the internal pull-ups. Port 2 emits the high-order address byte during fetches from external program memory and during accesses to external data memory that use 16-bit addresses (MOVX @ DPTR). In this application, Port 2 uses strong internal pull-ups when emitting 1s. During accesses to external data memory that use 8-bit addresses (MOVX @ RI), Port 2 emits the contents of the P2 Special Function Register.

Port 3:

Port 3 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 3 output buffers can sink/source four TTL inputs. When 1s are written to Port 3 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 3 pins that are externally being pulled low will source current (IIL) because of the pull-ups.

RST:

Reset input. A high on this pin for two machine cycles while the oscillator is running resets the device. This pin drives high for 98 oscillator periods after the Watchdog times out. The DISRTO bit in SFR AUXR (address 8EH) can be used to disable this feature. In the default state of bit DISRTO, the RESET HIGH out feature is enabled.

ALE/PROG:

Address Latch Enable (ALE) is an output pulse for latching the low byte of the address during accesses to external memory. This pin is also the program pulse input (PROG) during Flash programming.
In normal operation, ALE is emitted at a constant rate of 1/6 the oscillator frequency and may be used for external timing or clocking purposes. Note, however, that one ALE pulse is skipped during each access to external data memory.

PSEN:

Program Store Enable (PSEN) is the read strobe to external program memory. When the AT89S52 is executing code from external program memory, PSEN is activated twice each machine cycle, except that two PSEN activations are skipped during each access to external data memory.

EA/VPP:

External Access Enable. EA must be strapped to GND in order to enable the device to fetch code from external program memory locations starting at 0000H up to FFFFH. Note, however, that if lock bit 1 is programmed, EA will be internally latched on reset. EA should be strapped to VCC for internal program executions. This pin also receives the 12-volt programming enable voltage (VPP) during Flash programming.

XTAL1:

Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

XTAL2:

Output from the inverting oscillator amplifier

Oscillator Characteristics:

XTAL1 and XTAL2 are the input and output, respectively, of an inverting amplifier which can be configured for use as an on-chip oscillator, as shown in Figure 1. Either a quartz crystal or ceramic resonator may be used. To drive the device from an external clock source, XTAL2 should be left unconnected while XTAL1 is driven as shown in Figure 6.2. There are no requirements on the duty cycle of the external clock signal, since the input to the internal clocking circuitry is through a divide-by-two flip-flop, but minimum and maximum voltage high and low time specifications must be observed.

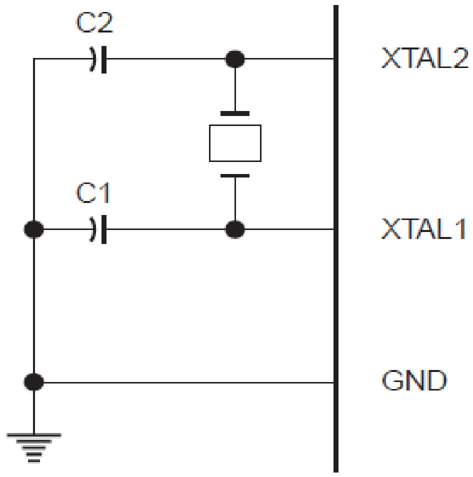


FIG 4.5(c): Oscillator Connections

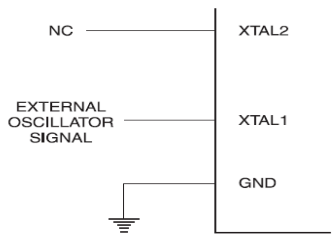


FIG 4.5(d): External Clock Drive Configuration

Idle Mode

In idle mode, the CPU puts itself to sleep while all the on chip peripherals remain active. The mode is invoked by software. The content of the on-chip RAM and all the special functions registers remain unchanged during this mode. The idle mode can be terminated by any enabled interrupt or by a hardware reset.

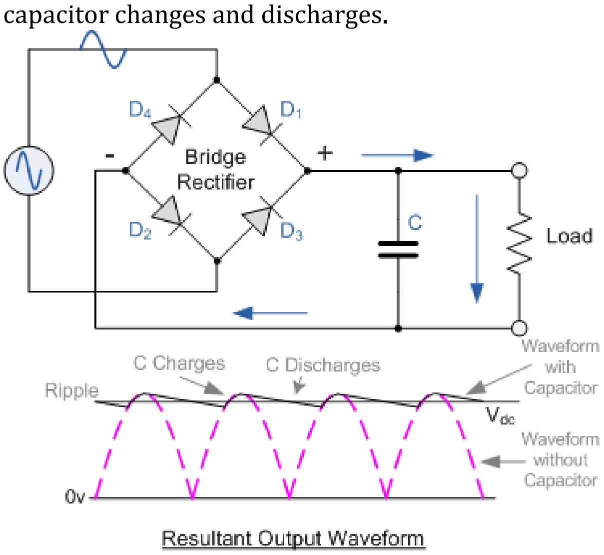
Power down Mode

In the power down mode the oscillator is stopped, and the instruction that invokes power down is the last instruction executed. The on-chip RAM and Special Function Registers retain their values until the power down mode is terminated. The only exit from power down is a hardware reset. Reset redefines the SFRs but does not change the on-chip RAM. The reset should not be activated before VCC is restored to its normal operating level and must be held active long enough to allow the oscillator to restart and stabilize.

6.FILTER

Capacitive filter is worn in this project. It removes the ripples from the output of rectifier and smoothens the D.C. Output received from this filter is consistent until the mains voltage and load is maintained constant. However, if either of the two is diverse, D.C. voltage received at this point changes. Therefore a regulator is applied at the output stage.

The elementary capacitor filter is the most basic type of power supply filter. The use of this filter is very defined. It is sometimes used on extremely high-voltage, low-current power supplies for cathode-ray and similar electron tubes that require very small load current from the supply. This filter is also used in circuits where the power-supply ripple frequency is not demanding and can be relatively high. Below figure can show how the capacitor changes and discharges.



7.DC MOTOR

PRINCIPLES OF DC MOTOR OPERATION:

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization).

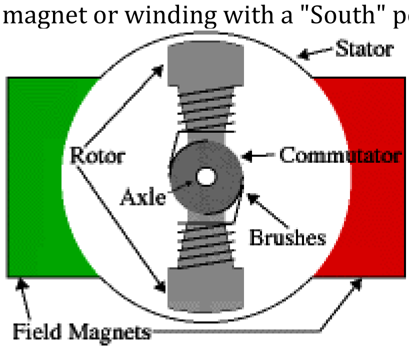
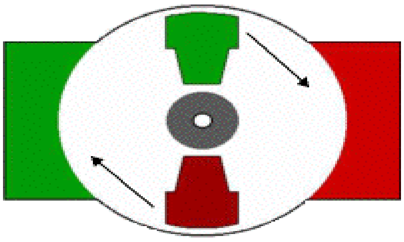


Fig 4.8: DC motor

Every DC motor has six basic parts -- axle, rotor (a.k.a., armature), stator, commutator, field magnet(s), and brushes. In most common DC motors, the external magnetic field is produced by high-strength permanent magnets[1]. The stator is the stationary part of the motor -- this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotor rotates with respect to the stator. The rotor consists of windings (generally on a core), the windings being electrically connected to the commutator. The above diagram shows a common motor layout -- with the rotor inside the stator (field) magnets.

The geometry of the brushes, commutator contacts, and rotor windings are such that when power is applied, the polarities of the energized winding and the stator magnet(s) are misaligned, and the rotor will rotate until it is almost aligned with the stator's field magnets. As the rotor reaches alignment, the brushes move to the next commutator contacts, and energize the next winding. Given our example two-pole motor, the rotation reverses the direction of current through the rotor winding, leading to a "flip" of the rotor's magnetic field, driving it to continue rotating.



In real life, though, DC motors will always have more than two poles (three is a very common number). In particular, this avoids "dead spots" in the commutator. You can imagine how with our example two-pole motor, if the rotor is exactly at the middle of its rotation (perfectly aligned with the field magnets), it will get "stuck" there. Meanwhile, with a two-pole motor, there is a moment where the commutator shorts out the power supply (i.e., both brushes touch both commutator contacts simultaneously). This would be bad for the power supply, waste energy, and damage motor components as well. Yet another disadvantage of such a simple motor is that it would exhibit a high amount of torque "ripple".

8.WHAT IS ANDROID?

Android is a Linux-based operating scheme designed Mainly for touch screen mobile devices such as smart phones and tablet computers. Originally developed by Android, Inc., which Google backed financially and later bought in 2005, Android was disclosed in 2007 along with the founding of the Open Handset Alliance: a consortium of hardware, software, and telecommunication companies dedicated to accelerate open standards for mobile devices. The first Android-powered phone was sold in October 2008.

7.1.FACTORS THAT LED ANDROID TO BECOME WORLD'S MOST POPULAR OS

Android is open source and Google releases the code under the Apache License. This open-source code and indulgent licensing allows the software to be freely modified and shared by device manufacturers, wireless carriers and enthusiast developers. Additionally, Android has a large community of developers calligraphy applications ("apps") that extend the functionality of devices, written primarily in a custom-built rendition of the Java programming language. In October 2012, there were approximately 700,000 apps available for Android, and the predicted number of applications downloaded from Google Play, Android's primary app store, was 25 billion. A developer survey oversee in April–May 2013 found that Android is the most popular platform for developers, used by 71% of the mobile developer population.

Memory management

Since Android devices are usually battery-powered, Android is designed to manage memory (RAM) to keep power consumption at a minimum, in contrast to desktop operating systems which generally assume they are connected to unlimited mains electricity. When an Android app is no longer in use, the system will automatically suspend it in memory – while the app is still technically "open," suspended apps consume no resources (e.g. battery power or processing power) and sit idly in the background until needed again. This has the dual benefit of increasing the general responsiveness of Android devices, since apps don't need to be closed and reopened from scratch each time, but also ensuring background apps don't waste power needlessly.

Android manages the apps stored in memory automatically: when memory is low, the system will begin killing apps and processes that have been inactive for a while, in reverse order since they were last used (i.e. oldest first). This process is designed to be invisible to the user, such that users do not need to manage memory or the killing of apps themselves. However, confusion over Android memory management has resulted in third-party task killers becoming popular on the Google Play store; these third-party task killers are generally regarded as doing more harm than good.

10.HARDWARE TESTING

10.1 CONTINUITY TEST:

In electronics, a continuity test is the checking of an electric circuit to see if current flows (that it is in fact a complete circuit). A continuity test is performed by placing a small voltage (wired in series with an LED or noise-producing component such as a piezoelectric speaker) across the chosen path. If electron flow is inhibited by broken conductors, damaged components, or excessive resistance, the circuit is "open".

Devices that can be used to perform continuity tests include multi meters which measure current and specialized continuity testers which are cheaper, more basic devices, generally with a simple light bulb that lights up when current flows.
An important application is the continuity test of a bundle of wires so as to find the two ends belonging to a particular one of these wires; there will be a negligible resistance between the "right" ends, and only between the "right" ends.

This test is the performed just after the hardware soldering and configuration has been completed. This test aims at finding any electrical open paths in the circuit after the soldering. Many a times, the electrical continuity in the circuit is lost due to improper soldering, wrong and rough handling of the PCB, improper usage of the soldering iron, component failures and presence of bugs in the circuit diagram. We use a multi meter to perform this test. We keep the multi meter in buzzer mode and connect the ground terminal of the multi meter to the ground. We connect both the terminals across the path that needs to be checked.

APPLICATIONS

1) Military and aerospace embedded software operations
2) Communication Applications
3) Industrial automation and process curb software
4) Mastering the complexity of applications.
5) Reduction of product design time.
6) Real time processing of ever blooming amounts of data.
7) Intelligent, autonomous sensors.

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BIOGRAPHIES

K.Yuvaraj, B.E/Mechatronics Engineering, Paavai Engineering College. This project has been the most innovative concept. Thanks for all those who guided me for this project successfully in all the concepts.