

# Remotely Controlled Railway Gate

Ashutosh Khatri<sup>1</sup> Anuj Vijayvergia<sup>2</sup> Arpit Sharma<sup>3</sup> Ashish Prajapat<sup>4</sup> Ankit Vijayavargiya<sup>5</sup>

<sup>1,2,3,4,5</sup>Department of Electrical Engineering  
<sup>1,2,3,4,5</sup>Engineering, SKIT, M&G College, RTU, Rajasthan

**Abstract**— The project is deliberate to realize control over the railway level cross gate through Android Application by the station master. Opening and closing of railway level crossing gate involves manpower, which could be often flawed leading to accidents. The proposed scheme rules out the need of any individual concern at the railway level crossing. This system involves opening and closing of the level crossing gate with help of an Android Application tool. Remote operation is achieved by any smart-phone/Tablet etc., with Android OS, upon a GUI (Graphical User Interface) based touch screen operation. A Bluetooth device is interfaced with the scheme. When the station master sent grasp to close from the Android application device (when the train is approaching at the level crossing) to the Bluetooth device which while fed to the microcontroller, sends an output signal which activates a system to switch on the motor to close the gate. To open the gate, another command wants to be sent for the microcontroller to open the gate with help of motor driver IC. In this project we use a microcontroller of 8051 family, and the input to it is a Bluetooth device which receives command from the abuser Android application. The output to microcontroller is given to a motor through a motor driver IC for required operation. The condition, whether the gate is open / close is displayed on an LCD display interfaced to the microcontroller. the project can be enhanced by sending an acknowledgement to the correspondent about the status of the gate.

**Key words:** Railway Gate

## I. INTRODUCTION

Early level crossings had a flagman in an instantaneous position who would on the ploy of a train, spray a red flag or light to stop all traffic and clear the tracks. Physical or electrical closable gates that encouraged the roadway was later introduced. The gates were intended to be a broad barrier against intrusion of any road traffic onto the railway. In the early days of the railways much road traffic was horse wan or encompassed beef. It was thus obligatory to provide a real barrier. Thus, crossing gates, when closed to road traffic, crossed the entire distance across the road. When opened to permit road users to cross the line, the gates were swung across the width of the railway, averting any perambulators or animals getting onto the line. With the presence of motor vehicles, this barrier became fewer effective and the need for obstacle to beef contracted dramatically. Many republics substituted the gate crossings with scrawnier but more highly noticeable barriers and trusted upon road users following the a companying threatening indicators to end .In many countries, level crossings on less significant roads and railway lines are often "open" or "uncontrolled", sometimes with threatening lights or chimes to advise of approaching trains. Un-gated crossings represent a safety anxiety. Many coincidences have occurred due to displeasure to notice or obey the threatening Level crossings present a significant risk of collisions between trains and road vehicles. Level crossings

in India, China, Thailand, and Malaysia are still largely manually-operated, where the obstacles are lowered using a manual switch when trains approach.

## II. KEYWORDS

Sensor, Microcontroller, Liquid Crystal Relay, Stepper Motor, Motor IC, Bluetooth Module, Android Smartphone, etc.

## III. PROPOSED SYSTEM

The features of remotely controlled railway gate control are as follows:

### A. Low Cost

The aim of remotely controlled railway gate control is to reduce the cost of the operation.

### B. No Difference from Usual System

Whenever the rail come across the gate a signal is sent to the gatekeeper by using smartphone gatekeeper sent command to microcontroller using Bluetooth module and gate will be closed and after that open the railway crossing gate.

### C. Safety

In our old controlling system of gate control and automatic gate control in faulty condition problem increases like if gate closed then it is permanently closed and in case of open gate then gate is permanently opened and we are not able to operate manually & at the time of closing of railway gate if any person is in the mid of crossing then that person has no choice to come outside the crossing line and in thisIn this remotely controlled railway gate control we use Bluetooth module to receive and transfer the signal from smartphone to Bluetooth module and from Bluetooth module to smartphone too. In this method on our smartphone screen signal is shown that rail is passed through the sensor and then by sending command by phone gate is opened or closed by the station master.

## IV. BLOCK DIAGRAM

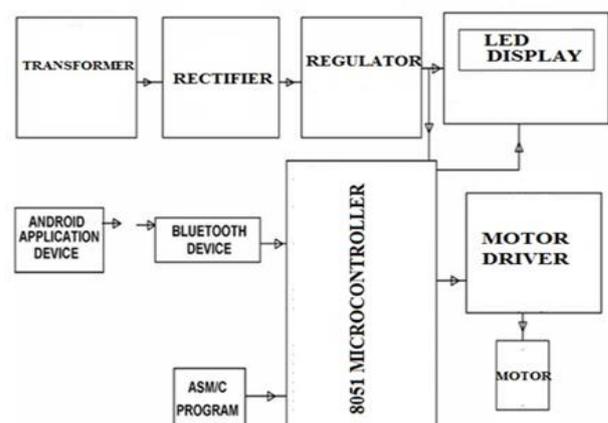


Fig. 1: Block Diagram

## V. MICROCONTROLLER

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The expedient is synthetic using Atmel's high-density non-volatile memory expertise and is compatible with the manufacturing-standard 80C51 instruction set and pin out. The on-chip Flash allows the package memory to be reprogrammed in-system or by a conservative non-explosive memory pro-grammar. By uniting a adaptable 8-bit CPU with in-scheme programmable Flash on a colossal chip, the Atmel AT89S52 is a influential microcontroller which provides a highly-springy and cost-effective solution to many entrenched control applications. The AT89S52 provides the following standard topographies: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Ombudsman regulator, 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 motherboard. In addition, the AT89S52 is designed with stagnant logic for operation down to zero frequency and cords two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interject system to continue operative. The Power-down mode saves the RAM fillings but restrictions the oscillator, incapacitating all other chip functions until the next interject or hardware reset.

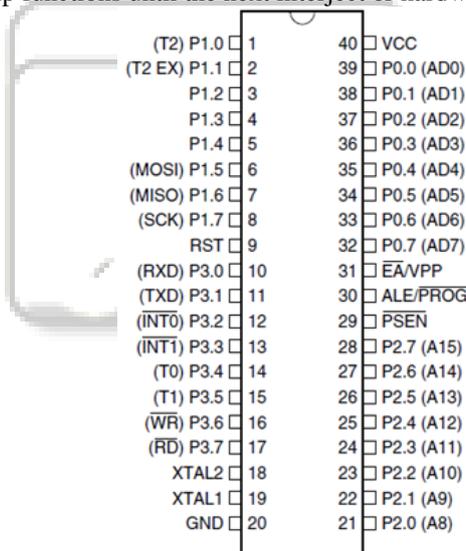


Fig. 2: Pin Configuration

### A. Pin Description

VCC- Supply voltage	
GND- Ground	

Table 1.

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 is written to port 0 pins, the pins high impedance inputs. Port 0 can also be configured to be the multiplexed low-order address/d ata bus during accesses to external program and data memory. In this mode, P0 has internal pull-ups. Port 0 also receives the code bytes during Flash programming and outputs of code bytes during program verification. External pull-ups are required during program verification.

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), respectively, as shown in the following table .Port 1 also receives the low-order address bytes during Flash programming and verification

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 uses 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. Port 3 receives some control signals for Flash programming and verification.

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.

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.

XTAL1-Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

XTAL2-	Output from the inverting oscillator amplifier.
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Table 2.

## VI. MOTOR & MOTOR DRIVES

Stepper motors are DC motors that move in discrete steps. They have multiple coils that are organized in groups called "phases". By energizing each phase in sequence, the motor

will rotate, one step at a time. A **stepper motor** (or **step motor**) is a brushless, synchronous electric motor which renovates electrical pulsations into detached mechanical movements. The shaft or baluster of a stepper motor rotates in detached step increments when electrical grasp pulses is applied to it in the appropriate sequence. The motors rotation has several direct relationships to these applied input pulses. The sequence of the applied pulses is directly related to the direction of motor shafts rotation. The speed of the motor sluces rotation is directly related to the frequency of the input throbs and the length of rotation is directly related to the number of input throbs applied.

A driver IC is an electro-magnetic alteration that will be used whenever we dearth to use a low voltage circuit to switch a light bulb ON and OFF which is associated to 220V mains supply. The required current to course the relay coil is more than can be supplied by innumerableassimilated circuits approximating Op-Amp, etc. Relays have inimitable properties and are supplanted with solid state switches that are resilient than solid-state devices. High current capacities, capability to stand ESD and drive circuit isolation are the inimitable properties of Relays.

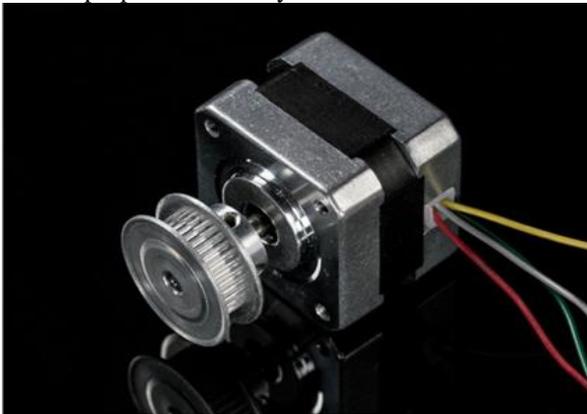


Fig. 3: Stepper Motor

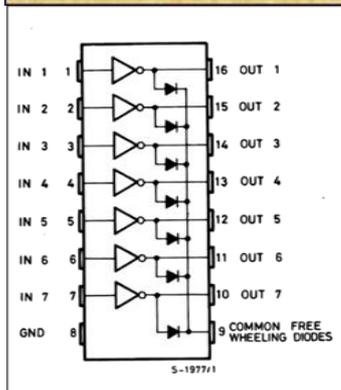


Fig. 4: Driver IC

#### A. Advantages

##### 1) Positioning

Since steppers move in precise repeatable steps, they excel in applications requiring precise positioning such as 3D printers, CNC, Camera platforms and X,Y Plotters. Some disk drives also use stepper motors to position the read/write head.

##### 2) Speed Control

Precise increments of movement also allow for excellent control of rotational speed for process automation and robotics.

##### 3) Low Speed Torque

Normal DC motors don't have very much torque at low speeds. A Stepper motor has maximum torque at low speeds, so they are a good choice for applications requiring low speed with high precision.

#### B. Limitations

##### 1) Low Efficiency

Unlike DC motors, stepper motor current consumption is independent of load. They draw the most current when they are doing no work at all. Because of this, they tend to run hot.

##### 2) Limited High Speed Torque

In general, stepper motors have less torque at high speeds than at low speeds. Some steppers are optimized for better high-speed performance, but they need to be paired with an appropriate driver to achieve that performance.

##### 3) No Feedback

Unlike servo motors, most steppers do not have integral feedback for position. Although great precision can be achieved running 'open loop'. Limit switches or 'home' detectors are typically required for safety and/or to establish a reference position.

## VII. BLUETOOTH MODULE

HC serial Bluetooth products consist of Bluetooth serial interface module and Bluetooth adapter, such as:

(1) Bluetooth serial interface module:

Industrial level: HC-03, HC-04(HC-04-M, HC-04-S)

Civil level: HC-05, HC-06(HC-06-M, HC-06-S)

HC-05-D, HC-06-D (with baseboard, for test and evaluation)

(2) Bluetooth adapter:

HC-M4

HC-M6

This document mainly introduces Bluetooth serial module. Bluetooth serial module is used for converting serial port to Bluetooth. These modules have two modes: master and slaver device. The device named after even number is defined to be master or slaver when out of factory and can't be changed to the other mode. But for the device named after odd number, users can set the work mode (master or slaver) of the device by AT commands.

HC-04 specifically includes:

Master device: HC-04-M, M=master

Slave device: HC-04-S, S=slaver

The default situation of HC-04 is slave mode. If you need master mode, please state it clearly or place an order for HC-04-M directly. The naming rule of HC-06 is same. When HC-03 and HC-05 are out of factory, one part of parameters are set for activating the device. The work



2) *Specification*

- Bluetooth Frequency: 2.4GHz ISM band
- Modulation: GFSK(Gaussian Frequency Shift Keying)
- Emission power:  $\leq 4\text{dBm}$ , Class 2
- Sensitivity:  $\leq -84\text{dBm}$  at 0.1% BER
- Speed: Asynchronous: 2.1Mbps(Max) / 160 kbps, Synchronous: 1Mbps/1Mbps
- Security: Authentication and encryption
- Profiles: Bluetooth serial port
- Power supply: +3.3VDC 50mA
- Working temperature:  $-20 \sim +75\text{Centigrade}$
- Dimension: 26.9mm x 13mm x 2.2 mm
- protocol: Bluetooth Specification v2.0+EDR

3) *Application*

- Computer and peripheral devices
- GPS receiver
- Industrial control

VIII. CIRCUIT DIAGRAM

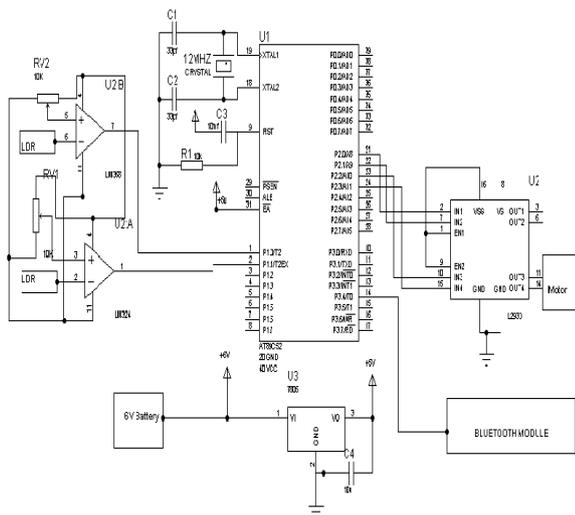


Fig. 7: Circuit Diagram

IX. WORKING

Remote operation is achieved by any smart-phone/Tablet etc., with Android OS, upon a GUI (Graphical User Interface) based touch screen maneuver. A Bluetooth device is interfaced with the system. When the station master sent grasp to close from the Android application device (when the train is approaching at the level crossing) to the Bluetooth device which while nourished to the microcontroller, refers an output signal which triggers a contrivance to switch on the motor to close the gate. To open the gate, alternative facility desires to be sent for the microcontroller to open the gate with help of motor driver IC. In this project we procedure a microcontroller of 8051 family, and the input to it is a Bluetooth device which receives grasp from the worker Android application. The production to microcontroller is given to a motor through a motor driver IC for mandatory action. The status, whether the gate is open / close is presented on an LCD display interfaced to the microcontroller.

X. RESULT

Railways being the realistic approach of conveyance are favored determinate all the other means .When we go through the daily newspapers we originate athwart many railway affluences occurring at unmanned railway crossings. This is chiefly due to the weariness in blue-collar operations or imaginarieness of operative. In this endeavour has come up with a resolution for the same. Using simple electronic components we have stressed to systematize the control of railway gates. As a train approaches the railway crossing from whichever side, the sensors placed at a definite detachment from the gate differentiates the imminent train and subsequently controls the crusade of the gate. Also an display light has been distributed to alert the runs about the imminent train.

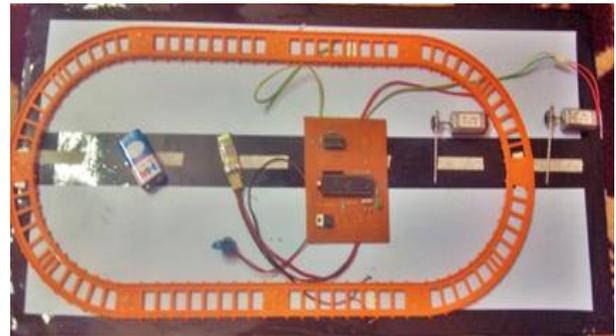


Fig. 8: Remotely Controlled Railway Gate

XI. CONCLUSION

The ding of automating the process of railway gate operation in level crossings has been assumed. The reaction of which is the decrease of mishaps within the gate. By this contrivance, gate keeper presence is not required. Microcontroller performs all the operations like sensing, software coding & opening and closing of railway gate using stepper motor which is used. The mechanism works on a simple principle like the sensor sense the rail and then sent signal to the microcontroller and then according to coding the microcontroller perform an action and gate automatically closed by motor and after crossing the second side sensor gate automatically open by same manner and the accident reduces and there is not much of complexity needed in the circuit. And by this real life project the perfection increases and the we can control the railway gate manually too by using an application in our smartphone and by this Bluetooth application we can open or close the railway gate manually.

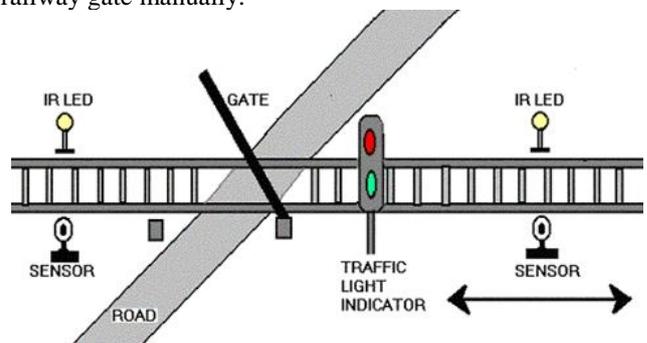


Fig. 9: Remotely Controlled Railway Gate

## XII. APPLICATION

- 1) Possibility of accident reduce.
- 2) cost of system reduces.
- 3) system efficiency increases.

## XIII. FUTURE SCOPE

In future we have to expand our project like we give both the feature in the project so that in faulty cases the gate control can be done by the remotely and this all system is controlled by the station like our electrical grid system and we provide wifi system for that so that the cost of gatekeeper is also reduced and everything will be automatic with safety and the main purpose of this project is safety and cost effective too.

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