

Environmental Adaptive Automatic Railway Platform

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Abstract :- Environmental Adaptive Automatic Railway Platform ,as the name suggests is a system being presented as a fully programmed adaptive system i.e. it contains automation process for operating the platform without any manual interference. The system being proposed is specially designed for

specially challenged/divyanjang pedestrians and old age, senior citizens.

This presentation specially features the solution to mobility problems , faced by pedestrians on railway platforms to climb stairs. The main design concept is to combine the boarding platforms functionally by inserting one bridge type plank, which will connect two different boarding platforms in the absence of any trains and disconnect the bridge before the train arrives on the Platform.

Manual switches have been provided to override the automation, to carry out any maintenance and to make the system fail safe.

Key Words : Automatic Railway Platform, Senior citizens and pedestrian, Automation, Microcontroller, IR sensor, Motor.

1. INTRODUCTION –

The recent survey through social analytics, has thrown some interesting and glaring facts. It clearly came up with some compelling data on the difficulties faced by the physically challenged and senior citizens on Indian Railways platform in terms of ease of mobility within boarding platforms. The proposed system mainly deals with the mitigation of these difficulties.

The proposed system here introduces a new concept of an ‘Artificial railway foot bridge’. To achieve this, the system has a set of Sensors, relay and a P89V51RDXX microcontroller. In railway stations, normally physically

challenged people also need to use foot bridges. It is very difficult for the elderly people or handicapped people to use the bridge .This proposed system tries to find a suitable alternative for such a problem.

The tracking of the train is primarily sensed by a sensor, the output of this is used for automatically closing/opening the foot bridge. Sensors are placed on two sides of the boarding platform track to sense the motion of the train. The microcontroller senses the presence of trains by using infrared sensors. After sensing the train before it enters into the platform, respective sensor will give pulse to the drive to disconnect the platform.

2. THE EXISTING SYSTEM :-

In the present system for crossing over or approaching to another platform, is a foot bridge and elevators. This leads to long and arduous movement for commuters who are physically challenged or are senior citizens. These foot bridges are usually positioned at the ends of the platform. The idea to cross over the tracks is the only easier option. This is fraught with danger and so has been rightly banned as per the Indian Railway act and is an offence.

3. DRAWBACKS IN EXISTING SYSTEM



- It is punishable under Railway act 147 to cross over railway tracks and accidents may occur.
- During platform transfer passengers may fall while

climbing the stairs.

- People cannot change the tracks immediately.
- Trains also cannot be stopped immediately in case of any eventuality.

4. PROPOSED SYSTEM –

The proposed system basically is an introduction to an intelligent platform or a dynamic bridge platform which directly disconnects and connects two boarding platforms, before the train arrives or departs respectively. As all the operations are controlled through software, human interfacing is minimized.

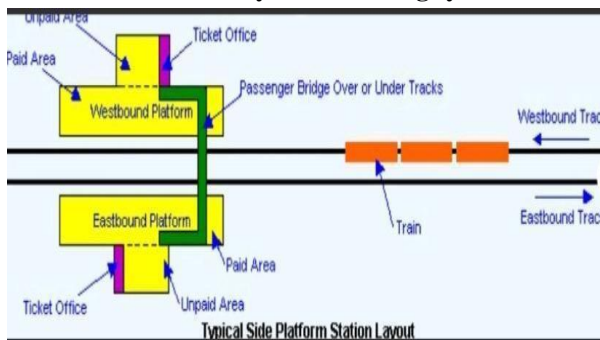
- As human interfacing is minimized maintenance and human errors are minimized.
- Gives more accuracy, works continuously & gives consistency.
- It is an autonomous fail safe device.
- The system used is microcontroller based.

As soon as this system is implemented then the rail crossing incident will be reduced as compared to the existing system .

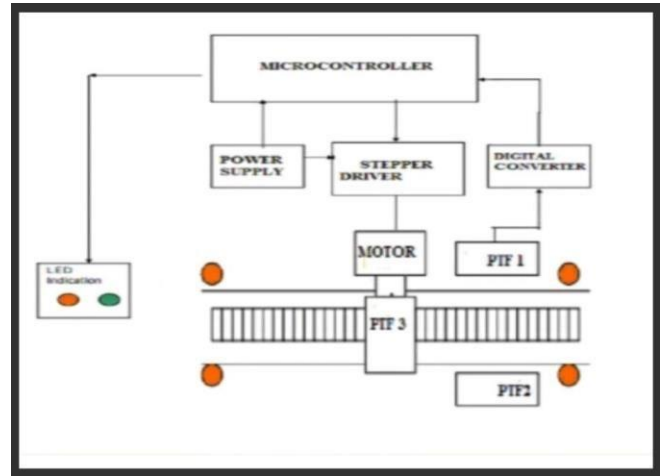
The easy approach and ease of movement will lead to lesser difficulties to commuters. The ease of maintenance and enhanced safety will lead to more user friendly Railway stations. Easy deployment and capital expenditure will lead to better returns and productivity. The system can be easily duplicated with standard rail gauges and mass produced. Application of other field sensors can be added for enhanced safety and fail safe operations.

5. DIAGRAM OF EXISTING SYSTEM AND PROPOSED SYSTEM-

Layout of existing system:-



Layout of proposed system:-

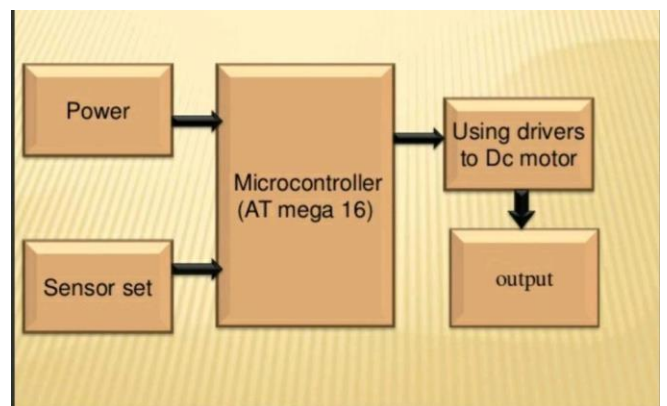


6. WORKING-

The main components of the EAARP System has a MICROCONTROLLER, SET OF SENSORS and DRIVES.

When power is supplied to the microcontroller At mega 16 microcontroller becomes active and then input from the sensor set given to the microcontroller will activate the signal for the drives and the mechanical mechanisms helps to deploy the bridge platform to platform which will horizontally connect the said platforms.

Advance block diagram: In this type of the block diagram for the proposed system, we have shown the basic connection or taken a rough picturization of how the elements in the system are arranged. All the components are to be interfaced with the Microcontroller 89c51, The said micro controller, is programmed for the selected use and automation. The Microcontroller is interfaced with the IR sensor, dome switch, LED indicator.



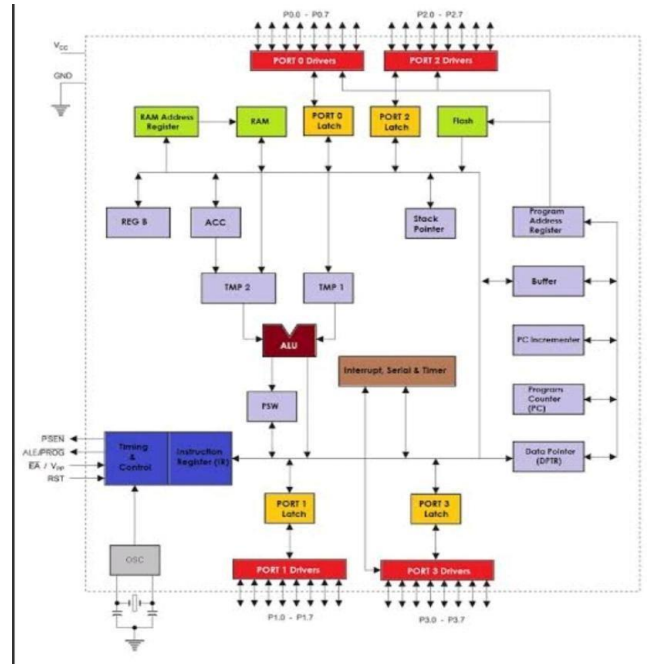
7. COMPONENTS USED IN THIS PROPOSED SYSTEM:-

- Transformer 12-0-12V,750mA
- Diode 1N4007
- Capacitor 1000microfarad,25V
- Voltage regulator IC 7805
- Capacitor 1microfarad
- LED
- Resistors
- Disc capacitors
- IC Base
- PCB
- Wires
- Solder wire
- Cabinet/railway platform
- Mains cord
- IR sensor
- Ic89s52 microcontroller
- LCD
- General Pinion Gear gear 10 tooth
- General Pinion Gear gear 100 tooth
- Rack 12cm
- DC motor 100rpm
- Micro push to on switch
- L293d motor driver
- Train and Track

Microcontroller:

Description

The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of In System Programmable Flash memory. The device is manufactured using Atmel’s high-density nonvolatile 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 nonvolatile memory programmer. By combining a versatile 8-bit CPU with In-System Programmable Flash on a monolithic chip, the Atmel AT89S51 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S51 provides the following standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, two 16-bit timer/counters, a five-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S51 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 external interrupt or hardware reset.



LCD DISPLAY

Liquid crystal Display (LCD) displays temperature of the measured element, which is calculated by the microcontroller. CMOS technology makes the device ideal for application in hand held, portable and other battery instruction with low power consumption.



IR SENSOR

Infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.



Dome switch:

As a safety precaution the Dome switch has been provided. that means if the sensor detects the various obstacle for example the dog is passing nearing from the sensor and hence the sensor senses which will result into malfunctioning of the automated system in order to prevent that proposed system is using the dome switch which will be located under the track and it is pressed by only the train weight.



Buzzers and LED for indications:

Here the LED and buzzers are only used to alert the people that the train is ongoing to come please be alert.



Implementation of roof top solar

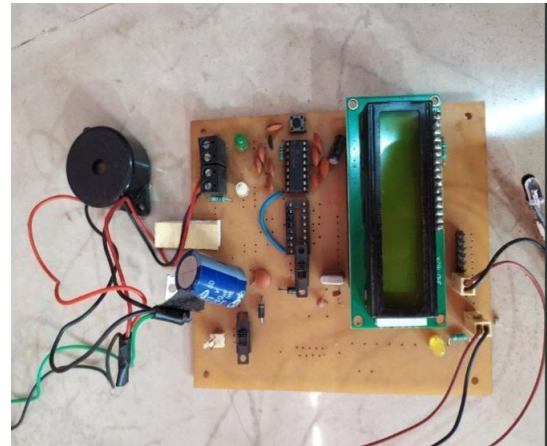
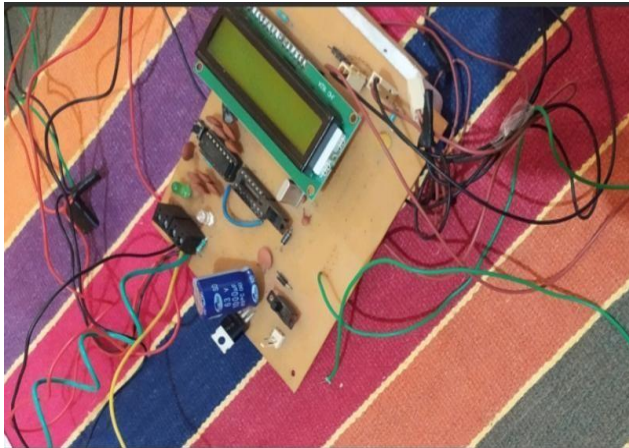
In this section for the power saving module, the proposed system has implemented a roof top solar power system. Since the proposed EAARP system uses DC power, an incorporated



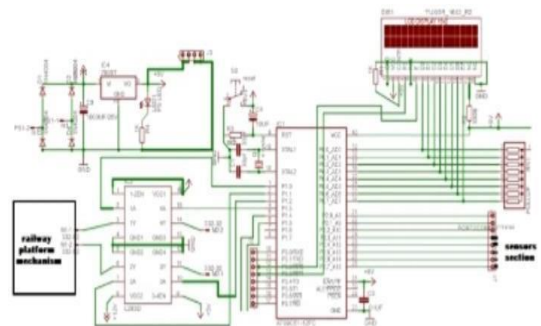
Solar power system will inherently save on operating expenses in the long run

8. **Circuit design and Circuit Diagram:-**

Circuit design of proposed system:-



9. **Circuit Diagram of the proposed system**



As soon as the railway tracks on the boarding platforms are clear with the trains, the sensors will send the signal to the microcontroller to deploy the automatic foot bridge parked in its normally closed position to connect the boarding platforms. The DC motors along with the mechanical mechanism will deploy the foot bridge. When the train is at a specific distance away from the platform, then a buzzer will sound at the platform for the remaining people, who are standing on foot bridge to disembark. They will cross on to the boarding platform and once it is done then the foot bridge is closed and lifted away from the connecting platform to a parked position. After parking of the footbridge, the GREEN signal is illuminated, so that the train can proceed further. If due to any unforeseen fault or incident in the system or footbridge ; a red signal will be initiated & the train has to stop there. So there is no risk of any type of accident.

Testing:-

- While testing the proposed system is came across to the certain difficulty.
- The result of testing is such that , **the total power is needed about 24 watts**, but the rechargeable battery is discharging earlier by using this system continuous. In order to over come this disadvantage the proposed system came across with the installation of roof type solar.
- While testing the proposed system came across the one fault that what if sensor were failed, then in order to overcome on this disadvantage proposed system has incorporated the backup plan if sensor were failed that is dome switch or pressure switch.
- The second thing and the most important is what if another people tries to take the advantage of this system rather than the senior citizen and pedestrian.

This is covered in future scope of this proposed



system.

10. Future Scope of the proposed system:-

- The Power supply for the motor operation and signal lights is a disadvantage. It can be avoided by means of solar cell.
- The obstacle detection part can be implemented using fuzzy logic. As it thinks in different angles and aspects, the system works still more efficiently.
- The footbridge can be fabricated with advanced materials which are very lightweight and strong and this in turn brings down the cost of operations using lesser power and can be easily replace able in case of repairs.

11. Safety Quotient followed while using Proposed System:-

- This Proposed system contains a large number of big electronics components which is difficult to handle so frequent maintenance should be done.
- Proposed system ensures that it can sense any object, living or non living, within 2km it's sensor is activated.

- Proposed system is for elderly persons and senior citizen ordinary people cannot approach to the proposed system.

12. CONCLUSION:-

Physically challenged citizens, senior citizens and patients will find the above fail safe system really useful and easy to use.

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