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# Traffic Light Control Using Accelerometer Sensor on ARM Platform

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**Abstract:** ***This paper is to build a system in which the signaling time at traffic signaling junction will be controlled according to the availability of ambulances or VIP vehiclesIn this paper, "Traffic control System" is based on the traffic rules. For that traffic police gestures are important. There are two methods for gesturerecognition,first is vision based and other is sensorbased.In this paper sensor based method is used forgesture recognition on ARM platform.For thatthresholding method is used as detectingalgorithms. SD card is used to store the voice dataand transmitted using XBEE module.***

**Keywords:** MEMS, Microcontroller, ZIGBEE and LCD.

## 1. Introduction

When traffic is very heavy, an automatic trafficlight system is not efficient to control traffic, causing traffic jam. In this case, it is necessary toswitch off the traffic light and let traffic policeguide traffic by gestures. In the case of bad weatheror obstruction by other vehicles, however,sometimes it is difficult for all drivers to recognizethe gestures. It would be useful if the traffic lightcan follow the traffic police gestures.Two methods are considered suitable for gesturerecognition. The first one is to use vision sensorslike cameras to acquire images, which are analyzedto recognize the gestures. The second one is toplace inertial sensor on the traffic police hand andextract the motion characters. The most advantageof the vision method is that it can recognizegestures without adding any extra hindrance to thepolice. However, it suffers from poor illumination,e.g. at night or in fog weather.

Due to the advantages of low cost and small size, MEMS accelerometers have been used widely ingesture recognition. By fixing two 3-axisaccelerometers on wrist of both hands, so the armmovement and hand position, when the arm issteady, can be extracted. By recognizing trafficpolice gestures and synchronizing the traffic lightswith them, it is envisage that this application willgive help to vehicle drivers.There are no of systems for regulating the traffic given as following: The author Zhang Yuye et.al. [11] System useAT89C51 and CAN BUS controller which leads tocomplicated design and cost of the system morebecause of CAN BUS controller. Also powerrequirement will be more in case of AT89C51.The author Manoj Kanta Mainali et.al.[7] proposeda genetic algorithm approach to estimate the trafficvolume in road sections without the trafficinformation of road sections. This method canestimate the unknown traffic volume using only the known traffic volumes. The author CaiBai-gen et.al.[3] design a vehicledetection system based on magneto-resistive sensoris composed by wireless traffic informationcollection nodes which are set on two sides of roadto detect vehicle signal. The magneto-resistivesensor is costly and maintenance cost of the systemwill be more if the system fails. This system is lackof emergence measures.

The author S.L.Toral et.al.[13] design willprovide good result for vehicle detection whereARM-based video processor not only deals withthe video processing algorithms but again the costof system design will be more because camera willbe required to capture video .The author ShilpaS.Chavan et.al.[12] design oftraffic light controller handles major problem ofconventional traffic signal. At certain junction,sometimes even if there is no traffic but peoplehave to wait because the traffic light remains redfor the preset time and road users waits until thelight turn to green. They try to solve this problem effectively by using Microcontroller (89c51), GSM but system will leads to complications.

The author Ahmed S. Salamaet.al.[8] provideintegrated intelligent traffic light system usingphotoelectric sensors distributed on long rangebefore and after traffic light on roads. Emergencycases such as, the passing president car andambulance that require immediate opening oftraffic signal. The system has the ability to open acomplete path for such emergency cases untilreaching the target but this system does not operatewells when more than one emergence Vehiclescome on the signal from two sides. The author Dinesh Rotake,Swapnili Karmore.al.[2] provides ITSC system. When more than oneemergency car came then most of the system fails.The ITSC system consist of AVR-32microcontroller with inbuilt 8-channel ADC toreceive IR-input from IR-transmitter which isembedded in the emergence vehicle. The 8-IRsensors are used to detect the emergence vehicleand open the divider gate to pass emergence carand then immediately closed the gate.

## 2. System Design Model

The proposed system implementation, the trafficpolice hand gestures are important.So that requiresuitable hand gesture recognition technique.Thereare no of "Hand Gesture Recognition techniques"present, from that only two techniques are considerfirst is vision based and second sensor based. Invision based system for traffic control then itrequire camera, time consuming technique andhave some disadvantages. So that to design realtime traffic control system, here used sensor basedtechnique. In this system, accelerometer sensor isused for hand gesture recognition. Block diagramof proposed system is given in fig.no.1. Here

utilize a sensor on handheld unit whichintegrated a tri-axes accelerometer chip as ahandheld input device in this interaction system.When the human performs a gesture, the sensorwill collect the data flow output by accelerometerchip, and send it to PC via wireless protocol. Hereconsider this raw data stream fetched from sensoras an “input pattern”.

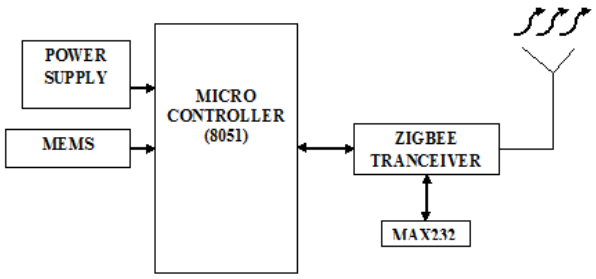


**Figure 1:** transmitting section

According to the daily experience, the patternsgenerated by the movement of hand when humanperforming the same gestures satisfy certainstatistical rules to some extent, based on it wepropose the “standard pattern”. The “standardpattern” is a class of pre-defined patterns, each onecorresponding to a special “input semantics”. Whenuser performed a gesture, the sensor will send the“input pattern” to interaction system, then systemwill find out the most approximate “standardpattern”, this also can be regarded as a procedure ofrecognition, and finally the interaction system getan input semantic according to the recognitionresult.

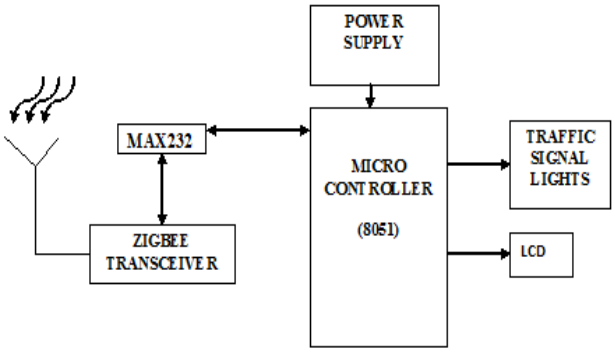


**Figure 2:** monitoring section

The three axis accelerometer are basically used todentify the movements across the three axis i.e. xaxis,y-axis, z-axis. Accelerometer is an electronicdevice which is interfaced using I2C protocol andprovides the reading after every 1msec. Accordingto the requirement of the application, themicrocontroller will take the reading from theaccelerometer within a fixed interval of time and dothe necessary operation according to therequirement of the application.

It is possible to create the source files in a text editor such as Notepad, run the Compiler on each C source file, specifying a list of controls, run the Assembler on each Assembler source file, specifying another list of controls, run either the Library Manager or Linker (again specifying a list of controls) and finally running the Object-HEX Converter to convert the Linker output file to an Intel Hex File. Once that has been completed the Hex File can be downloaded to the target hardware and debugged. Alternatively KEIL can be used to create source files; automatically compile, link and covert using options set with an easy to use user interface and finally simulate or perform debugging on the hardware with access to C variables and memory. Unless you have to use the tolls on the command line, the choice is clear. KEIL Greatly simplifies the process of creating and testing an embedded application. The user of KEIL centers on “projects”. A project is a list of all the source files required to build a single application, all the tool options which specify exactly how to build the application, and – if required – how the application should be simulated. A project contains enough information to take a set of source files and generate exactly the binary code required for the application. Because of the high degree of flexibility required from the tools, there are many options that can be set to configure the tools to operate in a specific manner. It would be tedious to have to set these options up every time the application is being built; therefore they are stored in a project file. Loading the project file into KEIL informs KEIL which source files are required, where they are, and how to configure the tools in the correct way. KEIL can then execute each tool with the correct options. It is also possible to create new projects in KEIL. Source files are added to the project and the tool options are set as required. The project can then be saved to preserve the settings. The project is reloaded and the simulator or debugger started, all the desired windows are opened. KEIL project files have the extension

## 3. Experimental Results

Here two unit are present, first is base unit andanother is handheld unit. At the start of system,initializing of all component. There are two modeof the system first is auto mode second is manualmode. The results are categorized based onobjective and mode of the system.1) To recognizereal time hand gesture using accelerometersensor.2) To control hardware according to handgesture. First system in auto mode, so that at baseunit traffic light signal are glowing automaticallyaccording to the programmed them. If there is needto control the traffic by traffic police gesture, thensystem change the mode ie it switch to manualmode by pressing manual mode button. Thensystem is controlled by hand gesture of trafficpolice. One example is given below.

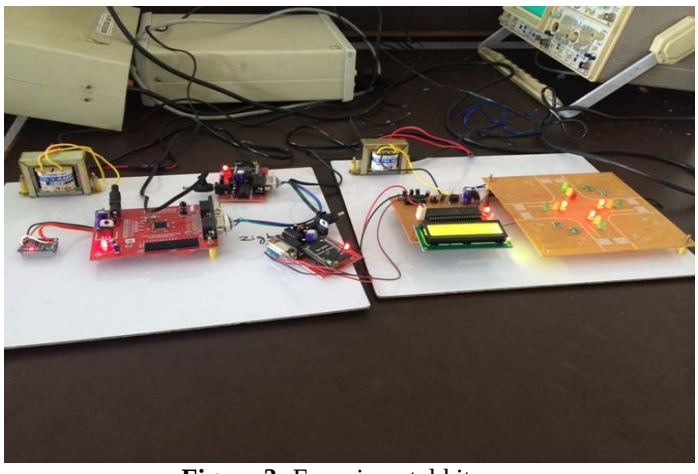

**Figure 3:** Experimental kit

According to this project, it employs 2 sections; one is placed at traffic signal junction and the other one section Ambulance section. The section placed in the ambulance contains a MEMS accelerometer for the operations Emergency, Normal, out, direction 1 and direction 2.So according to this project, whenever the ambulance is yet to reach a traffic signal junction, the concerned person need to press the switches like Emergency / Normal and direction 1 / 2 informing the direction and ambulance reaching the signal junction. The other section placed at traffic signal receives the information and takes the control action. The control action is in the form of timing for Green lights. The communication between the sections is done using Zigbee technology. Each and every section is designed around a microcontroller as a control unit. The Zigbee module is interfaced to microcontroller.

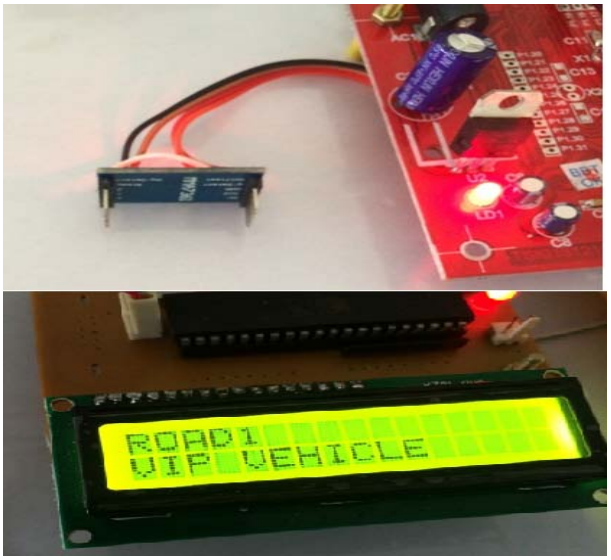


**Figure 4: CASE 1**

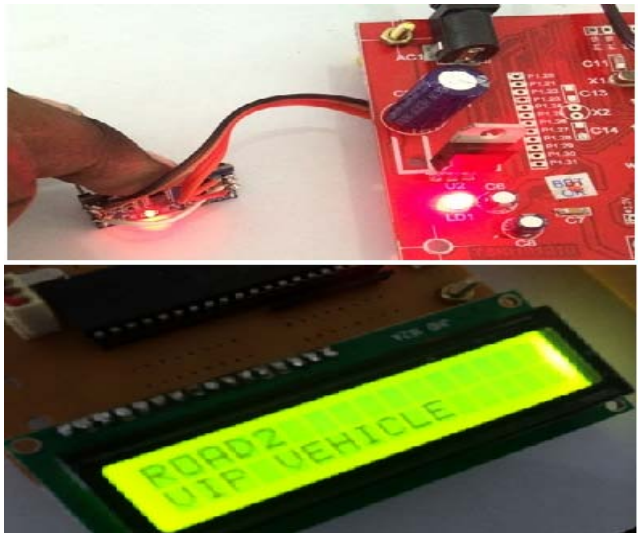


**Figure 5:** CASE 2


**Figure 6:** CASE 3


**Figure 7:** CASE 4

## 4. Conclusion

The design system is implemented usingaccelerometer sensor-based hand gesturerecognition technique. This is user friendly system,where the complex human-computer interface isrequired. The system is more accurate than visionbased system as an illumination problem is solved.

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