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Sky Bus

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Abstract: Because the driverless bus concept incorporates automated and control technology, it must be implemented with caution to avoid mishaps. Many advanced countries across the world have installed automated Sky bus systems to transport passengers from the airport to the central city; for this purpose, dedicated tracks called sky bus tracks or metro lines are laid above busy roads. In order to investigate the technology of automated sky bus systems and demonstrate the concept in practise, we chose to build a simple driverless sky bus module that operates between the two reference sites.The major goal of this project is to run the bus without a human driver, control the door automatically, and stop the bus automatically at stations, using limit switches and magnetic switches to generate interrupt signals.

I. INTRODUCTION

Various sectors, including as electrical, electronics, and mechanical, are involved in the development of the prototype module.

As a result of the interaction of these three areas, this running machine can be described as a 'Micro electronics controlled Electro mechanical machine.'

To make the bus "autonomous," software for the microcontroller is included in this project effort, and it is written in Assembly language; hence, the entire system can be referred to as a "embedded" system driven sky bus.

Furthermore, with the necessary adjustments, the same technology can be utilised for various applications such as transferring materials from one location to another, such as sky luggage carriers.

To replicate a bus, a vehicle in the form of a trolley with wheels facing in the opposite direction, i.e. on the top side of the bus body, is constructed to operate over a sky track; for this purpose, an aluminium channel is put over two poles.

The trolley is propelled by a DC motor, which is controlled by a microprocessor. To replicate a bus, a vehicle in the form of a trolley with wheels facing in the opposite direction, i.e. on the top side of the bus body, is constructed to operate over a sky track; for this purpose, an aluminium channel is put over two poles.

The trolley is propelled by a DC motor, which is controlled by a microprocessor.

Mechanical, Electrical, Electronic, and Digital components are found in most systems that create motion and force.

In fact, the majority of systems today are mixed systems.

The design of these hybrid systems necessitates a thorough understanding of all of these disciplines.

The technique is known as 'Mechatronics,' and its goal is to give knowledge about the Mechanical, Electrical, Electronics, Embedded Software, and Digital components required for the system, as well as to analyse the interface requirements for signals, power transmission, and conversion, and to investigate the performance of the integrated system.

Here, the many fields united to build a marvellous computer that makes appropriate selections based on the circumstances.

The device is nothing more than a skybus that can transport passengers along a predetermined itinerary.

The work on this project begins with a brief overview of sensing and control technologies as they apply to autonomous robots.

The machine is equipped with a microcontroller that regulates the DC motors based on the data collected by the sensor circuits.

The reference point sensing circuit is made up of magnetic switches and magnets, and the output of the magnetic switch circuit is routed to a microcontroller, which is programmed to stop the bus at an exact reference point based on the signals collected from the reference points. Limit switches are also utilised to limit the movement of the bus door.

The controller, which can be described as the "heart" of the project's operation, plays a significant role here.

With the growth of technology in the field of microcontrollers, all of our daily activities have become part of information technology, and microcontrollers can now be found in almost every application.

As a result, the trend is toward controller-based project work.

However, in this project, many different analogue and digital circuits are created in addition to the controller to efficiently run the machine.

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II. CHAPTER 2

The ATMEL 89C51 controller was utilised in this project, and it is a 40-pin IC with 32 I/O lines.

The ATMEL AT89C51 is a CMOS 8-bit microcomputer with 4K bytes of programmable and erasable read-only memory (PEROM).

Its high-density non-volatile memory, which is compatible with the standard MCS-51 instruction set, makes it a strong controller that can control a wide range of applications.

The microcontroller executes the programme that has been programmed into it.

The software is built in such a way that the information received from the sensing circuits may be read and stored by the Micro controller.

The Micro controller energises the DC motors in accordance with the received data.

Microcontrollers are "Embedded" inside other devices in order to control the product's features or activities.

"Embedded controller" is another term for a microcontroller. Microcontrollers are committed to completing a single task and running a single programme.

The programme is stored in read-only memory (ROM) and does not change in most cases.

The majority of microcontrollers are low-power devices.

A Micro controller that is powered by batteries could use up to 50 milliwatts.

A microcontroller has a specialised input device and a control data or LCD display for output.

A microcontroller also receives input from the device it is regulating and controls it by sending signals to its various components.

The goal of this project is to present control theory that is useful to the analysis and design of regulated systems, with a focus on fundamental concepts and principles. For computations and simulations, it is expected that a digital microcontroller chip with adequate software is available, allowing the microcontroller to handle many of the tedious details.

III. FUNCTIONAL DESCRIPTION

The main processing unit, which is created with a microcontroller chip, is responsible for the entire functional description.

This chip is configured to do a variety of tasks, including managing bus movements, door movements, showing the pausing time in seconds, and sounding an alarm to inform passengers. The entire process is depicted in a block diagram, which shows that the process starts with the bus track, which is made up of two poles made of wood or metal planks, and bus track made of aluminium channels. Two channels' distance will be modified based on the distance between the model bus's two wheels, and they will be fixed to the top end of poles at the needed height. This system allows the bus to travel longer if more poles are installed, although only two poles are utilised for demonstration purposes.

Strong concrete poles are required for real-world applications. Permanent magnets must be attached to the poles after the bus track has been completed in order to identify the reference locations. Because the bus body is equipped with magnetic switches that move with the bus body, the switch must be actuated whenever the bus approaches the reference point, and the two devices must be aligned. The magnetic switch will be engaged whenever it is brought close to the magnetic field created by the permanent magnet.

The microcontroller can determine the reference point based on this signal, and the bus will be promptly stopped. .

The bus door will then be opened, and the seconds counter will be triggered, beginning to count the time in decrement mode, as stated in the previous chapter.

When the counter reaches zero, the door automatically closes and the bus reverses direction.

The identical procedure is repeated on the other side, and the bus continues to drive between two points of reference.

A. Construction of Door Mechanism

To make motions in the door mechanism, rack and pinion methods are utilised. This door mechanism attached to the bus body is motorised, which means the motor shaft paired with pinion may drive the door in both directions.

A small rectangular plastic or wooden sheet is used to represent the door, and the rack is affixed to the door's bottom side.

The engine will be permanently attached to the bus body, while the door mechanism will move back and forth.

Limit switches are used to control the movement of a sliding door mechanism. Because the width of the door is roughly 8 to 10 cm, limit switches are installed at both ends of the door at a predetermined span.

Whenever the door is opened or closed, the corresponding limit switch is triggered, and the microcontroller can determine whether the door is open or closed based on the interrupt signal received from the associated limit switch.

B. Magnetic Switches

The reference points are simply stations; whenever the bus arrives at a station, the microcontroller should get a logic low signal from the magnetic switch, allowing the station to be identified.

Two magnets are positioned at the two distinct locations as a result.

Because this is a driverless bus, it is critical to receive a proper fail proof signal; otherwise, the bus would continue to move forward. As a result, great care must be used when organising magnetic switches and their matching permanent magnets.The placement of this magnetic switch on the bus is critical, as it must be brought extremely close to the magnetic field generated by the permanent magnet whenever the bus arrives at the bus stop.

The contacts of the magnetic switch close due to the magnetic field, and only the microcontroller receives signal through this magnetic switch.

When the contacts of the magnetic switch are closed, the microcontroller outputs a logic low signal.

The station's magnet and magnetic switch are now connected in parallel, and whenever the switch comes close to the magnet, the controller receives a signal that the station has arrived, and it automatically stops the motor.

When a small heavy magnet is introduced close to a magnetic switch, the contact of the switch closes automatically owing to the magnetic field.

When it comes to magnetic switches, they come in a variety of shapes and sizes.

As product technologies progress, items must meet a requirement for increased safety, convenience, and cheap cost.

Magnetic switches are small, simple, and straightforward to install in any small space.

Electrical interference has no effect on these switches.

Chemicals, high temperatures, and pressures are not a problem for them.

When the permanent magnet inside the float moves close enough to the reed switch inside the fixed stem, the reed switch "snaps" the contacts together, closing the electrical circuit.

When the magnetic field surrounding the switch is gone, the switch's contact does not make contact, and the circuit is left open.

The diagram of a magnetic switch is shown below.

Limit switches for sensing door position:

Limit switches are employed here to detect whether the door is open or closed. There are two switches to detect open and closed circumstances.

These switches are set up to activate automatically during open and close situations, which means that out of two switches, only one is always active, depending on the gate condition. For example, if the gate is open, one switch is active, while the other is dormant.

Similarly, the gate state is monitored and reported to the microcontroller.

The other ends of both limit switches are interfaced with the microcontroller and are regarded as input signals to detect the gate status.

C. Mechanical Auction Section

A motion converter is a mechanical system that is produced using electro-mechanical processes.

The idea is to use appropriate mechanical and electrical equipment to change the motion from one form to another required form.

The technique of transforming rotational motion into linear motion is used in this project.

The trolley and the door are both powered by two DC motors for this reason.

These motors are created with a reduction gear mechanism that is integrated into the motor.

The mechanism is driven by the lowest grade motors because the machine is developed as a prototype module.

The advantage of using reduction gear mechanism motors is that they can drive big loads with a small motor. However, because these motors are obtained from the local market, torque ratings are not provided.

Only the speed and operating voltage are stated; these motors are supposed to operate at 12V DC and have speeds of 30 and 10 RPM, according to this data.

The bus body is driven by a 30RPM motor, while the sliding door is driven by a 10RPM motor.

The driving capacity of these motors has been tested in the field, and we discovered that each motor can drive a load of up to 2Kg independently.

One miniature trolley is built for the demonstration purpose based on this driving capacity.

A pair of rolling gears can transfer rotary motion from one shaft to another.

Gear trains are mechanisms that are extensively used to increase or decrease the final shaft speed based on the ratio of final shaft speed; these gear trains are the mechanisms that are frequently used to increase or decrease the final shaft speed based on the ratio of final shaft speed. When the speed is increased, torque is reduced, but when the speed is dropped, torque is increased.

These teethed gear wheels are usually connected by two parallel shafts.

When two gears mesh, the bigger gear wheel is known as the crown wheel, and the smaller gear wheel is known as the pinion.

IV. DESCRIPTION ABOUT MICROCONTROLLERS

A. Introduction: World Of Microcontrollers

The Situation We Find Ourselves Today InThe Filed Microcontrollers Had its
Begging In The Development Of Technology Of Integrated Circuits. This
Development Has Enabled Us To store Hundreds Of Thousands Of
Transistors into one Chip. That Was a Precondition For The Manufacture Of
External Peripherals Such As Memory Input/output Lines, Timers And Others To It. Further Increasing.

B. This Is How It All Got Started

In The Year 1969 , a Team of Japanese engineers From BUSICOM Came To The USA With a Request That a Few Integrated Circuits For Calculators Were To Be Designed According To Their Projects . The Request Was Sent To INTEL And MARCIAN HOFF Was In Charge OF The Project There. Having Experience Working With a Computer , The PDP8, He Came Up With An Idea To Suggested design. This Solution Presumed That The Operation Of Integrated Circuit . The Speed Of 6000 Operation Per Second. Not Long After That, An American Company CTC Requested From Intel and Texas Instruments To Manufacture An 8-bit Microprocessor to be Applied In Terminal. Even Though CTC gave Up This Project, In April 1974 It Launched An 8-bit Processor Called The 8080. It Was Able To address 64kb Of Memory , Had 75 Instruction And Initial

1) It has an 8-bit processor with registers A (accumulator) and B (data).
2) Data pointer and eighteen programmercounter (DPTR).
3) The word "status" for an eight-bit programmer (PSW).
4) Stack pointer with an eight-bit value (SP).
5) 0 to 4K internal ROM
6) A total of 128 bytes of internal RAM.
7) Four 8-bit ports made up of 32 I/0 pins: P0-P3

T0 and T1 are two 16-bit timer/counters.

SBUF is a half duplex serial receiver and broadcaster.

TCON, TMOD, Stone countertops, Uses the approach, Cp, with Ie are the control registers.

11. There are two external interrupt sources and three main interrupt sources.

Circuits for the oscillator and the clock.

Descriptions for pins:

VSS (Visual Support System) (pin-20)

0 V ground reference

VCC is number two (pin-40)

For normal, idle, and power-down modes, that's the power supply voltage.

C. Oscillator Characteristics

The output signals of an amplifier circuit are XTAL1 and XTAL2, respectively. An on-chip oscillator can be used by configuring the pins. XTAL1 should be operated while Typically provides is left unconnected to run the devices from an exterior clock source. Because the external clock signal is sent into the circadian rhythm circuitry through a divide-by-two flip-flop, there are no constraints for its duty cycle. However, the data sheet's upper and lower limits high / low times must be followed.

RESET

While the synthesizer is running, hold the RST approach shot with at least two machines cycles (24 oscillatory periods) to reset it. The RST flag must be high enough for the power-on reset to be successful.

Mode 1: Mode 1 is identical to Mode 0, albeit the Time register is used with all binary numbers.

Mode 2: As illustrated in Figure 4, Integration configures theClock register as an 8-bit Clock (TL1)with automatic reload. Overflowing from TL1 not just to sets TF1, but it also refreshes TL1 the with data of TH1, which has been pre-programmed. TH1 is unaffected by the reload. Timer/Counter 0 actions are the same in Mode 2.

Mode 3: In Mode 3, Timer 1 simply keeps counting. Using TR1 = 0 has the same effect. In Mode 3, Timer 0 creates two distinct counters, TL0 and TH0. Figure 5 depicts the logic for Cyclic loading on Timer 0. TL0

V. DESCRIPTION OF SKY BUSES

India's economy relies heavily on transportation. Infrastructure development has accelerated during the 1990s economic liberalization, and there are now a range of land, sea, and air modes of transportation.

A suspension rail, sometimes known as a sky bus, is a type of elevated monorail in which the vehicles is suspended from a permanent track above road level, over a river , canal, or over a existing railway track. With the Konkan Train, Indian inventor B Rajaram built the Sky bus, a prototype suspending train network. The system is made from an elevated track and cars hung beneath it.

In 2004, trials on a 1.6 kilometer race course in Margo Goa began, however on September 25, oneemployee was murdered and three others were injured.Commuters' safety is paramount.

Sky Coaches is a company that provides transportation via air.

1) These are light shells with double walls and enormous, broad windows suspended on sky bogies.
2) Curves can be banked in a controlled manner. It is possible to negotiate curves with diameters of 50 metres.
3) The vehicles are equipped with air conditioning and automated doors.
4) They provide travellers with audiovisual information.
5) They also include four-meter-wide sliding doors for convenient passenger ingress and egress.
6) . Each couple of coaches can carry 300 people and provide service every minute or 30 seconds.

Stations in the Sky

a) Unlike traditional mass transit, Sky Bus requires smaller stations with a length of roughly 50 metres.
b) Every 1 km, a station is accessible. It's a natural footbridge that spans the river.

•A train unit with a capacity of 20 metres in length

Each Sky bus unit is 20 metres long and has two compartments (3.25 metres by 9.5 metres) with a capacity of roughly 400 people at a density of 7 people per square metre. The 58 million units can be connected to make a three-unit, 60 m long train with a capacity of 1200 people.

•Train and signal control

Simple three-aspect signal system powered by the motorman's line of sight, with a special safety layer of Shri Kavach, capable of delivering a 40-second headway (although 60-second headway is planned).

•Capacity of the Route

In peak periods, a Sky bus line can carry 1000 to 1.5 million guests at a time per direction, even with a 60-second headway.

•Security and protection

Continuous computerised central monitoring and control with audio/visual access is provided.

A. Innovation OF SKYBUS GOA

New Delhi

It was announced with considerable enthusiasm two years ago, promising to provide India with an international Sky bus Metro. However, like previous grandiose NDA programs, this one has hit a snag. According to a government commission, developing the track and obtaining other clearances might take two years. While B Rajaram, the man the behind Sky bus concept and former MD of the Kutch Railway Corporation (KRC), believes that all that is necessary is "political will," the committee believes that development, testing, and validation will take time.

"Many issues still need to be done," a senior official from the Ministry of Urban Development, which oversees urban transportation, said.

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B. Recommendation& Conclusion

India has made a technological leap with the Sky Bus. The sky bus is an enhanced railway technology that eliminates the issues that plague present metro rail systems, such as derailments, crashes, and capsizing, which crush passengers. Old classic railway men, who remained mostly operating and maintenance professionals, may take a while to understand Sky bus, but the truth remains that it is an upgraded railway technology that eliminates their anxieties of derailments and capsizing, which they have suffered from for decades!

Skybus is a financially viable option. Metro makes urban transportation a dream come true for city planners—a it's virtually free gift to individuals who don't have access to government funds.

If we really want to solve, we need to get rid of the doubts Thomas in our heads and take the Sky bus.

C. Why Is The Government Of India Not Clearing Sky Bus Metro And Clearing Metro Which Is Costlier Than Sky Bus Metro?

Pushed in 2011 to revive the project, claiming that the catastrophe was caused by human error. In 2012, many tier 3 cities are considering adopting this technology because it is a price initiative. But the question is whether the government will still support it.

VI. ADVANTAGES & APPLICATIONS OF DRIVER LESS SKY BUSES

A. Advantages of Driverless Metros

Lower staffing costs in tunnels, beginning from the first row of seats In automated systems, however, service and security employees are ubiquitous.

1) The compartment can be cut shorter and run greater frequently without affecting staffing costs.
2) Operators' ability to quickly change service frequency in response to unforeseen needs. Why Despite popular belief, autonomous metro areas were safer than traditional metros. Accidents caused by human mistake can occur in a variety of ways; nevertheless, accidents caused by negligence can be avoided. Why If it's on the tracks, intruder detecting technologies can be more successful than humans in halting the bus.
3) Cost reductions in terms of both energy and carry because these buses consume less energy.

B. Dis-advantages

Despite the fact that automated systems have been demonstrated to be safe, some passengers may have safety concerns or be terrified of trains that appear to travel on their own

• If train drivers could be retrained to serve as maintenance or security employees, traditional metros will be converted to driverless metros, putting them out of employment.

• Many self-driving metros have both underground and above-ground parts. Many automated systems resemble traditional systems because drivers remain in the cabs to instil confidence and attract passengers.

C. Applications

This kind of driver less carrier's runs over the tracks can be utilized for many applications in addition to the transporting of passengers.

1) Can be used at coal mines for shifting coal from tunnel mouth to dumping yard. For this application, the coal container should be designed as automatic for easy process while filling and dumping the coal, and the vehicle must be designed as autonomous, such that it can find empty space it self where the coal is supposed be dumped.
2) It can be used at heavy industries like steel factories, cement factories, etc, for transporting the heavy material.
3) These kind of autonomous vehicles are well suited at hazardous places like deserts and jungles from through the material is supposed to be transported.

VII. DESCRIPTION ABOUT 'H' - BRIDGE

When a robotics hobbyist thinks of building a bot, the first thing that springs to mind is having it move on the ground. And the designer is always faced with the decision of whether to employ a Dc source or a servo motors. Dc generators are always preferable over stepper motors in terms of speed, mass, size, and cost. When a DC motor is connected to a microcontroller, we can do a lot of things with it. For example, we can manage the motor's speed, direction of rotation, and decoding of the rotation performed by DC motors, such as keeping a record of how many rotations the motors make, and so on. As a result, we can really see DC.

INPUT A	OUTPUT Y
L	L
H	H

VIII. CHAPTER 8

Magnet that lasts forever. The DC motor responds to both voltage and current. The steady state voltage across a motor determines its running speed, and the current through its armature windings determines its torque. Apply a voltage and the motor will begin to run in one direction; reverse the polarity and the direction will be reversed. When you apply a load to the motor shaft, it draws more current; if the power supply is unable to provide enough current, the voltage drops and the motor's speed is reduced. However, if the power supply can maintain voltage while supplying current, the motor will continue to run at the same speed. In general, speed can be controlled by applying the appropriate voltage, whereas torque cannot. Because most DC motors are powered by a fixed DC power supply, it is more efficient to use a chopping circuit. Consider what happens when a voltage applied to the windings of a motor is rapidly turned ON and OFF in such a way that the frequency of the pulses produced remains constant but the width of the ON pulse varies. This is referred to as Pulse Width Modulation (PWM). The motor receives current only during the ON portion of the PWM waveform. If the PWM input frequency is high enough, the motor's mechanical inertia cannot react to the ripple wave; instead, the motor behaves as if the current were the DC average of the ripple wave. As a result, by we can control the motor speed by changing the width of the pulse. At the most basic level, electric motors exist to convert electrical energy into mechanical energy. This is done by way of two interacting magnetic fields — one stationary, and another attached to a part that can move. There are several types of electric motors, but most BEAM bots use DC motors in some form or another. DC motors have the potential for very high torque capabilities (though this is typically a function of the motor's physical size), are easy to miniaturise, and can be "throttled" by adjusting their supply voltage. DC motors are also the oldest and simplest electric motors. Oersted, Gauss, and Faraday discovered the fundamental principles of electromagnetic induction in the early 1800s. Hans Christian Oersted and Andre Marie Ampere discovered the magnetic field produced by an electric current in 1820. Over the next 15 years, there was a frenzy of cross-Atlantic experimentation and innovation, culminating in the development of a simple DC rotary motor. Because several men were involved in the work, proper credit for the first DC motor is really a function of how broadly you define the term "motor."

A. Operating Principles

The operation of any electric motor is based on simple electromagnetism. When a current-carrying conductor is placed in an external magnetic field, it experiences a force proportional to the current. the conductor's current and the strength of the external magnetic field As you may recall from your childhood experiences with magnets, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. A DC motor's internal configuration is intended to generate rotational motion by harnessing the magnetic interaction between a current-carrying conductor and an external magnetic field. Let's start with a simple 2-pole DC electric motor (here dark black represents a magnet or winding with a "North" polarization, while light colour represents a magnet or winding with a "South" polarization). Every DC motor has six basic components: an axle, a rotor (also known as an armature), a stator, a commutator, field magnets, and brushes. High- strength permanent magnets generate the external magnetic field in most common DC motors. The stator is the motor's stationary component, which includes the motor casing as well as two or more permanent magnet pole pieces. The rotor rotates in relation to the stator (along with the axle and attached commutator). The rotor is made up of windings (usually on a core), which are electrically connected to the commutator. The diagram above depicts a typical motor layout, with the rotor enclosed by stator (field) magnets. When power is applied, the polarities of the brushes, commutator contacts, and rotor windings are reversed.

IX. INTERFACING SEVEN-SEGMENT DISPLAY

Seven segment displays are among the most basic display devices with which to interface a microcontroller (except LEDs perhaps, but seven segments are LEDs anyway).A seven-segment display is made up of seven LEDs moulded into a specific shape. Each bar on a 7-segment is a separate LED that can be controlled. These segments are denoted by the letters A to G and DP (Decimal Point). Each display contains 8 LEDs (7 for the segments and 1 for decimal point). With 8 LEDs, you'd expect 16 pins (one for each anode and cathode), but there are only 10 at most. The reason for this is that all of the cathodes (common cathode display) or anodes (common anode display) are internally connected and are usually connected to the top and bottom two pins. The remaining pins are connected to a single segment. Because the pin outs appear to differ between manufacturers, it may be best to experiment and see which pin lights up which segment. A common anode seven segment is a seven-segment in which the positive ends of all the segments are connected to a common terminal. In contrast, the negative terminals of a common-cathode seven-segment display are connected to a common node. To light a segment on the seven-segment display, connect the common terminal to logic high for common anode or logic low for common cathode. Individual segment ends are then connected to logic low for common anode and logic high for common cathode.The module here is made up of four common-anode type seven-segment displays. A1 is the common anode for the first seven-segment display, A2 for the second, and so on. Each display's segments are denoted by the letters a, b, and so on, as shown in Figure 7.1. To reduce the number of connections on the board, the cathode pins from each display have been connected together to form seven common terminals, labelled a, b, c, d, e, f, and g, which correspond to the seven-segments shown in Figure below. To illuminate a segment of a specific display, for example, segment e of the third display, a "1" (High or Vdd) must be applied to anode A3 (to first select the segment A3) and a "0" (GND or Low) to cathode node e. (to light segment e). The power dissipation of a 7-segment display is usually quite significant. To save power, 7-segment displays are typically not enabled continuously, but rather alternately enabled and disabled with a frequency that gives the human eye the illusion that the display is continuous. A visual impression is retained by the human eye and brain for approximately 1/30th of a second. (The exact time depends on the image's brightness.) This ability to remember an image is well known as vision persistence As a result of this fact, a display should not be turned off for more than 1/30th of a second; otherwise, human eyes will notice the irregular behaviour.Time-multiplexing is used when two or more distinct digits are to be displayed. Time multiplexing in this experiment simply means that each of the four 7-segment displays is enabled for a fixed amount of time, then disabled, and another one is enabled for the same amount of time, and so on in a circular fashion.The seven inputs that control the illumination of the seven segments are shared by all four digits. However, the four digits (7-seg displays) have independent enable inputs (A1, A2, A3, A4). This is depicted in Figure 7.2. As a result, the four digits receive the same seven control inputs. However, only enabled digits will display the corresponding pattern.

A. Specifications for Design

You must create a decoder that accepts a 4-bit code (one hexadecimal digit) and outputs the seven segment states that correspond to the hexadecimal number supplied.

A seven-segment display decoder is a combinational circuit that accepts a 4-bit input and generates appropriate outputs for enabling/disabling each of the seven segments so that the corresponding decimal digit is displayed. The decoder has seven outputs (a, b, c, d, e, f, and g), each of which controls a segment on the 7-segment display.

For example, in order to display a zero, all segments must be enabled (connected to GND) with the Furthermore, you must determine the frequency with which your eye perceives the four seven-segment displays when they are time-multiplexed.

When your electronics project requires multiple seven-segment LED displays, power consumption is a common issue; the electrical current required by the entire circuit will be double, if not triple! Another issue is that each digit requires a driver-decoder IC, which adds to the cost, area, and size of the PCB

This tutorial will show you how to use the multiplexing technique to reduce power consumption by using only one 7-segment driver chip. The main idea here is to link all of the seven-segment LED display units together in parallel and only turning one unit at a time for a short period of time before moving on to the next unit As a result, the power consumption will be the same as if you had only one 7-segment.

If each unit is turned on for 1 or 2 milliseconds, the human eye will see all of the 7-segment units as if they were all turned on at the same time! The entire operation will be controlled by a microcontroller, which will turn on one seven-segment unit via a transistor and send the appropriate BCD code to the 74573-driver chip to be displayed on that unit. After 2ms, this unit is turned off and moved to the next unit, which is turned on and sends the appropriate BCD code to the driver chip. In this project, we will use four 7-segment common anode display units connected to a 74573 driver chip and controlled by an AT89C51 ("8051 family") microcontroller via a BC547 NPN transistor to display the numbers mille seconds, seconds, and minutes. The controller will read the binary number from the port, convert it to BCD data, and display the decimal number on the 7-segment LED display unit. The 74573 - driver - decoder chip is connected to port 0 pins, and switching is accomplished by connecting four NPN transistors to another port.

X. DETAILS ABOUT THE HARDWARE

The integrated circuits and other critical components used in this project were obtained from the Hyderabad Electronics Market. A mechanical engineer is used to design the mechanical construction part. The IC's details or data sheets are downloaded from the Internet. The following are links to websites where data sheets can be obtained.

1) TexasInstruments (www.texasinstruments.com)
2) National Semiconductors, Inc.
3) Fairchild Semiconductors, Inc.

The integrated circuits and other critical components used in this project are listed below.

a) 89C51 Microcontroller Chip
b) L293D H – Bridge IC
c) 7805 Voltage Regulator
d) 74573 Latch

SUN RISE CIRCUITS, Kushaiguda Industrial Estate, Hyderabad, manufactured the required PCBs (Printed Circuit Boards) for the project work. Industrial Estate of Kushaiguda.

XI. CHAPTER 11

This project demonstrated that it is possible to construct a low-cost, high-precision automatic driverless shuttle Sky bus. This project also demonstrates the benefits of this system. Future decisions will be made to improve the system and make it useful for a wide range of other applications.

To demonstrate the concept practically, a prototype module is built for live demonstration. A mechanical trolley with a bus body is designed to run over a track, and a nearly 4 foot track is laid over two poles, with platforms with steps built at both ends of the track. With these arrangements, an environment is created to simulate the sky bus and its track. The step-by-step approach is used to complete the project work, and the end results are found to be satisfactory.

The technology used here is limited to running the bus between two points; however, by improving and implementing sophisticated technology, the system can be designed for multiple stops. Because it is a prototype module, embedded technology is used, which can be converted to hi-fi using computers. The benefits of using a computer are that many tedious logics can be delegated to it, and important data such as train arrival and departure times can be stored in the system.

REFERENCES

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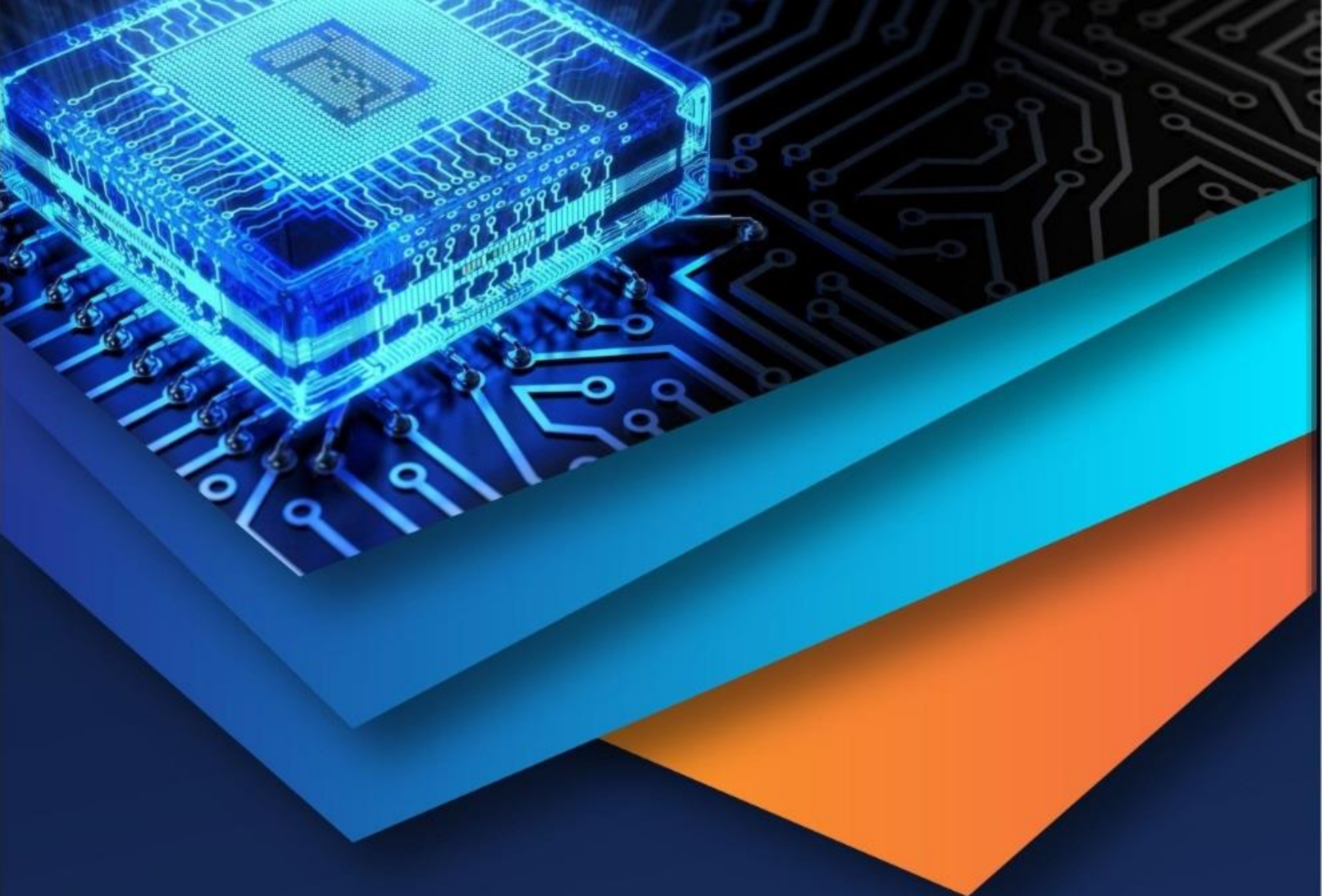

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