Microcontroller based Automatic railway gate control

By:

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Agenda

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- Automatic railway gate system.
- Schematic diagram.
- Detailed description.
- The sensor set.
- Working of the sensor set.
- Microcontroller
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The Present Scenario

➤ Generally the railway crossings are of two types

        1.Manned

        2.Unmanned

➤ A lot of time is wasted due to this particular system.

➤ Many errors occur due to the manual operation of the entire system.

The Real time example

The Automatic railway gate

➢ The arrival and departure of trains is done by the sensor set.

➢ The automatic railway gate has two main advantages:

    1. The reduction of time for which the gate is being kept closed.

    2. To provide safety for the road users by reducing the accidents as there is no scope of human errors in this case.
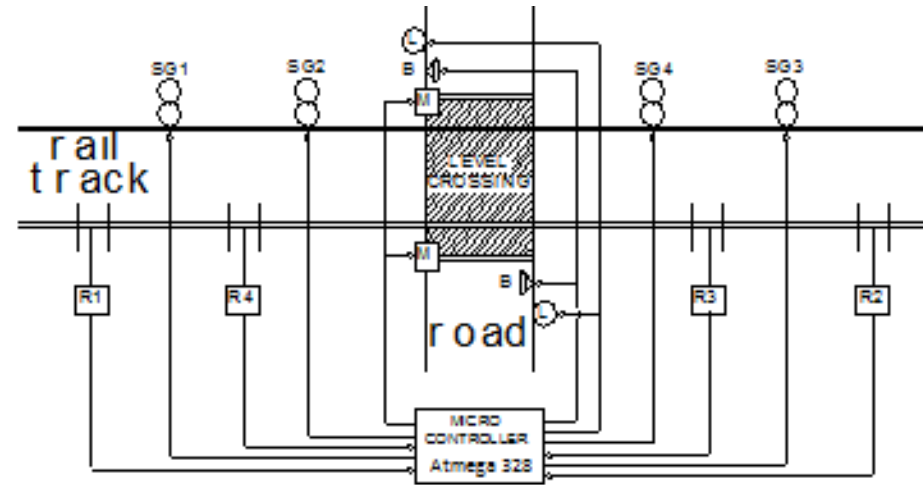
The Schematic diagram
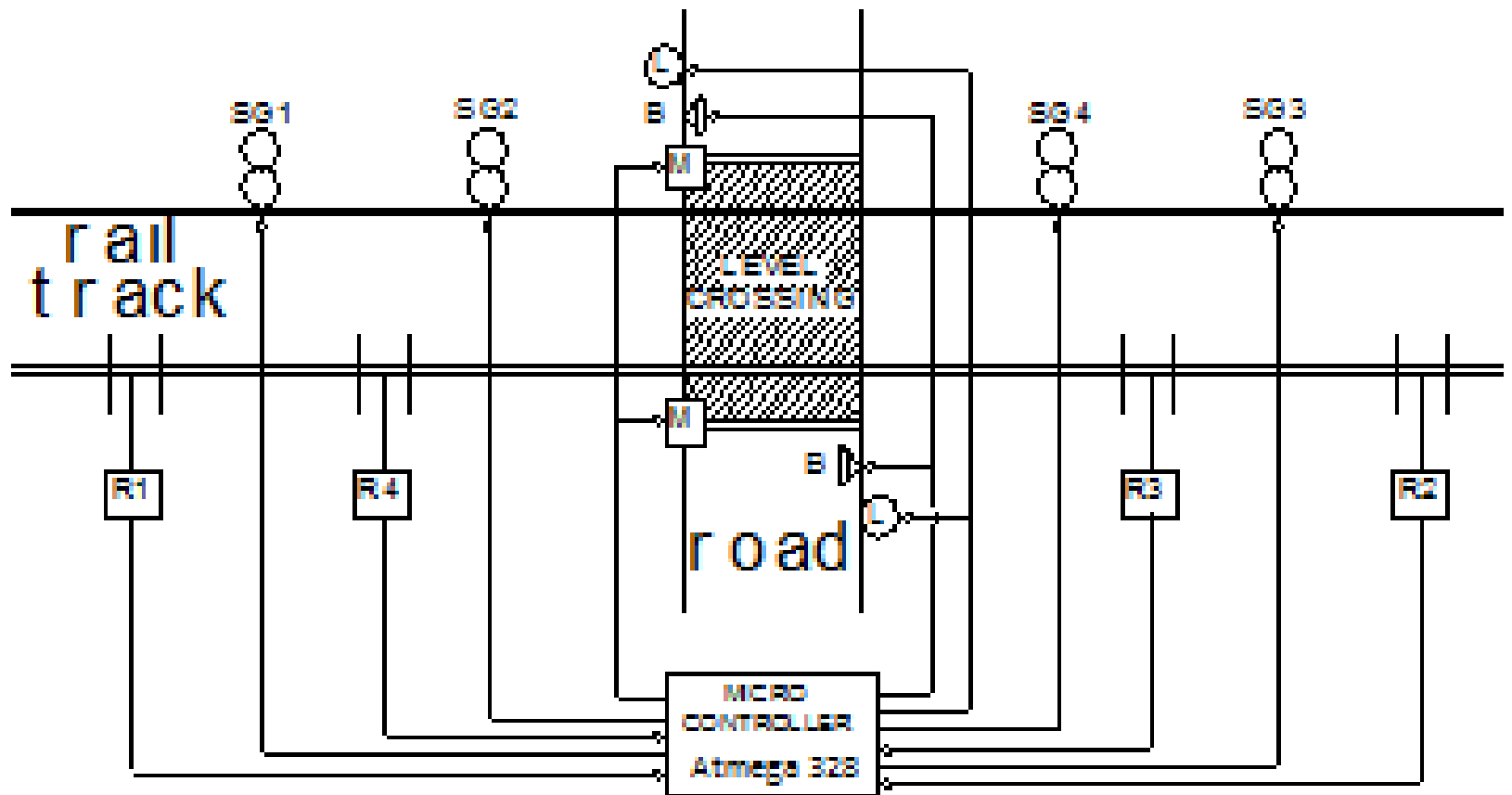
The Detailed Description

- Initial Signal Display
- Train Arrival Detection
- Warning for Road Users
- Sensing For Vehicles
- Gate Closing Operation
- Signal For Train
- Train Departure Detection
- Gate Opening
- Interrupt

The Sensor Set

- A sensor set is used in all these places instead of a single sensor.

- The sensor set consists of the following sensors:

  1.) An IR sensor.

  2.) A Sound sensor.

  3.) A Thermal sensor.

Working of the Sensor set

- All the above 3 sensors are ANDed together and they form a single sensor set.

- So to trigger the entire set, we need to trigger all the above sensors.

- The reason why we go for this type of sensor set is to make it triggered 'only' by a **train** thus this increases the reliability of the system.
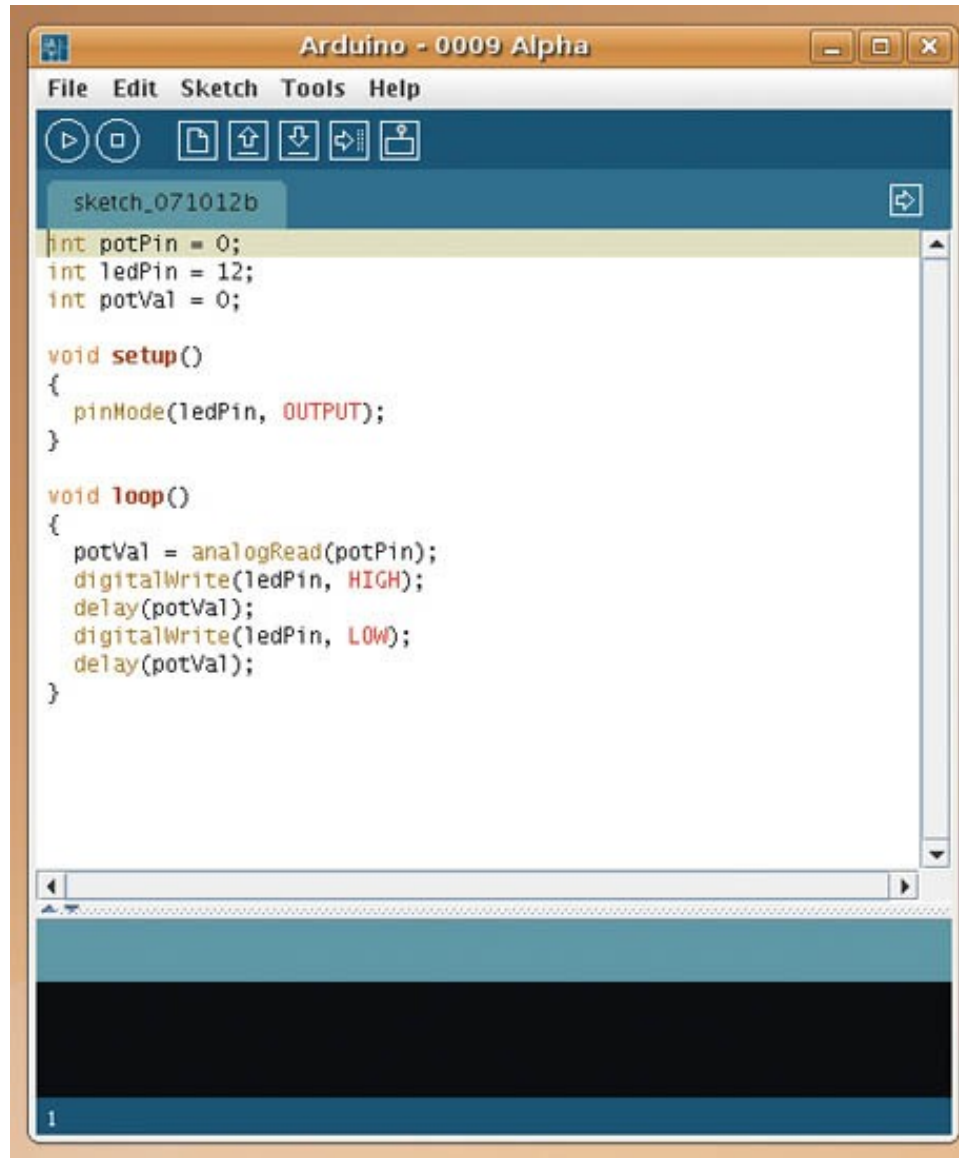
Microcontroller

- This forms the brain of the entire system.
- Atmega 328 using arduino platform is used for the programming of this logic.
- Microcontroller "Atmega 328" performs
  the complete operations of
  - Sensing
  - Closing of the gate
 - Opening of the gate operation done by software code written on the controller.
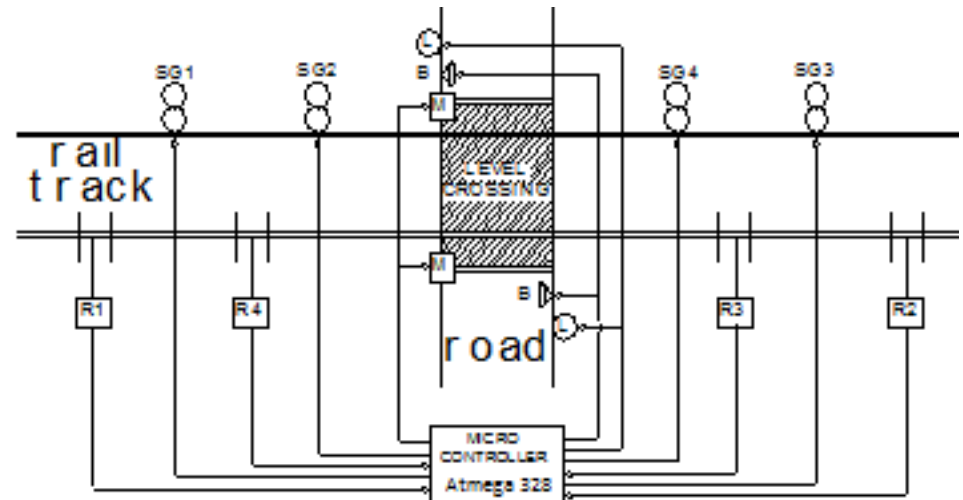
Arduino

Arduino IDE

Algorithm

- 1: Make initial settings of the signals for the train and road users.

- 2: Check for the arrival of the train in either direction by the sensors. If the train is sensed go to 3 otherwise go to step 2.

- 3: Make the warning signal for the road users and set the signal for the train.

- 4: Check for the presence of any obstacle using sensors. If no obstacle, go to step5 otherwise repeat step4.
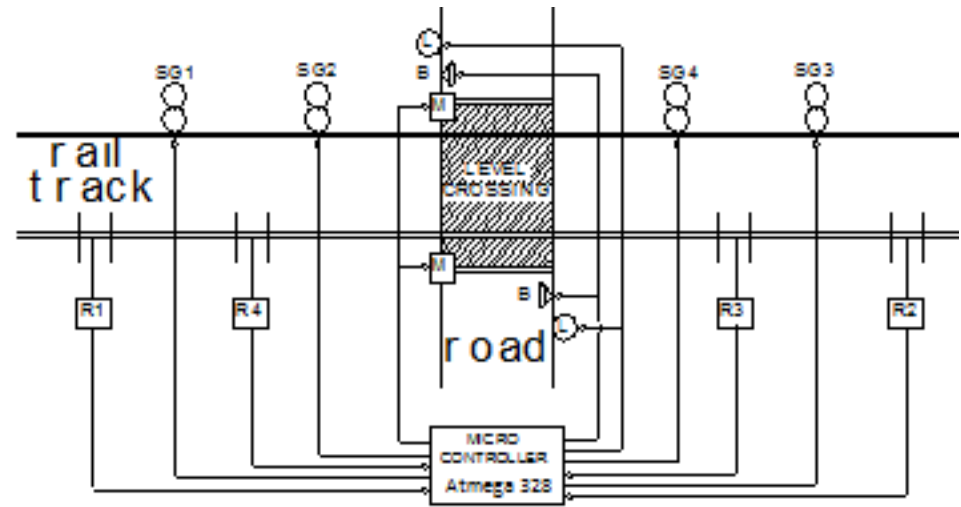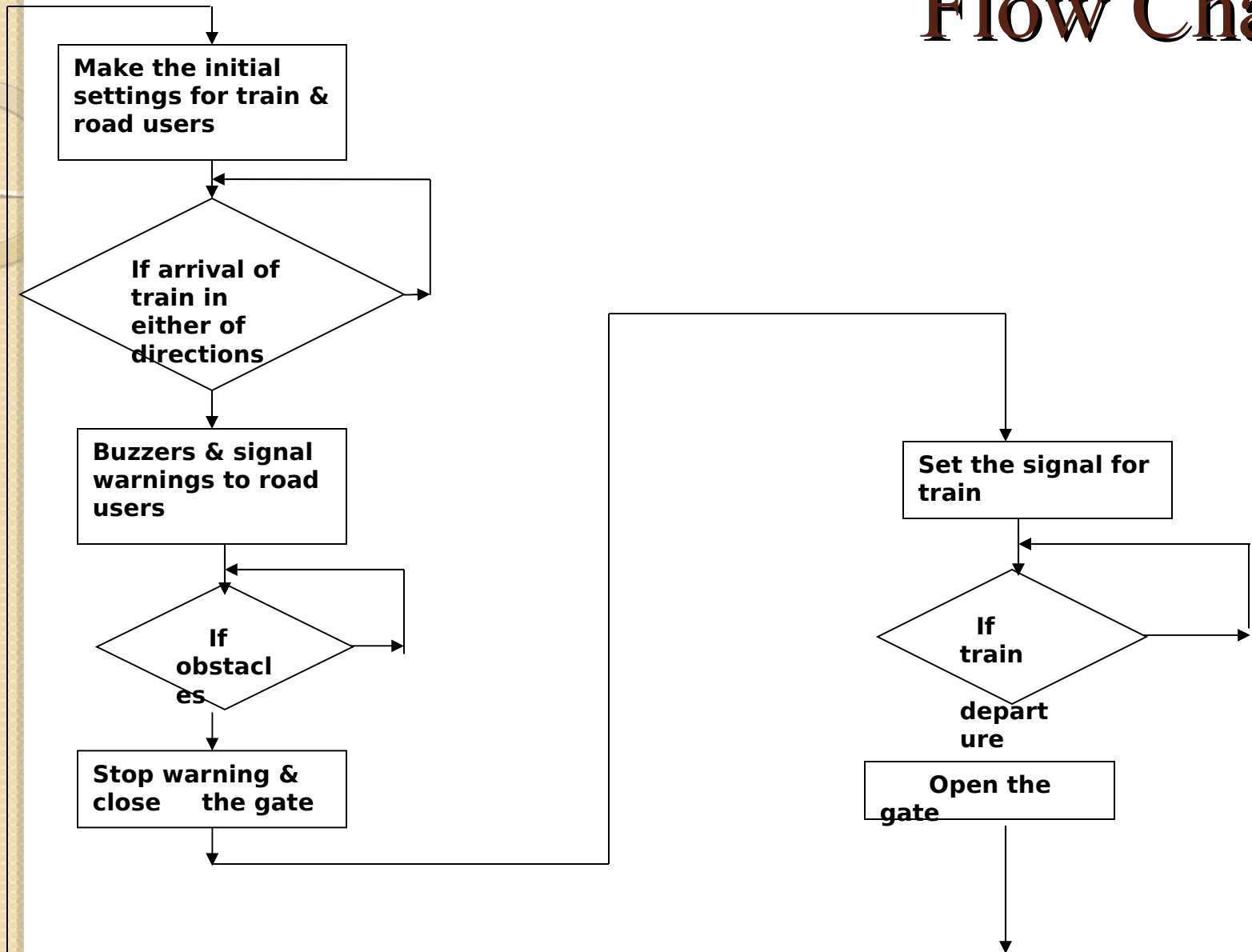
Algorithm contd…

- 5: Close the gate .

- 6: Change the signal for the train.

- 7: Check for the train departure by the sensors. If the train sensed to next STEP. Otherwise repeat STEP 7.

- 8: Open the gate.

- 9: Go to STEP 3.

Flow Chart

Make the initial settings for train & road users

If arrival of train in either of directions

Buzzers & signal warnings to road users

Set the signal for train

If obstacles

Stop warning & close   the gate

If train departure

Open the gate

Advantages

- Prevention of accidents inside the gate.

- Reliable machine, which operates the railway gate even without gatekeeper which makes it useful for operation at unmanned crossings.

- Power supply for the motor operation and signal lights is required.

- Battery which is charged by means of a solar cell can be used in remote areas where the power supply can't be expected.

Advantages of the microcontroller

➤ Cheap

➤ Open source hardware and software

➤ Easy learning curve

➤ Extensible

Disadvantages

- To establish the entire network it is quite a costly task. Since these are the issues of the government cost doesn't matter a lot.

- The Arduino board is a delicate device so it has to be handled carefully.

Conclusion

- Avoids manual errors & provides ultimate safety to road users.

- Gatekeeper not necessary and automatic operation of the gate through the motor.

- The mechanism works on a simple principle.

Queries??????