# WORKERS' ALCOHOL DETECTION AND PREVENTION SYSTEM

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**Abstract**- Factories are industries of vital importance, and they operate with two main resources, machinery and manpower. When dealing with Machines, workers should work carefully as an error could lead to injury or loss of life and trade. The biggest industrial machine which operates with high power are critical because a small mistake upon those may lead to huge losses. In this paper an automatic system to detect alcohol ingesting of factory labourers and the engine shut down with a warning scheme is described.

Though this is a common problem in many factory areas no one seems to focus on it in order to prevent the problem that could occur when dealing with machines and lives right away. Humans are always doing silly things. But taking alcohol and doing some heavy stuff in their working areas could lead them to huge losses even more than people could ever imagine. So, in this research paper, how to take control of these things and to prevent workers from alcohol usage in their own working area has been summarized.

**Keywords**- Alcohol Detection and Prevention

## I. INTRODUCTION

So, when talking about alcohol addiction most of the grown human are alcohol addicts. According to 2015, the Nationwide Drug Use and Use Study (NSDUH), 86.4% of people over the age of 18, transferred that they had a drink at a certain time in their lives. But in here it does not directly focus on the addiction of alcohol and their negatives to a human body. In here our main focus is how the alcohol usage and those impacts directly influenced to the factory workers' lives and their misuse of tasks. Not only that, another main focus is to help the company owners to reduce the damages which could occur because of their working staff. So they will be able to reduce alcohol usage and by doing that they can reduce the damage and even increase the work performances so they could increase their brand name highly. Down here in the (figure 1) are some recent finding of alcohol addiction in our day to day world. So, you guys can clearly understand how much effect it kept on doing to a human. So, people could never say no to alcohol usage in the working area between human.

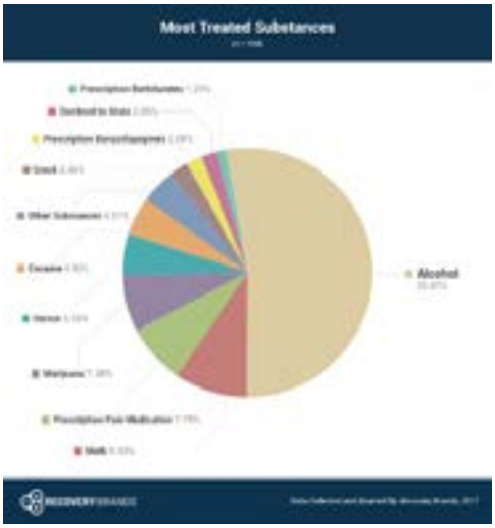


***Figure 1. Usage of alcohol in worldwide prior to other things***

As web applications are increasingly used to deliver though there are many systems and research papers has been

published regarding alcohol detection and prevention. 95% those are for the safety of the drivers who use alcohol. Their main goal is to prevent the accidents which occur because of ruthless driving while being drunk. Because so many systems were developed on driver's alcohol detection and prevention main focus was to touch a side which no one had ever touched earlier, in order to develop an alcohol detection and prevention system of workers.

Drinking of alcohol moves the psychological state of a person. Operating heavy machinery under the impact of alcohol, which can be led to self-injuries. So, in here, developers are going to set up the alcohol detection system at the front door where the workers enter. For the identified purpose, it is going to set it up right with the fingerprint or whatever the identification machine where workers use to mark their present to the working area. So, an MQ3 sensor is there in order to detect alcohol gas. Then uses a microcontroller-based circuit that contains of an alcohol sensor interfaced with it. Also, have a GSM modem and an LCD display. The whole scheme is powered by a 12V source. Alcohol sensor regularly runs in an uneven directions to check whether the worker is drunk. The alcohol direction sensor can intellect the level of alcohol and produce an output according to the alcohol that it felt.

The microcontroller interfaced to it reads the value and if it is found to be above the permissible range it goes into alerting mode. As soon as they enter the alarm mode, the microcontroller prevents the machine operated by the worker and displays the status of the alcohol alarm on the LCD screen. While on the exact same time, there will be a mobile alerting system for the manager of that area saying that this worker is drunk at this moment.

Now it was avoiding the disasters, the system now must submit a report to the applicable offices/owner of the industry, reporting on the incident sends. It will then inevitably send a text message via the GSM modem's official number to inform the situation so that the necessary actions can be taken from it. So basically, that is what will be going to get deployed by this system.

## II. LITERATURE REVIEW

### *A. Early Developments.*

The Alcohol prevention or detection systems has been dramatically increased and many research papers and review papers have been published. Some of them discussed the danger of the work environment, analyzing the security and the privacy risks of people.

Many research papers have been published all those years regarding alcohol detection and prevention system, but most of those are about the driver's alcohol detection and prevention state. Phani Sridhar et al (2014) has done a research based on Alcohol Recognition through Automatic Motorised Padlocking System: In Built (LDAMLS) has provided a specific concern about what alcohol can do to a man while driving etc. it's same like operating a machine. Operators got to stay focused on what they do. Here he clearly says what alcohol does to a human body and their mind. It could destroy human sensors somewhat than what people could ever imagine. So, he estate how dangerous it can be. Just like operating a machine, driving is also so similar to that task. Because both are machines and in order to take control of a machine first workers have to take control of their selves. But being drunk is a disaster, so worker could be in danger. That's why this alcohol detection and prevention system is going to developed for an office.

Not only that. M. K. Mishra et al (2013) has also done a research based on the Fuzzy Based Model for Accident Avoid System, which also a focus on controlling vehicle accidents in many ways. Here he has his focus on a different way, but towards the same target. Here he has industrialised fuzzy logic to make one paper, which operates the emanation of toxic gases, smokes inside the vehicle and dodge the drunken drive. Though the technique is dissimilar, it also uses sensors to notice smoke, air, and gas. Then the warning system go on to snooze to warning mode where many drivers could easily get their lives saved.

Mandalkar Rahul B et al (2015) has provided an experimental analysis of the same issue in some other ways and all are based on Liquor Detection and Accident Escaping Using Padlocking with Tracking. In here they clearly mentioned that lots of drunk drivers and accident were clearly not found by the police. So just imagine if the police can't catch drunk drivers how organizational owners can get a chance to catch their drunk workers who operating their machines. In that system, they proposed a system that would show the drunk drivers using alcohol sensor with the use of driver's breath, along with the driver's navigation. System also provide a GSM system that sends a message to the nearest police and provides the appropriate data for the driver's alcohol detection application. As they use alcohol sensors, the driver tries to detect an irregular heart disease, which is why they are drunk drivers.

### *B. Early Findings of alcohol usage.*

Conferring to a study done in the year 2016 around Canada and the USA (figure 2.0) exposes that nearly 50% of their occupied employees are addicted to liquor. So, you all can imagine the impact that can bring to their industry.

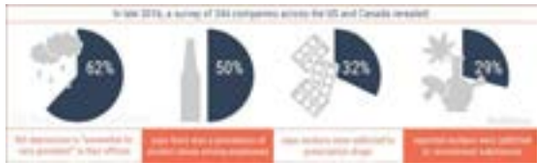


***Figure 2. Survey was done in the USA and Canada about company workers alcohol addiction***

Another survey was done by the Royal military in early 2016 and that state, even the most disciplinary places like Air force, Army, and Navy too addicted to the liquor so much (figure 3)

| | Percentage |
|---|---|
| Royal Navy (inc. Royal Marines) | 31.6 |
| Army | 19.9 |
| Royal Air Force | 24.6 |

***Figure 3. (Royal Military based alcohol addiction while working)***

Think of other office locations except these military places.

Not only that there is indication to show that the damage of skills begins with any important amount of liquor in the body.

For example, in a study on airline pilots who have to achieve routine tasks in a simulant in the case of 3 liquor tests; [5]

- Before the breakdown of any alcohol, 10% of them could not achieve all the processes properly;
- After attainment a blood alcohol attention of 100mg/dl, 89% could not achieve all the actions properly.
- Then 14 hours later, after all the liquor had left their schemes, 68% still could not achieve all the processes properly.

So, visualize the destruction that could bring to the organization by having a liquor in the body of their labours.

### *C. Existing Systems and Solutions.*

Vaishnavi. M et al (2014) has introduced an alcohol detection and prevention system for drivers. It offers the most advance in the alcohol sector, a device that notices a change in the content of alcohol fuel in the air. The sensor will analyse the amount of alcohol vapours and give the user a sign of the amount of alcohol present. This device is more commonly referred to as an analyser; since it analyses the liquor content of a person's breathing. When someone used it, anyone can obviously see that it is a useful method.

Not only that, like in earlier mentioned researches Phani Sridhar et al (2014) has done a research based on Liquor Detection through Automatic Motor Locking System and it senses the air and smell so the system could capture alcohol detection and it will automatically lock the car and block it.

Kousikan1 et al (2014) has done a research based on Automatic drunken drive prevention system by which is integrated with the steering wheel. Ethanol has an advanced capacity to absorb infrared radiation. Therefore, the system use an IR sensor that is connected to send an address. Source IR LED-894 IR Power Head from Sensor Continuous. If you stop the IR beam from the fascinating alcohol light, the relay path will be triggered. This link shackle has changed the system of gas origin and fails the supply of engine fuel.

Just like earlier mentioned M. K. Mishra et al (2013) has also done a research based on the Fuzzy Based Model for Accident Prevent System uses smoke and smell. Although they all look different they all merge as against one goal. It is to detect the alcohol of the human body and avoid incidents that may arise. Just as the office worker's Alcohol Detection and prevention

## III. METHODOLOGY

According to the above works of literature, it is easy to identify what are the pre-made systems for alcohol detection and prevention. Though every research seems to be about drunk driver's safety this is something different to all other paths. That is office worker's alcohol detection and prevention system. So, because of not having further details to carry on this research, there is a survey developed to collect more and more details. In that survey, there are 14 questions and sent it to people who have been working in the industrial area for some time.

So, in that survey, it has been declared as 75% male and 25% female. That is because lots of males are addicted to alcohol far than the females. But still the experiences of the females around the working area is much more important because they might have witnessed some of those incidents where their office mate get caught drunk while working. Then at the same time, there are some age limits like 16-25, 26-45 and 45 – more.

Then the next step is to check the number of people who take alcohol and who does not. But even someone who does not take alcohol must have some experience of it, while working because of their fellow mates who drink somehow. So, through this survey it was easy to collect the details, because the entire survey covered all those areas where workers drink or not, how much will it affect to the working area.

This survey covered all the areas like whether there is any alcohol detection system inside their office, if it is "what kind of system is it". Were there any incidents regarding alcohol usage in their office etc.

Likewise, in here there are many more important questions and it developed by using Google Form to collect the details, and it distributed between almost 50 people around the industry to capture their experiences and ideas. While at the same time there are sample two questions to collect their feedback regarding this system. So, they can give an idea of what this system should do and what are the things should be added etc.

So, the past week or so there were much more interesting ideas and feedback collected from various people and this is a simple method which used to collect information regarding this idea of developing alcohol detection and prevention system.

## IV. RESULTS

When talking about results first there were inclusion of 75% males and 25% females in this survey. Then the survey added some age limits and the interesting thing is that lots of them are young teenagers between 16-25. As a percentage, it's 77.3% and other remaining 22.7% are more than 26 and above. When responding to these questions, it asked whether they are alcohol users or not, interestingly more than half of them are alcohol users. So, you can imagine the impact of alcohol towards human these days. As a percentage, it's 56.8%. So even from that point onwards, it says that this research is a worthy one.

Then the interesting part is that the survey added a question, saying have you ever seeing any of your mates being drunk while working and the response is 40.9% (figure 4.0) so that means lots of them are using alcohol while working without knowing what they do.

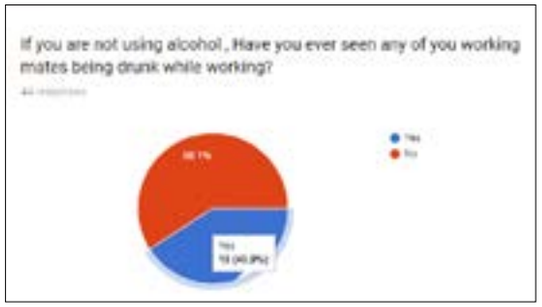


*Figure 4. Regarding alcohol users inside the office*

When asking whether they had witnessed any of their supervisors caught their drunk office workers in the office only 30.2% were saying yes and another 69.8% said no (Figure 5.0). So that means it's rare to get caught while working drunk inside the office.

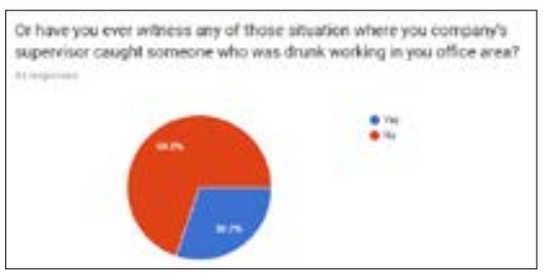


*Figure 5. any incident of a supervisor attempts to capture their drunk workers*

When it comes to the main questions whether there are any systems to detect alcohol users while working (figure 6), 79.5% of people said there is no exact system inside their office. So that motivated further to develop this system.

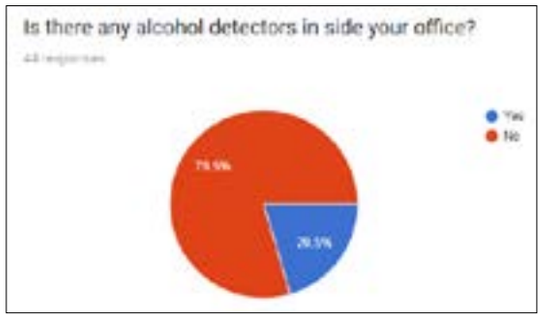


***Figure 6. to check whether any alcohol detectors inside the office***

When asking further they said that there is no way to check alcohol usage if they needed to. So, they said that there were only 59.6% times where their supervisors couldn't take actions against their drunk workers because they couldn't prove it. When asking whether it is a good idea to develop an alcohol detection and prevention system in their office almost 70% (figure 7) of people agreed and that indicates the need of alcohol detection and prevention system around an office areas.

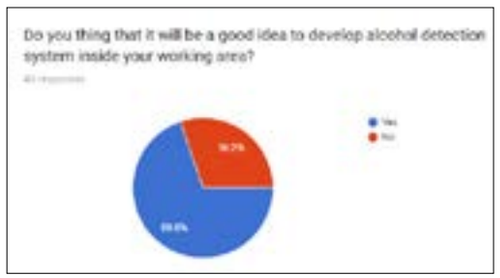


***Figure7. To check whether it is a good idea to develop an alcohol detection and prevention system***

When further asking about what were the problems which their companies faced regarding their drunk workers they said that they saw some workers fighting and inefficiency of their work performance, and even its hard to live around the office because of the smell and they are afraid that even they will face legal matters if there is any situation occurred etc. Then finally through the survey it gave them to provide feedbacks asking what the positives are and what are things should be further added in order to develop this system.

So, they said that the system has to be on alert for 24 hours and should keep track of their drunk employee's record. Then they state that the system must be updated with the technology. While not only with technology the mindset of the people should be corrected too. Some of them said it should be right there with the fingerprint in order to detect exact employee. So, in order to do that there will be a database to keep the track of their records according to the identification purpose.

- They can also say that it can bring safety, dangerous working location with damages and mortalities, especially in occupations where substantial machinery or motor vehicles are used.
- **Workroom affairs** with colleagues and clients and customers. Effects on liquor may affect performance, such as a person who is prejudiced by alcohol, may amateurishly treat customers and clients in working circumstances; Colleagues can be solid on other affected alcohol or "hangovers" The effects of alcohol are sheltered.
- **Low labour productivity** due to nonattendance in the short term and a lower value and quantity of work due to the poor choices making and the disruption of operations and co-workers to cover for labours affected by alcohol.
- **Workplace economy** with long-term alcohol-associated problem attributed to recompense and employer responsibilities; loss of services and employees; and the associated charges of replacement and training new employees can be happened and having alcohol detection and prevention system could stop those unwanted and uninterrupted things from occurring.

## V. DISCUSSION AND CONCLUSION.

So, when taking all those methodologies, surveys and results final solution is to develop this alcohol detection and prevention system.

In order to do that there are some software and hardware specifications,

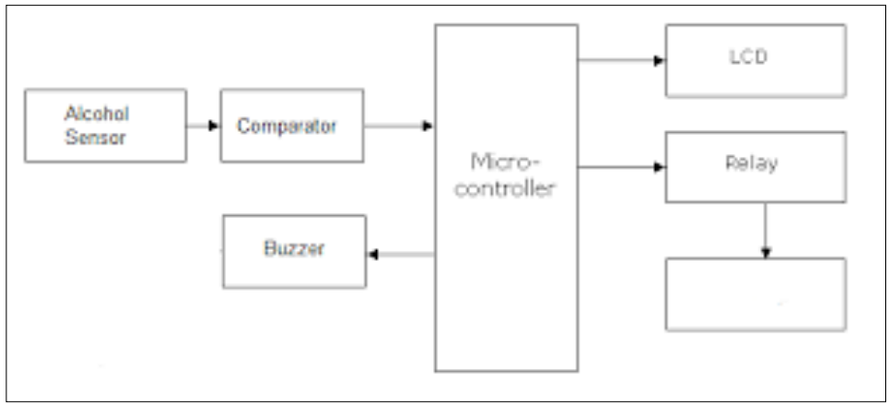


*Figure 9. Small Chart How it Works*

Hardware Specifications

- PIC Microcontroller
- Rectifier
- Regulator
- Transformer
- GSM Modem
- MQ3 Alcohol Sensor
- Buzzer
- LCD
- Motor
- Resistors
- Capacitors
- Diodes

**Software Specifications**

- MC Programming Language: C
- Android
- MYSQL

Therefore, the system use a microcontroller-based circuit that consists of an alcohol sensor (MQ3) connected to it. In addition, it have a GSM modem and an LCD display. The entire system is equipped with a 12V supply.

Then from feedbacks which is being received, the system must set it right up there with the fingerprint or any identification machine where workers enter into the working area. So the system could detect which person exactly is drunk at the exact time. So, in here the MQ3 Alcohol sensor will be set in front the entrance, so any person before entering the working area the detector will detect whether that person drunk or not. Through Alcohol sensor you can smell the alcohol level and the voltage according to perceived alcohol productions. The microcontroller interfaced to it reads the value and if it is found to be above the permissible range it goes into alerting mode. After entering the notification mode, the microcontroller prevents the machine operated by the worker and displays the status of the alcohol signal on the LCD screen. Also, it sounds a Bell to show the same. Now separate the car used to prove himself as a machine.

Now the Miss bite was avoided, the system now needs to submit a report to the appropriate authorities/industry owner to inform about the incident. It then automatically sends an SMS message to the GSM modem to an authorized number to inform about the situation so that the required action can be taken. And to talk about other workers there is a need of developing a database that will keep track of the worker's details so that supervisors can take steps accordingly.

## VI. CONCLUSION

Alcohol detection and prevention is a must in the modern era because there are lots of accidents and problems which





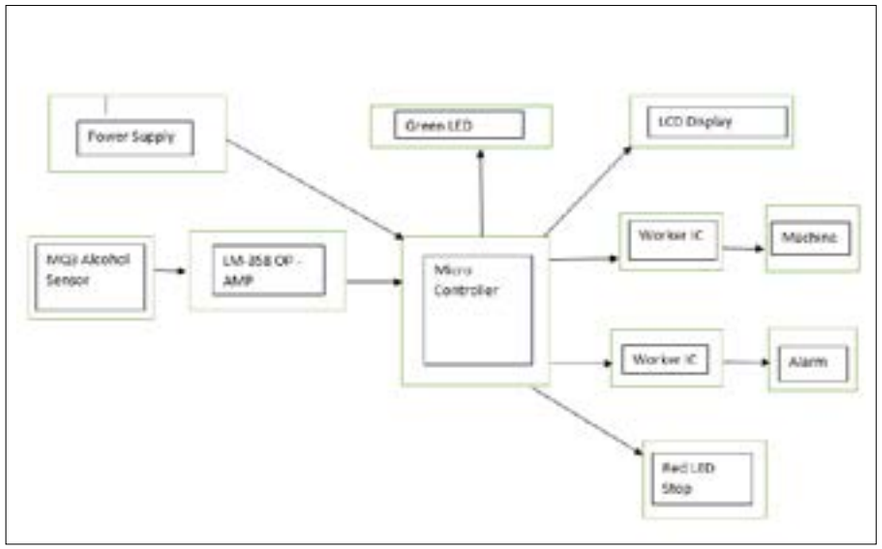


*Figure 8. Small Chart How It Works*

has been occurring in an office areas throughout the world. With the modern technology, developers can get many more ideas about how to develop an efficient alcohol detection and prevention system easily. Talking about the idea the arduino part has already been developed and it can be used for many vulnerabilities like helping police to detect drunk drivers, prevent alcohol usage in colleges, workplaces even when doing sports etc. Because this topic is a new topic to Sri Lanka and existing systems regarding alcohol systems are very hard to find.

## ACKNOWLEDGMENT

The author would like to acknowledge the supervisor, Dr. (MRS.) Wijendra Gunathilaka for her massive support. Then (MR.) Ruvan Pathum, (MR.) Maithri Ranga Kulasekara and (Mr.) Nisal Hewagamage for guidance of path regarding all the hardware specifications. Finally the author would like to acknowledge all the supporting staff who taught and supported to complete this project.

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