International Journal For Technological Research In Engineering
Volume 4, Issue 5, January-2017 *ISSN (Online): 2347 - 4718*

TECHNOLOGY TO AVOID ACCIDENTS IN OVERBURDENED HIGHWAYS

Dr. S.R.Boselin Prabhu[1], M.Pradeep[2], Dr. E.Gajendran[3]
[1,2]Assistant Professor, [1,2]Department of Electronics and Communication Engineering,
[1]SVS College of Engineering, Coimbatore, India, [2]Sasurie Academy of Engineering, Coimbatore,
[3]Professor, Department of Information Technology, St.Martin‟s Engineering College, Hyderabad.

Abstract: Techniques to mitigate blasting accidents are discussed. These include proper blast design, driller-blaster communication, inspection prior to loading and firing the blast, removing employees from the blast area, controlling access to the blast area, and using a blasting shelter. An experienced driller could detect potential problem areas such as voids, mud seams, incompetent rocks, and other irregularities by observing the progress of drilling. The drill log should include the details of any unusual or exceptional circumstances noticed during drilling. A blaster may need to alter the loading configuration to alleviate potential problems. Highway travel is the lifeblood of modern industrial nations. The larger roads are sorely over burdened: around the major cities, heavy usage slows most peak-hour travel on freeways to less than 60 kilometers per hour. In all excessive traffic causes more than five billion hours delay every year; it wastes countless gallons of fuel and needless multiplies exhaust emission. The main goal of this paper is to make the experience of driving less burdensome and accident less, especially on long trips. This can be achieved by making the highway itself part of the driving experience and integrating roadside technologies that would allow the overburdened highway system to be used more efficiently. The automobile will have automatic throttle, braking and steering control. Here is a system to host these cars consist of roadside sensors that obtain information about current traffic condition and rely them to receives in the automobile on the road. The automobile can be grouped together at highway speeds, 65-70MPH, no more than a few feet apart, which make better use of the available roadways. In this manner, the traffic system and the automobiles work together to bring passengers safely and quickly to their destination.
Keywords: Integrating roadside technologies, overburdened highway system, automatic throttle, braking control, steering control.

I. INTRODUCTION

On July 5, 1990, a blaster standing on the top of a 200-ft high wall about 505 ft. from the blast site was fatally injured by fly rock [MSHA, 1990a]. The high wall could not shield him from fly rock. The employee suffered a massive head injury. The flyrock originated from a toe blast. The toe round consisted of 23 holes ranging in depth from 3 to 5 ft. The holes were loaded with 2-1/2-in diameter packaged explosive product. Explosive energy takes the path of least resistance and blasting of small diameter angled toe holes requires special attention. The blaster failed to perceive that flyrock could strike him on the top of a high wall. This accident could have been prevented by using a proper blasting shelter or "matting" the holes. On October 12, 1990, a visitor sustained severe injuries and a miner was fatally injured by flyrock in a surface silica flux mine [MSHA, 1990b]. The mining company used a blasting contractor for loading and firing the shots. The visitor and the miner were about 150 ft. from the edge of the blast. Upon firing the shot, the miner was fatally struck on the back of his head. This accident underscores the importance of identifying a proper blast distance and clearing the blast area. On February 1, 1992, a blaster was fatally injured in a surface coal mine [MSHA, 1992]. The blaster positioned himself under a Ford 9000, 2-1/2-ton truck while firing the shot. Flyrock traveled 750 ft. and fatally injured the blaster. This accident illustrates the importance of being in a protected location or using a proper blasting shelter. On April 25, 1994, a driller/loader was fatally injured by flyrock in a surface coal mine [MSHA, 1994]. The blaster notified the superintendent of an impending blast and cleared other employees from the pit area. The victim and another employee working under the direction of the blaster were about 236 ft. from the nearest blast hole. Upon firing the blast, the driller/loader was fatally injured by flyrock. This accident emphasizes the significance of being in a protected location or using a proper blasting shelter for employees whose presence is required in the blast area. On December 21, 1999, an equipment operator in a pickup truck was guarding an access road to the blast site [MSHA, 1999]. The pickup truck was about 800 ft. from the blast site. Flyrock entered the cab through the windshield and fatally struck the employee. The high wall face was about 50 ft. high and the depth of holes ranged between 49 and 54 ft. The blast round consisted of 22 holes drilled on a 16- by 16-ft pattern. Some of the holes were angled up to 25º toward the high wall to compensate for irregularities in the high wall face. At least one of the holes blew out causing flyrock.

This incident underscores the importance of being in a protected location. When the internal combustion engine, and later the automobile, was first introduced to the public, no one could have seen the extent to which they would influence daily life. Today, with information age in full swing, it is still hard to believe the way that computers and other information technology have permeated people's lives [1] and seems only natural to expect information technologies to enhance the way we view automobiles. People now take for granted automotive systems like emission control and fuel injection. In fact, many people do not realize many systems inside their automobile are already monitored and controlled by computers. Fuel delivery, ignition, emission, air-conditioning, and automatic transmission system are example of the systems used daily by a car that are computer controlled or assisted. An articulation of automated car is shown in figure 1.Now in the information age, people have come to realize on the other driver assistance technologies, such as mobile phones and in-vehicle navigation systems. The goal of these technologies is to make the experience of driving fewer burdens, especially on long trip. Even when cars were still young, future began to think about vehicles that could dive themselves without human help. Perhaps the best known of these conjectures was the "General Motor Futurama" the hit of the 1939 New York World's Fair [2].

Figure 1: An articulation of automated car

During the following decades interest in automated vehicles rose and fell several times. Now at the start of the new century, it's worth taking a fresh look at this concept and asking how automation might change transportation and the quality of our lives. Automating the process of driving is a complex endeavor. Advancements in information technology of the past decade have contributed greatly, and research specifically devoted to the design of automated highway system has many specific contributions. These progresses make it possible for us to formulate operational concepts and prove out the technologies that can implement them.

II. AN AUTOMATED DRIVE

We can now readily visualize your trip on an automated highway system. Imagine, leaving work at the end of the day and needing to drive only as far as the nearest on-ramp to the local automated highway. At on-ramp you press a button on your dashboard to select the off-ramp close to your home and then relax as your car's electronic systems, in cooperation with roadside electronics and similar systems on other cars, guide your car smoothly, safely and effortlessly towards your destination [3]. En-route you save time by maintaining full speed even at rush-hour traffic volumes. At the end of the off-ramp you resume normal control and drive the remaining distance to your home, better rested and less stressed than if you had driven the entire way. The same capability can also be used over longer distances, e.g. for family vacations that leave everybody, including the "DRIVER" relaxed and well-rested even after a lengthy trip in adverse weather. Although many different technical developments are necessary to turn this image into reality, none requires exotic technologies, and all can be based on systems and components that are already being actively developed in the international motor vehicle industry. These could be viewed as replacements for the diverse functions that drives perform every day: observing the road, observing the preceding vehicles, steering, acceleration, braking, and deciding when and where to change course.

III. AN OBSERVATION OF THE ROAD

Cheap permanent magnets are buried at four-foot intervals along the lane centerline and detected by magnetometers mounted under the vehicle's bumpers. The magnetic-field measurements are decoded to determine the lateral position and height of each bumper at accuracies of less than a centimeter. In addition the magnet's orientations (either North Pole or South Pole up) represent a binary code [4] (either 0 or 1), and indicate precise milepost location along the road geometry features such as curvature and grade. The software in the vehicle's control computer uses this information to determine the absolute position of the vehicle, as well as to anticipate upcoming changes in the roadway [6-15].

Figure 2: National automated highway consortium

Other researchers have used computer vision system to observe the road. These are vulnerable to weather problems and provide less accurate measurements, but they do not require special roadway installations, other than well-maintained lane markings. Both automated highway lanes and intelligent vehicles will require special sensors, controllers and communications devices to coordinate traffic flow. A national automated highway consortium is depicted in figure 2.

IV. AN OBSERVATION OF PRECEDING VEHICLES

The distance and closing rates to preceding vehicles can be measured by millimeter-wave radar or a laser rangefinder. Both technologies [5] have already been implemented in commercially available adaptive cruise control system in Japan and Europe. The laser systems are currently less expensive, but the radar systems are more effective at detecting dirty vehicles and operating in adverse weather conditions. As production volumes increase and unit costs decrease, the radars are likely to find increasing favour.

International Journal For Technological Research In Engineering
Volume 4, Issue 5, January-2017 *ISSN (Online): 2347 - 4718*

V. ACCELERATING AND BRAKING

The equivalents of these driver muscle functions are electromechanical actuators installed in the automated vehicle. They receive electronic commands from the onboard control computer and then apply the appropriate steering angle, throttle angle, and brake pressure by means of small electric motors. A sketch of automated communication is given in figure 3. Early versions of these actuators are already being introduced into production vehicles, where they receive their commands directly from the driver's inputs to the steering wheel and pedals. These decisions are being made for reasons largely unrelated to automation. Rather they are associated with reduced energy consumption, simplification of vehicle design, enhanced case of vehicle assembly, improved ability to adjust performance to match driver preferences, and cost savings compared to traditional direct mechanical control devices [16-24].

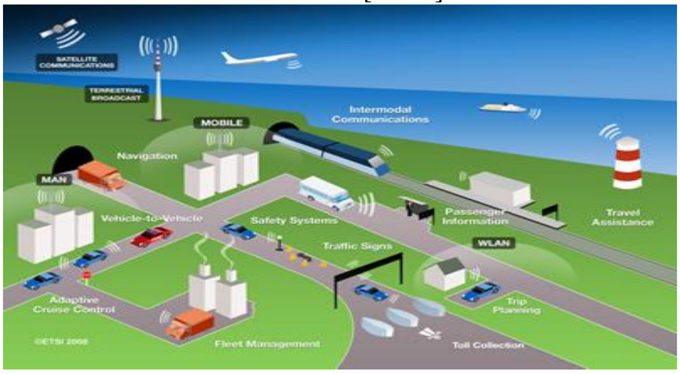

Figure 3: A sketch of automated communication

Computers in the vehicles and those at the roadside have different functions. Roadside computers are better suited for traffic management, setting the target speed for each segment and lane of roadway, and allocating vehicles to different lanes of a multilane automated facility. The aim is to maintain balanced flow among the lanes and to avoid obstacles or incidents that might block a lane. The vehicle's onboard computers are better suited to handling decisions about exactly when and where to change lanes to avoid interference with other vehicles.

Some additional functions have no direct counterpart in today's driving. Most important, wireless communication technology makes it counterparts in adjoining vehicles. This capability enables vehicles to follow each other with high accuracy and safety, even at very close spacing, and to negotiate cooperative maneuvers such as lane changes to increase system efficiency and safety. Any failure on a vehicle can be instantly known to its neighbors, so that they can respond appropriately to avoid possible collisions.

In addition there should be electronic "check -in " and "check-out " stations at the entry and exit points of the automated lane, somewhat analogous to the toll booths on close where you a ticket at the entrance and then pay a toll at the exit ,based on how far you travel on the road at checking station ,wireless communication between vehicles and road side would verify that the vehicle is in proper operating condition prior to its entry to the automated line .similarly, the check out system would seek assurance of the drivers readiness to resume control at the exit the traffic management system for an automated highway would also have broader scope than today's traffic systems, because it would select an optimal route for every vehicle in the system ,continuously balancing travel demand the system capacity ,and directing vehicles to follow those routes precisely [25-29].

Most of the functions have already been implemented and tested in experimental vehicles. All except for check-in, check-out and traffic management were implemented in the platoon-scenario demonstration vehicles of demo'97 .a single116 megahertz Pentium computer handled all the necessary in vehicle computation for sensing , control and communications .

VI. TECHNICAL ISSUES

The technical challenges that remain to be mastered to be involve software safety, fault detection, a malfunction management. The state of the art of soft ware design not yet sufficiently advanced to support the development of soft ware that can be guaranteed to perform correctly in safety–critical application has complex road vehicle automation excellent performance of automated vehicle control system has been proven under normal operating conditions, in the absence of failures. Elementary fault detection and mall function management systems have already being implemented to address the most frequently encounter fault conditions, for use by well trained test drivers. However, commercially implemented will need to address all realistic scenarios and provide safe responses even when the driver is a completely untrained member of the general public. Significant efforts are still needed to develop system hardware and software designs that can satisfy these requirements.

VII. NON TECHNICAL CONSTRAINTS

The non technical challenges involve issues of liability, costs, and perception. Automated control of vehicles shifts liability for most crashes from the individual driver (and his or her insurance company) to the designer, developer and vendor of the vehicle and roadway control systems. Provided the system is indeed safer than today's driver-vehicle highway system, overall liability exposure should be reduced. But its costs will be shifted from automobile insurance premiums to the purchase or lease price of the automated vehicle and toll for use of the automated highway facility. All new technologies tend to be costly when they become available in small quantities, then their costs decline as production volumes increase and the technologies nature. We should expect vehicle automation technologies to follow the same patter. They may initially be economically viable only for heavy vehicles (transit buses, commercial trucks) and high-end passenger cars. However, it should not take long for the costs to become affordable to a wide range of vehicle owners and operators, especially with many of the enabling technologies already being commercialized for volume production today .It is important to recognize that automated vehicles are already carrying millions of passengers every day. Most major airports have automated people movers that transfer passengers among terminal buildings. Urban transit lines in Paris, London, Vancouver, Lyon and Lillie, among others, are operating with completely automated, driverless vehicles; some have been doing so for more than a decade. Modern commercial aircraft operate on autopilot for much of the time, and they also land under automatic control at suitably equipped airports on a regular basis. Given all of this experience in implementing safety-critical automated transportation systems, it is not such a large leap to develop road vehicles that can operate under automatic control on their own segregated and protected lane. That should be a realistic goal for the next decade. The transportation system will thus gain substantial benefits from the revolution in information technology.

VIII. INFRARED PROXIMITY DETECTOR

The IR proximity detector uses same technology found in a TV remote control device. The detector sends out modulated infra-red light, and looks for reflected light coming back. When enough light is received back to trigger the detector circuit, the circuit produces a high on the output line. Light in the form of a continuous string of bursts of modulated square waves. Bursts alternate between left and right LEDs. A microprocessor generates the bursts, and correlates the receiver output to burst. The IRPD had used Panasonic Pna4602M IR sensor coupled with two IR LEDs to detect obstacles. The Panasonic module contains integrated amplifiers, filters and limiter. The detector responds to a modulated carrier to help eliminate background noise associated with sunlight and certain lighting fixtures. The LEDs are modulated by an adjustable free running oscillator. The sensitivity of the sensor is controlled by altering the drive current to LEDs. The microcontroller alternatively enables the LEDs end checks for a reflection. As provided from the microcontroller one for enabling the left IR LED the second for enabling the righter LED. A third analog output from the IRPDKIT is connected to an analog-to-digital convertor. The detector is an infrared reflective sensor that can be attached to the front of the car to follow a white line on a black background, or vice versa. There are three reflective sensors, which are made from one piece of infrared LED and photo detector that are directed at the surface bellow the vehicle. Each of the sensors looks reflected IR light. When one of the sensors is positioned over dark or black surface its output will be high. The line detector works effectively when thickness ranged between “1/4 to 3/4” the track can be white tape on a black background or black tape on a white background. The sensor can be at a maximum height of .5 inches above the ground. The three IR-Detector pairs are depicted on the right of the circuit diagram. The base of each of the transistors is passed through an inverter. The lines from the inverter are passed to microcontroller and to the LEDS indicating the position of the detector on the road. As the emitted light from the IR LED is reflected from the road back to the transistor the current starts flowing through the emitter making the base low. The base is connected to the inverter which causes the line to go at its output. Since the output lines are also connected to the LEDs the corresponding LED glows when the particular output line is high.

IX. STEERING DEVICE

A servo comprises of control, a set of gears, a potentiometer is connected to the motor via gear set a control signal gives the motor a position to rotate to and the motor starts to turn. The potentiometer rotates with motor and as it does so it does so its resistance changes. The control circuit monitors its resistance, as soon as its reaches its appropriate values the motor stop and the servo is in correct position. A servo is a classic example of a closed loop feedback system. The potentiometer is coupled to the output gear. Its resistance is proportional to the position of the servo’s output shaft (0 to 180 degrees)

X. CONCLUSION AND FUTURE WORK

National Highway Traffic and Safety Administration is an ongoing research on collision avoidance and driver/vehicle interfaces. AHS was a strong public/private partnership with the goal to build a prototype system. There are many things that can be done in the vehicle, but if we do some of them on the roadway it will be more efficient and possibly cheaper. Preliminary estimates show that rear-end, lane-change, and roadway-departure crash-avoidance systems have the potential to reduce motor-vehicle crashes by one-sixth or about 1.2 million crashes a year. Such systems may take the form of warning drivers, recommending control actions, and introducing temporary or partial automated control in hazardous situations. AHS described in this paper is functional there is much room for improvement. More research is needed to determine if any dependencies exit that influence velocity of the vehicle maintaining proper following distance while following a path. Assuming such system is ever perfected, one would imagine it would tend to render the great tradition of the free-ranging car into something approaching mass –transit. Future works will be concentrated on developing a real-time hardware for this proposed system.

REFERENCES

[1]. M. A. Al-Mohammed, Onur Toker, Abdulkhalik Al-Harthy, “A 3-D Vision based Man-Machine Interface for Hand-Controlled Tele-Robot, “ Transactions on Industrial Electronics, vol. 52, pp.306-319, February 2005

[2]. R S Ramakrishna, chang wook Ahn, “A Genetic Algorithm for shortest path (sp) routing problem and the sizing of populations “Transactions and Evolutionary Computation, vol, 6,pp. 566-579,December 2002.

[3]. Ching-tang Hsieh, mu-Chun Su, Eugene Lai,” A segmentation method for continuous speech utilizing hybrid Neuro Fuzzy Network,” Journal of information science and engineeringpp.615-628, January 1999.

[4]. Emanuele Menegatti, Enzo Mumolo, Massimiliano

Nolichi, Enrico Pagello," a surveillance system based on audio and video sensory agents cooperating with a mobile robot," Italian national council of research, 2003.

[5]. Hamid Ali Abed Al-Asadi, "Temperature dependence of the lasing characteristics of vertical cavity surface emitting lasers," Engineering Journal of Technology University, Vol. 145, 1994.

[6]. Boselin Prabhu S.R. and Sophia S., "Environmental monitoring and greenhouse control by distributed sensor Network", International Journal of Advanced Networking and Applications, 5(5), 2014.

[7]. Boselin Prabhu S.R. and Sophia S., "Greenhouse control using wireless sensor network", Scholars Journal of Engineering and Technology, 2(4), 2014.

[8]. Hamid Ali Abed Al-Asadi, "Temperature dependence of the noise characteristics of Multiisection semiconductor lasers," Science Journal, vol. 7, No. 3, 2001.

[9]. Hamid Ali Abed Al-Asadi, "Linewidth characteristics of vertical cavity surface emitting lasers due to external optical feedback," Science Journal, vol. 8, 2001.

[10]. Boselin Prabhu S.R. and Sophia S., 'Modern cluster integration of advanced weapon system and wireless sensor based combat system', Scholars Journal of Engineering and Technology, 2(6A), 2014.

[11]. Boselin Prabhu S.R. and Sophia S., 'A review of efficient information delivery and clustering for drip irrigation management using WSN', International Journal of Computer Science and Business Informatics, 14(3), 2014.

[12]. Hamid Ali Abed Al-Asadi, "Linewidth characteristics of vertical cavity surface emitting lasers due to external optical feedback," Science Journal, vol. 8, 2002.

[13]. Hamid Ali Abed Al-Asadi, "Theoretical investigation of spectral linewidth properties of double fused 1.3 um MQW-VCA in reflection and transition modes," Tikrit Journal for Pure Science, vol. 8, No. 2, 2002.

[14]. Boselin Prabhu S.R. and Sophia S., 'Mobility assisted dynamic routing for mobile wireless sensor networks', International Journal of Advanced Information Technology, 3(3), 2013.

[15]. Boselin Prabhu S.R. and Sophia S., 'A review of energy efficient clustering algorithm for connecting wireless sensor network fields', International Journal of Engineering Research and Technology, 2(4), 2013.

[16]. Hamid Ali Abed Al-Asadi, "Vertical cavity amplifiers and its cavity length dependence the saturation power and quantum efficiency," Tikrit Journal of Pure Science, vol. 9, No. 2, 2003.

[17]. Hamid Ali Abed Al-Asadi, "Effects of pump recycling technique on stimulated Brillouin scattering threshold: A theoretical model," Optics. Express, Vol. 18, No. 21, pp. 22339-22347 Impact factor: 3.88, 2010.

[18]. Boselin Prabhu S.R. and Sophia S., 'Variable power energy efficient clustering for wireless sensor networks', Australian Journal of Basic and Applied Sciences, 7(7), 2013.

[19]. Boselin Prabhu S.R. and Sophia S., 'Capacity based clustering model for dense wireless sensor networks', International Journal of Computer Science and Business Informatics, 5(1), 2013.

[20]. Hamid Ali Abed Al-Asadi, "Brillouin Linewidth Characterization in Single Mode Large Effective Area Fiber through the Co-Pumped Technique," International Journal of Electronics, Computer and Communications Technologies (IJECCT), Vol. 1(1), pp. 16-20, 2010.

[21]. Boselin Prabhu S.R. and Sophia S., 'An integrated distributed clustering algorithm for dense WSNs', International Journal of Computer Science and Business Informatics, 8(1), 2013.

[22]. Boselin Prabhu S.R. and Sophia S., 'A research on decentralized clustering algorithms for dense wireless sensor networks', International Journal of Computer Applications, 57(20), 2012.

[23]. Hamid Ali Abed Al-Asadi, "Analytical study of nonlinear phase shift through stimulated Brillouin scattering in single mode fibre with pump power recycling technique,", Volume 13 Number 10, Journal of Optics. Impact factor: 1.99, 2011.

[24]. Hamid Ali Abed Al-Asadi , "Architectural Analysis of Multi-Agents Educational Model in Web-Learning Environments," Journal of Emerging Trends in Computing and Information Sciences, Vol. 3, No. 6, June 2012.

[25]. Boselin Prabhu S.R. and Sophia S., 'Hierarchical distributed clustering algorithm for energy efficient wireless sensor networks', International Journal of Research in Information Technology, 1(12), 2013.

[26]. Boselin Prabhu S.R. and Sophia S., 'Real-world applications of distributed clustering mechanism in dense wireless sensor networks', International Journal of Computing Communications and Networking, 2(4), 2013.

[27]. Haitao, Z, Shiwei, Z &Wenshao, B 2014, 'A clustering routing protocol for energy balance of wireless sensor network based on simulated annealing and genetic algorithm', International Journal of Hybrid Information Technology, vol. 7, no. 2, pp. 71-82.

[28]. Han, L 2010, 'LEACH-HPR: An energy efficient routing algorithm for heterogeneous WSN', Proceedings of the IEEE International Conference on Intelligent Computing and Intelligent Systems, pp. 507-511.

[29]. Y.linde, An Buzo, Gray," an algorithm for vector quantizer design"/IEEE transactions on communication, vol.28, pp.84-95, January 1980.

