# Embedded Based Priority Traffic Controller for Ambulance and Fire Brigade

M. Jasmin, S. Philomina and G. Angelo Virgin

*Abstract---* *In emergency system, the transfer of patients to the hospital should be in fast and save manner to increase the rescue and survival rates. Thus, the ambulances take the short and safe way to the emergency department at a hospital. To satisfy this, this paper tackles the problem of road jamming by controlling the underlying traffic lights and selecting the optimal path depending on crowed sensor readings.*

*Keywords---* *Wireless Sensor Network, Vehicle Detection, Intelligent, Traffic Signal Controller.*

## I. INTRODUCTION

When the traffic lane waits until the green light, time setting is almost same and fixed. A-road was always crowded with vehicles and go-ahead time is short. So, vehicles can't pass through in the time allowed. But sub lane has few vehicles and go-ahead time is relatively long. A steady increase in metro-city population, the number of automobiles and cars increases rapidly and metro traffic is growing crowded which leads to the traffic jam problem. This proposed system will have effective role to avoid the traffic jam. Under ordinary conditions, traffic signals control .

When the traffic lane waits until the green light, time setting is almost same and fixed. A-road was always crowded with vehicles and go-ahead time is short. So, vehicles can't pass through in the time allowed. But sublane has few vehicles and go-ahead time is relatively long. . Emergency cars are not considered. The two lanes should both wait them to pass . Because the traffic light control system is lack of emergency measures, the crossroads always meets a traffic jam and leads to unnecessary economic losses. The System use AT89C51 and CAN BUS controller which leads to complicated design and cost of the system more because of CAN BUS controller. Also power requirement will be more in case of AT89C51 but the proposed system will used low power AVR-32 microcontroller.

The proposed a genetic algorithm approach to estimate the traffic volume in road sections without the traffic information of road sections. This method can estimate the unknown traffic volume using only the known traffic volumes. So, proposed system use the advantage of to design very efficient system that use the combination of AVR-32 and genetic algorithm.

The author design a vehicle detection system based on magneto-resistive sensor is composed by wireless traffic information collection nodes which are set on two sides of road to detect vehicle signal. The magneto-resistive

M. Jasmin, Assistant Professor, Department of Electronics and Communication Engineering, BIST, BIHER, Bharath Institute of Higher Education & Research, Selaiyur, Chennai. E-Mail: Jasmin.ece@gmail.com
S. Philomina, Assistant Professor, Department of Electronics and Communication Engineering, BIST, BIHER, Bharath Institute of Higher Education & Research, Selaiyur, Chennai.
G. Angelo Virgin, Assistant Professor, Department of Electronics and Communication Engineering, BIST, BIHER, Bharath Institute of Higher Education & Research, Selaiyur, Chennai.

sensor is costly and maintenance cost of the system will be more if the system fails. This system is lack of emergence measures and proposed system will able to solve this problem effectively. The author design will provide good result for vehicle detection where ARM-based video processor not only deals with the video processing algorithms but again the cost of system design will be more Innovative Systems Design and Engineering because camera will be required to capture video.

## II. PROBLEM DESCRIPTION

The problems of typical conventional traffic light Controller are mentioned below:

*Heavy Traffic Jams:*
With increasing number of vehicles on road, heavy traffic congestion has substantially increased in major cities. This happened usually at the main junctions commonly in the morning, before office hour and in the evening, after office hours. The main effect of this matter is increased time wasting of the people on the road. The solution for this problem is by developing the program which different setting delays for different junctions.

The delay for junctionsthat have high volume of traffic should be setting longer than the delay for the junction that has low of traffic.At certain junctions, sometimes even if there is no traffic, people have to wait. Because the traffic light remains red for the preset time period, the road users should wait until the light turn to green. If they run the red light, they have to pay fine. The solution of this problem is by developing a system which detects traffic flow on each road and set timings of signals accordingly. Moreover, synchronization of traffic signals in adjacent junctions is also necessary Usually, during traffic jam, the emergency vehicle, such as ambulance, fire brigade and police will be stuck especially at the traffic light junction. This is because the road users waiting for the traffic light turn to green. This is very critical problem because it can cause the emergency case become complicated and involving life *When more than one emergency car came:* The proposed ITSC system solves this problem in most effective way. When more than one emergency car came then most of the system fails. They give green signal to both which lead to traffic conjunction problem and also leads to accidents. In system, this problem solve by giving red signal to all traffic. So only emergency cars will pass the signal for particular time period.
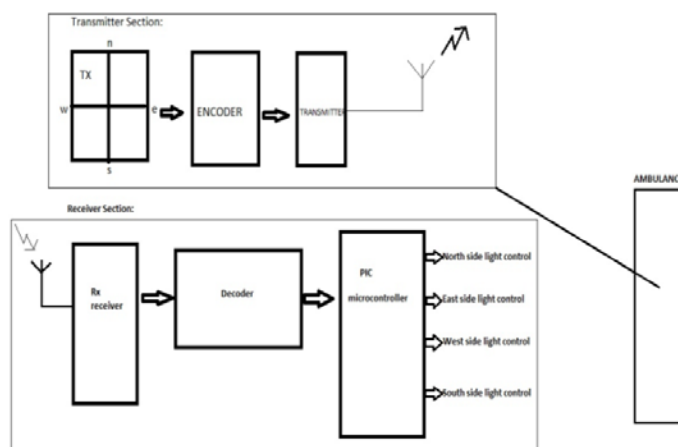


Fig 1: Block diagram of proposed system

## III. PROPOSED METHOD AND DESIGN

The proposed system consist of high-performance, low power AVR-32 microcontroller with 32kbytes of in-system programmable flash memory and in-built 8-channel ADC which required to process the IR input from sensor network. So complexity of system reduces as no additional ADC required When single emergency car comes on the signal and no. of vehicles will be available in front of the emergency vehicle. In this situation, IR sensor network detect the emergency car and then open divider gate to pass the car. As the signal. When two emergency cars come on the signal and no. of vehicles will be available in front of the emergency vehicle. In this situation, IR sensor network detect the emergency cars and then open divider gate to pass the cars. Arrows will indicate the possible direction. The sensor network is used to open and close the divider gate when emergency vehicles pass through gate. The proposed ITSC system combines the advantages of hardware and software and we can easily control the traffic system through central computer system vehicles, so no possibility of accident.
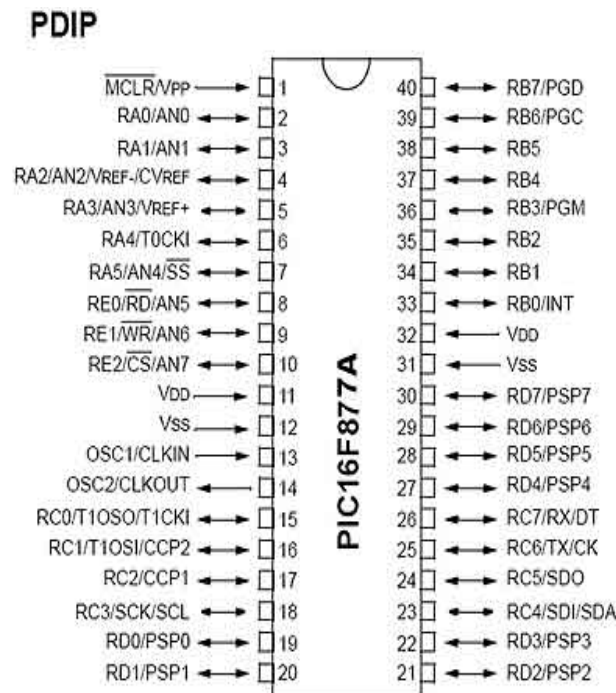


Fig 2.Proposed Design

The emergency vehicle detection system based on wireless IR sensor network is shown below to solve two basic problem related to emergency case:

Case1: When single emergency car comes on the signal and no. of vehicles will be available in front of the emergency vehicle. In this situation, IR sensor network detect the emergency car and then open divider gate to pass the car. As the signal will be red for other vehicles, so no possibility of accident.

Case 2: When two emergency cars come on the signal and no. of vehicles will be available in front of the emergency vehicle. In this situation, IR sensor network detect the emergency cars and then open divider gate to pass the cars.

Arrows will indicate the possible direction. The sensor network is used to open and close the divider gate when emergency vehicles pass through gate.

The proposed ITSC system combines the advantages of hardware and software and we can easily control the traffic system through central computer system.

## IV. EXPERIMENT ANALYSES

The system consist of AVR-32 microcontroller with inbuilt 8-channel ADC to receive IR-input from IR-transmitter which is embedded in the emergence vehicle. The 8-IR sensors are used to detect the emergence vehicle and open the divider gate to pass emergence car and then immediately closed the gate. This system used the genetic algorithm to find the traffic flow information at signalized intersection using previous data.

Genetic algorithm calculates the green light time for signal depending on the three factor's demands, densities, and flow.

The formula to calculate the green light time is given below:

$$\text{Total time} = (\text{Demands}) + (\text{Densities}) + (\text{flows})$$

Where,
Demands- Past dada of signalized intersection
Densities- No. Of present vehicle on the signal after red signal
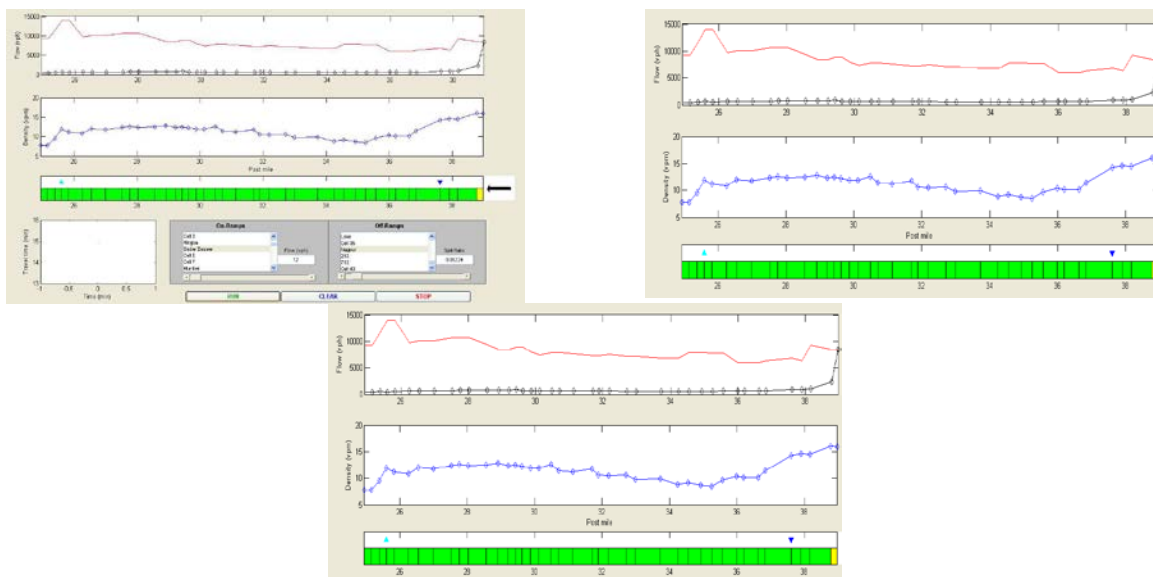Flows- Approximate no. Of vehicle comes from previous signal.



Fig 3.Waveform of density and flow.

## V. CONCLUSIONS AND FUTURE WORK:

In this paper, an evolutionary approach to estimate the traffic volumes of road networks has been proposed, in which real time traffic information is not provided. Genetic algorithm was used to estimate the unknown traffic volumes for such road section whose traffic information not available. Present work considered a simple road sections under static environments.

In future work, we will use real dynamic road section to estimate the unknown traffic volumes and apply to realtraffic. When more than one emergency car came then most of the system fails. They give green signal to both which lead to traffic conjunction problem and also leads to accidents. In system, this problem solve by giving red signal to all traffic and only emergency cars will pass the signal for particular time period.

## REFERENCES

[1]     Udayakumar R., Khanaa V., Saravanan T., Saritha G., Retinal image analysis using curvelet transform and multistructure elements morphology by reconstruction, Middle - East Journal of Scientific Research, V-16, I-12, PP:1781-1785, 2013.

[2]     Karthik B., Kiran Kumar T.V.U., EMI developed test methodologies for short duration noises, Indian Journal of Science and Technology, V-6, I-SUPPL5, PP:4615-4619, 2013.

[3]     Bomila R., Srinivasan S., Gunasekaran S., Manikandan A., Enhanced photocatalytic degradation of methylene blue dye, opto-magnetic and antibacterial behaviour of pure and la-doped ZnO nanoparticles, Journal of Superconductivity and Novel Magnetism, V-31, I-3, PP:855-864, 2018.

[4]     Manikandan A., Mani M.P., Jaganathan S.K., Rajasekar R., Jagannath M., Formation of functional nanofibrous electrospun polyurethane and murivenna oil with improved haemocompatibility for wound healing, Polymer Testing, V-61, PP:106-113, 2017.

[5]     Saravanan T., Sundar Raj M., Gopalakrishnan K., Comparative performance evaluation of some fuzzy and classical edge operators, Middle - East Journal of Scientific Research, V-20, I-12, PP:2633-2633, 2014.

[6]     Karthik B., Kiran Kumar T.V.U., Authentication verification and remote digital signing based on embedded arm (LPC2378) platform, Middle - East Journal of Scientific Research, V-20, I-12, PP:2341-2345, 2014.

[7]     Gopalakrishnan K., Sundar Raj M., Saravanan T., Multilevel inverter topologies for high-power applications, Middle - East Journal of Scientific Research, V-20, I-12, PP:1950-1956, 2014.

[8]     Sakthipriya N., An effective method for crop monitoring using wireless sensor network, Middle - East Journal of Scientific Research, V-20, I-9, PP:1127-1132, 2014.

[9]     Vijayaragavan S.P., Karthik B., Kiran Kumar T.V.U., Effective routing technique based on decision logic for open faults in fpgas interconnects, Middle - East Journal of Scientific Research, V-20, I-7, PP:808-811, 2014.

[10]    Kanniga E., Selvaramarathnam K., Sundararajan M., Kandigital bike operating system, Middle - East Journal of Scientific Research, V-20, I-6, PP:685-688, 2014.

[11]    Sundararajan M., Optical instrument for correlative analysis of human ECG and breathing signal, International Journal of Biomedical Engineering and Technology, V-6, I-4, PP:350-362, 2011.

[12]    Khanaa V., Thooyamani K.P., Saravanan T., Simulation of an all optical full adder using optical switch, Indian Journal of Science and Technology, V-6, I-SUPPL.6, PP:4733-4736, 2013.

[13]    Slimani Y., Baykal A., Amir M., Tashkandi N., Güngüneş H., Guner S., El Sayed H.S., Aldakheel F., Saleh T.A., Manikandan A., Substitution effect of Cr 3+ on hyperfine interactions, magnetic and optical properties of Sr-hexaferrites, Ceramics International, V-44, I-13, PP:15995-16004, 2018.

[14]    Suguna S., Shankar S., Jaganathan S.K., Manikandan A., Novel Synthesis of Spinel Mn x Co 1−x Al 2 O 4 (x = 0.0 to 1.0) Nanocatalysts: Effect of Mn 2+ Doping on Structural, Morphological, and Opto-Magnetic Properties, Journal of Superconductivity and Novel Magnetism, V-30, I-3, PP:691-699, 2017.

[15]    Mathubala G., Manikandan A., Arul Antony S., Ramar P., Enhanced photocatalytic activity of spinel CuxMn1-xFe2O4 nanocatalysts for the degradation of methylene blue dye and opto-magnetic properties, Nanoscience and Nanotechnology Letters, V-8, I-5, PP:375-381, 2016.

[16]    Kumaravel A., Dutta P., Application of Pca for context selection for collaborative filtering, Middle - East Journal of Scientific Research, V-20, I-1, PP:88-93, 2014.

[17]    Krishnamoorthy P., Jayalakshmi T., Preparation, characterization and synthesis of silver nanoparticles by using phyllanthusniruri for the antimicrobial activity and cytotoxic effects, Journal of Chemical and Pharmaceutical Research, V-4, I-11, PP:4783-4794, 2012.

[18]    Amir M., Gungunes H., Slimani Y., Tashkandi N., El Sayed H.S., Aldakheel F., Sertkol M., Sozeri H., Manikandan A., Ercan I., Baykal A., Mössbauer Studies and Magnetic Properties of Cubic CuFe 2 O 4 Nanoparticles, Journal of Superconductivity and Novel Magnetism, V-32, I-3, PP:557-564, 2019.

[19]    Raj M.S., Saravanan T., Srinivasan V., A modified direct torque control of induction motor using space vector modulation technique, Middle - East Journal of Scientific Research, V-20, I-11, PP:1572-1574, 2014.

[20]     Khanaa V., Thooyamani K.P., Using triangular shaped stepped impedance resonators design of compact microstrip quad-band, Middle - East Journal of Scientific Research, V-18, I-12, PP:1842-1844, 2013.

[21]     Asiri S., Sertkol M., Güngüneş H., Amir M., Manikandan A., Ercan I., Baykal A., The Temperature Effect on Magnetic Properties of NiFe 2 O 4 Nanoparticles, Journal of Inorganic and Organometallic Polymers and Materials, V-28, I-4, PP:1587-1597, 2018.Thaya R., Malaikozhundan B., Vijayakumar S., Sivakamavalli J., Jeyasekar R., Shanthi S., Vaseeharan B., Ramasamy P., Sonawane A., Chitosan coated Ag/ZnO nanocomposite and their antibiofilm, antifungal and cytotoxic effects on murine macrophages, Microbial Pathogenesis, V-100, PP:124-132, 2016.

[22]     Kolanthai E., Ganesan K., Epple M., Kalkura S.N., Synthesis of nanosized hydroxyapatite/agarose powders for bone filler and drug delivery application, Materials Today Communications, V-8, PP:31-40, 2016.

[23]     Thilagavathi P., Manikandan A., Sujatha S., Jaganathan S.K., Antony S.A., Sol-gel synthesis and characterization studies of NiMoO 4 nanostructures for photocatalytic degradation of methylene blue dye, Nanoscience and Nanotechnology Letters, V-8, I-5, PP:438-443, 2016.

[24]     Thamotharan C., Prabhakar S., Vanangamudi S., Anbazhagan R., Anti-lock braking system in two wheelers, Middle - East Journal of Scientific Research, V-20, I-12, PP:2274-2278, 2014.

[25]     Thamotharan C., Prabhakar S., Vanangamudi S., Anbazhagan R., Coomarasamy C., Hydraulic rear drum brake system in two wheeler, Middle - East Journal of Scientific Research, V-20, I-12, PP:1826-1833, 2014.

[26]     Vanangamudi S., Prabhakar S., Thamotharan C., Anbazhagan R., Collision control system in cars, Middle - East Journal of Scientific Research, V-20, I-12, PP:1799-1809, 2014.

[27]     Vanangamudi S., Prabhakar S., Thamotharan C., Anbazhagan R., Drive shaft mechanism in motor cycle, Middle - East Journal of Scientific Research, V-20, I-12, PP:1810-1815, 2014.

[28]     Anbazhagan R., Prabhakar S., Vanangamudi S., Thamotharan C., Electromagnetic engine, Middle - East Journal of Scientific Research, V-20, I-3, PP:385-387, 2014.

[29]     Kalaiselvi V.S., Prabhu K., Ramesh M., Venkatesan V., The association of serum osteocalcin with the bone mineral density in post menopausal women, Journal of Clinical and Diagnostic Research, V-7, I-5, PP:814-816, 2013.

[30]     Kalaiselvi V.S., Saikumar P., Prabhu K., Prashanth Krishna G., The anti Mullerian hormone-a novel marker for assessing the ovarian reserve in women with regular menstrual cycles, Journal of Clinical and Diagnostic Research, V-6, I-10, PP:1636-1639, 2012.

[31]     Thanigai Arul K., Manikandan E., Ladchumananandasivam R., Maaza M., Novel polyvinyl alcohol polymer based nanostructure with ferrites co-doped with nickel and cobalt ions for magneto-sensor application, Polymer International, V-65, I-12, PP:1482-1485, 2016.

[32]     Das M.P., Kumar S., An approach to low-density polyethylene biodegradation by Bacillus amyloliquefaciens, 3 Biotech, V-5, I-1, PP:81-86, 2015.

[33]     Vanangamudi S., Prabhakar S., Thamotharan C., Anbazhagan R., Turbo charger in two wheeler engine, Middle - East Journal of Scientific Research, V-20, I-12, PP:1841-1847, 2014.

[34]     Vanangamudi S., Prabhakar S., Thamotharan C., Anbazhagan R., Design and calculation with fabrication of an aero hydraulwicclutch, Middle - East Journal of Scientific Research, V-20, I-12, PP:1796-1798, 2014.

[35]     Saravanan T., Raj M.S., Gopalakrishnan K., VLSI based 1-D ICT processor for image coding, Middle - East Journal of Scientific Research, V-20, I-11, PP:1511-1516, 2014.

[36]     Ajona M., Kaviya B., An environmental friendly self-healing microbial concrete, International Journal of Applied Engineering Research, V-9, I-22, PP:5457-5462, 2014.

[37]     Hemalatha R., Anbuselvi S., Physicohemical constituents of pineapple pulp and waste, Journal of Chemical and Pharmaceutical Research, V-5, I-2, PP:240-242, 2013.

[38]     Langeswaran K., Revathy R., Kumar S.G., Vijayaprakash S., Balasubramanian M.P., Kaempferol ameliorates aflatoxin B1 (AFB 1 ) induced hepatocellular carcinoma through modifying metabolizing enzymes, membrane bound ATPases and mitochondrial TCA cycle enzymes, Asian Pacific Journal of Tropical Biomedicine, V-2, I-3 SUPPL., PP:S1653-S1659, 2012.

[39]     Masthan K.M.K., Aravindha Babu N., Dash K.C., Elumalai M., Advanced diagnostic aids in oral cancer, Asian Pacific Journal of Cancer Prevention, V-13, I-8, PP:3573-3576, 2012.

[40]     Asiri S., Güner S., Demir A., Yildiz A., Manikandan A., Baykal A., Synthesis and Magnetic Characterization of Cu Substituted Barium Hexaferrites, Journal of Inorganic and Organometallic Polymers and Materials, V-28, I-3, PP:1065-1071, 2018.

[41]     Yan, S., Gao, M., Qi, B., & Jiang, X. (2014). Blast Wave Propagation and Casualty Distribution Evaluation in the Subway Station Subjected to Internal Blast Loading. *The SIJ Transactions on Advances in Space Research & Earth Exploration, 2*(1), 6-11.

[42] Geetha, K., Preethy, C., and Thenmozhi, P. (2017). Simulation Model of Solar Induction Motor Drive System Using SVPWM Technique. *Bonfring International Journal of Power Systems and Integrated Circuits, 7*(1), 1-6.

[43] Archana Lal, P. (2014). A Neural Network Based Analysis of Altered Fingerprints. International Scientific *Journal on Science Engineering & Technology*, *17*(9), 863-868.

[44] AlaguPandian, P., Sakthivel, K., Sheik Alavudeen, K., & R.LakshmiPriya. R. (2017). A Low Power Efficient Design of Full Adder Using Transmission Gate. *International Journal of Communication and Computer Technologies, 5*(1), 1-5.

[45] SakthiPriya V., & Vijayan, M., (2017). Automatic Street Light Control System Using WSN Based on Vehicle Movement and Atmospheric Condition. *International Journal of Communication and Computer Technologies, 5*(1), 6-11.

[46] Sowmiya, E., Dr.Chandrasekaran, V., & Sathya, T. (2017). Sensor Node Failure Detection Using Round Trip Delay in Wireless Sensor Network. *International Journal of Communication and Computer Technologies, 5*(1), 12-16.

[47] Senthil Kumar, B., & Dr.Srivatsa, S.K.(2014). Opportunistic Channel Access Algorithm Based on Hidden Semi Markov Model for Cognitive Radio Networks. *Bonfring International Journal of Research in Communication Engineering, 4*(2), 17-21.

[48] Angeline, D.M.D., (2013). Association Rule Generation for Student Performance Analysis using Apriori Algorithm. *The SIJ Transactions on Advances in Space Research & Earth Exploration, 1*(1), 16-20.

[49] Preethi, L., & Dr.Periyasamy, S. (2018). Enhanced Scalable Learning for Identifying and Ranking for Big Data Using Social Media Factors. *Bonfring International Journal of Software Engineering and Soft Computing, 8*(1), 31-35.

[50] Saikong, W., & Kulworawanichpong, T. (2014).Voltage Stability Assessment in DC Railways with Minimum Headway Consideration. *The SIJ Transactions on Computer Networks & Communication Engineering (CNCE), 2*(4), 1-6.