

## **IOT/GPRS Based Dangerous Press Machine Safety System**

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### **Abstract**

This project is not only an electronic gadget but rather a total framework that executes security measures for specialist who includes in working perilous machines. Happening of mischance while working these machines can prompt friend in need wounds like finish cutting or squeezing of arms.

In this framework, we have executed our answer for metal sheet cutting or metal kicking the bucket processing plants. These industrial facilities utilize unsafe power squeeze machines. At some point laborers working these machines get into a mishap driving genuine wounds.

Having security instrument in power squeeze machines, this framework additionally helps production line proprietor/director to find specialist who are not genuine while working these unsafe machines. The framework executes passage control framework for laborers while going into industrial facility grounds. As the vast majority of these laborers are not knowledgeable, a large number of them are included in drinking habits. A specialist, who comes after having liquor in production line premises, can be identify by the framework and can disallow him working machine. Topsy laborer can bring about to significant damage to himself.

This framework log specialists manufacturing plant section designs, machines working example and mischance history. The greater part of this log data can

help chief/proprietor to take choice about him whether he ought to work machine or not. They can choose if the individual is eligible for it or not. As the log data is put away over cloud, production line proprietor can see this log data from anyplace on the planet. This framework includes most recent advances like IOT<sup>[1]</sup>, GSM and Cloud.

**Keywords:-** Internet of things, Arduino Mega 2560 Board GPRS, Alcohol sensor, Ultrasonic sensor, RTC, LCD, LN293D Motor Driver, Gear Motor, Micro SD Card RFID .

## I. INTRODUCTION

This venture is an entire framework that executes security measures for specialist who includes in working unsafe machines. Happening of mishaps while working these machines can prompt hero wounds like finish cutting or squeezing of arms.

Our framework gives an answer for metal sheet cutting or metal kicking the bucket processing plants. These industrial facilities utilize perilous power squeeze machines. At some point specialists working these machines get into a mishap driving genuine wounds.

Our framework is a mix taking after wellbeing measures which can guarantee security of machine administrators.

### *1) Entry Control to industrial facility.*

This safety effort guarantees that the laborer is not intoxicated. At plant door, laborer needs to go through RFID and Alcohol sensor check. Progressively, this data is put away on SD card joined with the framework and in addition logged over blurred.

### *2) Within machine sensor based component*

With machine sensor based safety effort, A ultrasonic sensor is utilized to recognize specialist's hand at wrong place and time over machine and stops machine. This data is sent over cloud and put away on SD card for future examination.

### *3) Machine Operating History based prudent steps.*

A history is kept up by the framework for mishaps chances happened amid the period on machine and liquor passages attempts. A forbidden and graphical diagrams are produced on the periodical information and supervisor/proprietor can take choices for laborer employment.

A history is maintained by the system for accidents chances occurred during the period on machine and alcohol entries attempts. A tabular and graphical charts are generated on the periodical data and manager/owner can take decisions for worker employment

According of NATIONAL CENSUS OF FATAL OCCUPATIONAL INJURIES IN 2015<sup>[2]</sup>

As per the U.S review numerous wounds and mishaps happens amid the operation of the Heavy risky machine. many individuals are murdered because of overwhelming unsafe machine. Many individuals are passed on because of wrong taking care of or working of substantial and hazardous machines in production lines. There are some data and information about the wounds and passing of specialists and Employees by working unsafe machines.

An aggregate of 4,836 lethal work wounds were recorded in the United States in 2015, a slight increment from the 4,821 deadly wounds revealed in 2014, the U.S. Agency of Labor Statistics detailed today. (See Fig. 1.) This discharge denote the first occasion when that the Census of Fatal Occupational Injuries (CFOI) has distributed a solitary, yearly discharge without any corrections and will be the main discharge for 2015 CFOI information. A comparable calendar will be followed in future years. Preparatory discharges, which showed up in August or September in past years, will never again be created

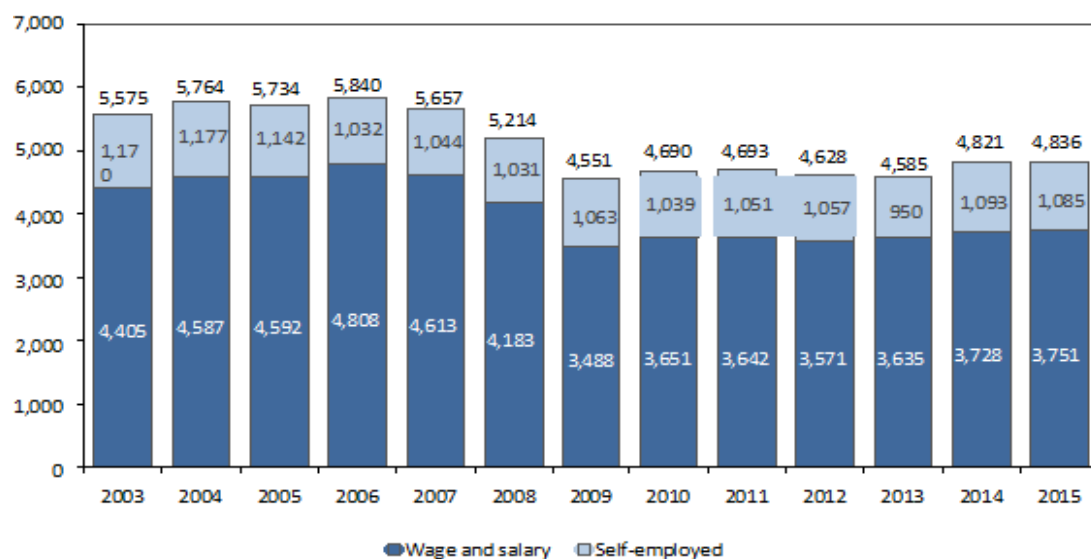
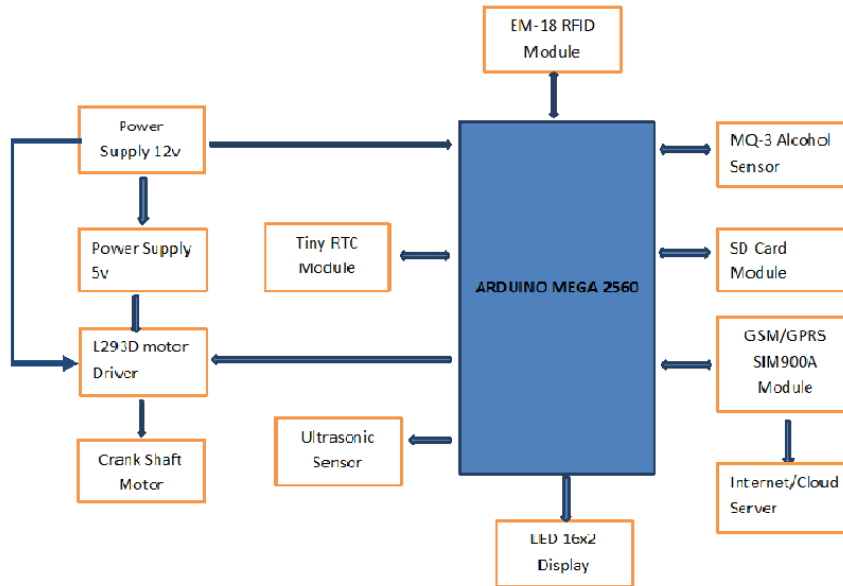


Fig.1: Number of fatal work injuries by employee status, 2003–15<sup>[2]</sup>

## II. WORKING PRINCIPLE

### Block Diagram



**Fig. 2.** Block Diagram

When we connected AC source to the progression down 12v transformer for power supply. we require 12v power supply to run the framework so along these lines we have utilized stride down transformer here to give 12v the power supply to the circuits and afterward it goes through the extension rectifier with the assistance of Diodes(IN4007) and Resistors (3 resistors 10k, 330 ohm, 1k separately) to redress the power supply and change over into air conditioning source to the DC source 12v power supply and the 1000uF capacitor is utilized for giving a DC source

Arduino Mega 2560<sup>[11][12]</sup>..... 12v

GSM/GPRS SIM900A .....12v

L293D Driver Motor Regulated IC..... 5V

The L293D<sup>[3]</sup> driver managed IC Convert the 12 v into 5v at Pin 8 we offer 12v to work the apparatus engine to turn the Crank shaft Motor. We are just utilizing left side engine arrangement for our unsafe machine venture to drive engine. Stick 10,11,14,15 are not utilized.

For Avoiding the wounds and mishap because of Press substantial and hazardous machine we have utilized Ultrasonic sensor<sup>[4]</sup>. a ultrasonic gadget measure the separation of the hand from the machine. On the off chance that an Employee put his hand between the Crank shaft engine to refill the paper into the machine. the ultrasonic sensor identify the Employee hand and it will stop the revolution of Crank Shaft engine consequently. at the point when the Employee expel his hand from the machine or when the ultrasonic sensor distinguish that the worker is presently out of threat not in the scope of risk then the Crank shaft engine will consequently begin.

Each Employee of the organization has given one of a kind Employee ID with a specific Machine no one but he can work the machine others can't inspire passage to work the machine they require appropriate approval to work the machine for along these lines we have utilize EM-18 RFID Module<sup>[5]</sup> to recognize the validation to the Employee ID.

We can likewise recognize the representative with the assistance of MQ-3 Alcohol<sup>[6]</sup> sensor to distinguish the Employee is inebriated or not. The liquor sensor we will utilize is the MQ-3 sensor. This is a sensor that is not just delicate to liquor, especially ethanol, which is the sort of liquor which is found in wine, brew, and alcohol. On the off chance that the Employee is smashed so the MQ-3 liquor sensor will recognize the Employee and EM-18 RFID module won't enable him to work the machine and it will demonstrate a message to the LCD " you are inebriated! Cant' Enter" and If the Employee is not smashed so the RFID module enable him to work the machine and it will demonstrate "Welcome" in the LCD module<sup>[7]</sup>.

Furthermore, we have utilize a RTC module<sup>[8]</sup> to give the control of timing of the industrial facility logs, wounds, mishaps and passing happens amid the operation of the machine. RTC module depends on the clock chip DS1307<sup>[8]</sup> which bolsters the I2C convention. It utilizes a Lithium cell battery (CR1225).

For putting away the data to the exercises and occasions of the Employee and machine we have utilized here GSM/GPRS SIM900A module<sup>[9]</sup>. GSM module needs 12v power supply to run the module in light of the fact that the module can't associate with the system at 5v it needs more power supply to set up the association with the system. a managed IC in worked in this module which change over the 12v into the 5v according to require. we have embedded a working SIM with 2G information association into the GSM/GPRS SIM900A module to interface the web and send data through the web to the cloud server.

Furthermore, here we are utilizing SD card module<sup>[10]</sup> likewise to store information and every one of the exercises , logs and occasions into the SD card into the type of table and outline in doc. furthermore, exceed expectations in the Micro SD card with is embedded in the SD Card Module of the framework by means you can store and read the information effectively in your telephone versatile PC or Laptops.

### Circuit Diagram :

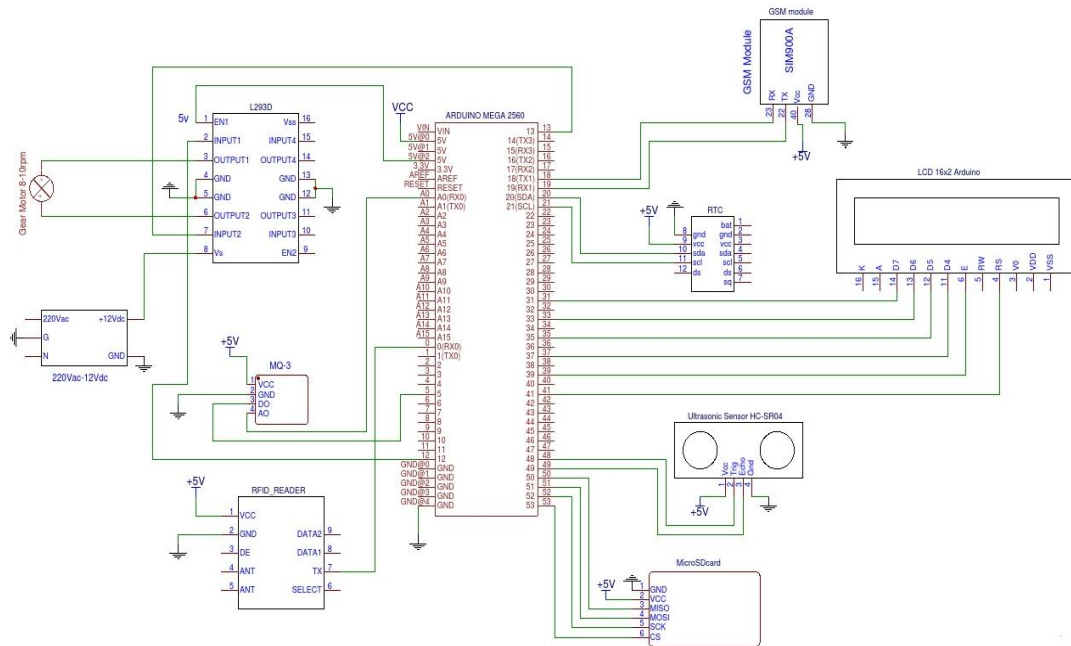


Fig. 3. Interfacing Circuit

## III. HARDWARE DISCUSSION

### Arduino Mega 2560 Board

The Arduino Mega 2560 is a microcontroller board in light of the ATmega2560. It has 54 computerized input/output pins (of which 14 can be utilized as PWM outputs), 16 simple sources of info, 4 UARTs (equipment serial ports), a 16 MHz precious stone oscillator, a USB association, a power jack, an ICSP header, and a reset catch. It contains everything expected to bolster the microcontroller; basically associate it to a PC with a USB link or power it with an AC-to-DC connector or battery to begin. The Mega is perfect with most shields intended for the Arduino Duemilanove or Diecimila.

### EM 18 RFID Reader Module

This board depends on the EM-18 RFID Module. Utilizing the board with microcontrollers to peruse a card's information is exceptionally straightforward and requires only a serial association. The board has a 5V voltage controller so it can be fueled by 9~15V DC connector. Module can likewise be controlled through header wires (+5V and GND) from other interfacing board.

**MQ-3 Alcohol Sensor**

The liquor sensor we will utilize is the MQ-3 sensor. This is a sensor that is not just delicate to liquor, especially ethanol, which is the kind of liquor which is found in wine, lager, and alcohol. This kind of sensor circuit can be utilized as a breathalyzer to check a man's blood liquor level. Similarly as we breathe out carbon dioxide when we inhale out, we likewise will inhale out some liquor in the event that we have liquor in our blood. Any alcometer gadget can quantify this liquor content. The more ethanol in your blood, the more there is noticeable all around on exhalation. This liquor content gives a decent sign for if a man is tanked and how inebriated they are.

**RTC Module**

This modest RTC module depends on the clock chip DS1307 which underpins the I2C convention. It utilizes a Lithium cell battery (CR1225). The clock/logbook gives seconds, minutes, hours, day, date, month, and year data. The finish of the month date is naturally balanced for a considerable length of time with less than 31 days, including remedies for jump year. The check works in either the 24-hour or 12-hour organize with AM/PM pointer.

Constant timekeepers (RTC), as the name suggests are clock modules. The DS1307 constant clock (RTC) IC is a 8 stick gadget utilizing an I2C interface. The DS1307 is a low-control clock/timetable with 56 bytes of battery reinforcement SRAM.

**Micro SD Card Module**

The microSD card is a kind of removable NAND-sort little Flash memory card arrange which was presented in 2003. microSD measures 11mm x 15mm and is 1mm thick. Inside the card is sorted out as interface driver, card interface controller and memory center. The interface driver associates with the outside interface pins. This sets the pins to suitable modes and select and screen the working voltage and different parameters required for physical interfacing. The card interface controller is the area that procedures client orders and perused from or keep in touch with the genuine memory center. It has many registers related with it. The memory center is the place information is put away. It is ordinarily a NAND Flash memory.

**L293D Motor Driver IC**

L293D is a run of the mill Motor driver or Motor Driver IC which permits DC Motor to drive on either bearing. L293D is a 16-stick IC which can control an arrangement of two DC motors at the same time toward any path. It implies that you can control two DC motor with a solitary L293D IC. Dual H-connect Motor Driver coordinated

circuit (IC). It chips away at the idea of H-extension. H-extension is a circuit which enables the voltage to be flown in either course. As you probably are aware voltage need to alter its course to be ready to turn the motor in clockwise or anticlockwise bearing, Hence H-connect IC are perfect for driving a DC Motor.

### **GSM Module**

A GSM module is a specific sort of modem which acknowledges a SIM card, and works over a membership to a versatile administrator, much the same as a cell phone. From the versatile administrator point of view, a GSM module looks simply like a cell phone. At the point when a GSM module is associated with a PC, this enables the PC to utilize the GSM module to impart over the portable system. While these GSM modules are most habitually used to give portable web availability, a considerable lot of them can likewise be utilized for sending and accepting SMS and MMS messages. In that GSM Module SIM900A Integrated Circuit is inbuilt.

### **Ultrasonic sensor**

A Ultrasonic sensor is a gadget that can quantify the separation to a protest by utilizing sound waves. It allots separate by sending a sound wave at a particular recurrence and tuning in for that sound wave to ricochet back. By recording the passed time between the sound wave being produced and the sound wave ricocheting back, it is conceivable to figure the separation between the sonar sensor and the question.

## **IV. RESULT**

In the testing of the IOT and GPRS system with the Arduino Mega 2560 Board has to connect to the computer by his given port. after compiling the code through the Arduino software and that code compilation is stored in a Atmega 2560 Microcontroller as a HeX file.

The system first initialize the SD card then RTC module to time set after setting the time system will ready and waiting for check in as shown in pictures.

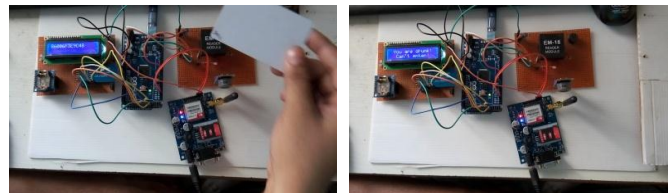
Here is some testing and result of the system.



**Fig.4:** Testing of IOT/GPRS



Now Employee has to check in by the Factory ID through the RFID module if he is valid Employee so then he can pass if Employee is not valid or drunk he will not be allowed to operate the machine for safety purpose.



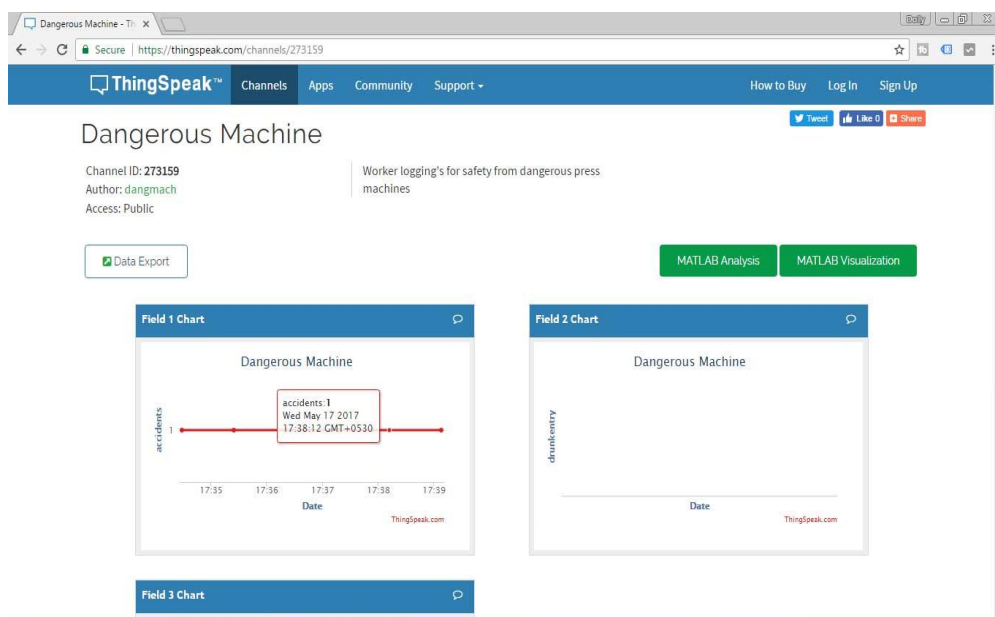
**Fig. 5:** Testing of RFID, Alcohol Sensor and LCD

All the Information is stored in a SD card or send the information on the server cloud through the GPRS module the Server Cloud website is <https://thingspeak.com/channels/273159>

If any Accident activity takes place during the period of operation of machine it sends the log to the cloud server and it also send the Logs information of Save Entry logs of Employee and Drunk Entry log of Employee

you can see all the information history anytime from anywhere from this cloud server website

<https://thingspeak.com/channels/273159>



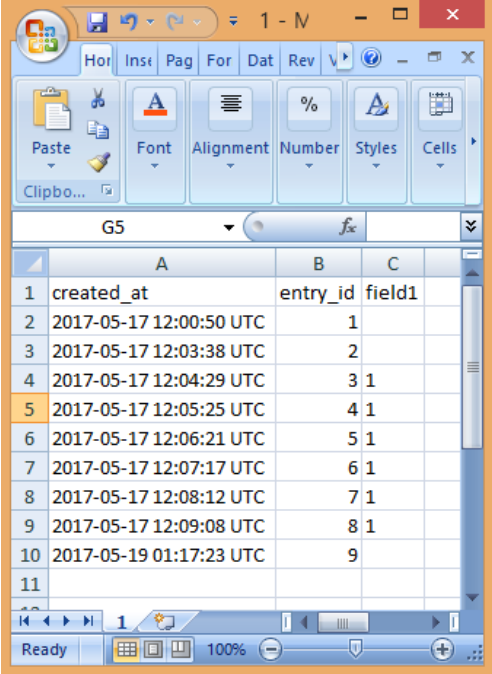
**Fig. 6:** Result of Cloud Server Data History

The above figure is the cloud server data in this server all the log Entry pattern of workers in the factory machine operating patterns and all accident patterns and history information is stored its maintaining the log data of how many accidents occurs by the machine , safe entry and drunk entry of the workers. It can store this data in to your mobile laptop and Computer by micro Sd card.

And you can see the Data in three different extension files

1. JSON
2. XML.
3. CSV (Excel)

The log Information of the workers of the factory with date and time is stored in the SD card in the Excel form result shown below:



	A	B	C
1	created_at	entry_id	field1
2	2017-05-17 12:00:50 UTC	1	
3	2017-05-17 12:03:38 UTC	2	
4	2017-05-17 12:04:29 UTC	3	1
5	2017-05-17 12:05:25 UTC	4	1
6	2017-05-17 12:06:21 UTC	5	1
7	2017-05-17 12:07:17 UTC	6	1
8	2017-05-17 12:08:12 UTC	7	1
9	2017-05-17 12:09:08 UTC	8	1
10	2017-05-19 01:17:23 UTC	9	
11			

**Fig 7:** Result of Data logs Entry in SD card Storage In Excel form

So therefore system is working when Arduino Mega 2560 Board connected to by USB to the computer and Compiling the Code . In the Arduino Board we can give the power source directly to the ac source or by the USB from the Computer. It is Compatible for the both the operation. and the Coding of the System is done by the Arduino Software and coding is stored in a ATmega Microcontroller to further use so mean that we need to compile the program again and again

## V. CONCLUSION

The principle target of our framework is to wellbeing gauge of the laborers and representatives. This IOT/GPRS BASED DANGEROUS PRESS MACHINE SAFETY SYSTEM is a total framework that executes wellbeing measures for laborers who includes in working unsafe machines. It helps the industrial facility proprietor or supervisor to find the Employees and laborers who are not genuine amid the operation of substantial and perilous machine. This framework log laborers industrial facility section designs, machines working example and mischance history. The greater part of this log data can help administrator/proprietor to take choice about him whether he ought to work machine or not. They can choose if the individual is qualified for it or not. As the log data is put away over cloud, manufacturing plant proprietor can see this log data from anyplace whenever on the planet.

Our System diminishes the unintentional exercises, deadly wounds and passing of the laborers and Employees in metal sheet cutting ,metal biting the dust and press kicking the bucket production lines.

## REFERENCES

- [1] P. Spiess, S. Karnouskos, D. Guinard, D. Savio, O. Baecker, L. M. Sa de Souza and V. Trifa, "SOA-Based Integration of the Internet of Things in Enterprise Services," *Proceedings of the 2009 IEEE International Conference on Web Services (ICWS'09)*, IEEE Computer Society, Washington, DC, 2009, pp. 968-975.
- [2] NATIONAL CENSUS OF FATAL OCCUPATIONAL INJURIES IN 2015 by News release bureau of labor statistics For release 10:00 a.m. (EST) Friday, December 16, 2016 USDL-16-230 Technical information: (202) 691-6170 ,iifstaff@bls.gov
- [3] LIFA Vatsal Shah1 1Electronics & Communication Department, Indus University International Journal of Advance Engineering and Research Development Volume 2, Issue 7, July -2015 Control Robotic Module using.
- [4] H. He, and J. Liu, "The design of ultrasonic distance measurement system based on S3C2410," *Proceedings of the IEEE International Conference on Intelligent Computation Technology and Automation*, Oct. 2008, pp. 44-47.
- [5] Bruno Crispo, Melanie R. Rieback, Andrew S Tanenbaum a paper on "The Evolution of RFID security."
- [6] Win, D. T. 2006. Breath Alcohol Testers. Prevent Road Accidents. Faculty of Science and Technology, Assumption University Bangkok, Thailand.
- [7] <http://www.circuitstoday.com/interfacing-lcd-to-arduino>.

- <https://www.arduino.cc/en/Tutorial>HelloWorld?from=Tutorial.LiquidCrystal>.  
[https://en.wikipedia.org/wiki/Liquid-crystal\\_display](https://en.wikipedia.org/wiki/Liquid-crystal_display).
- [8] Hobbyist. (2016). Real Time Clock Module. Retrieved from [http://www.hobbyist.co.nz/?q=real\\_time\\_clock](http://www.hobbyist.co.nz/?q=real_time_clock)  
<https://learn.adafruit.com/ds1307-real-time-clock-breakout-board-kit>
- [9] Interfacing SIM900A GSM Modem With Arduino by Erfinden <https://www.instructables.com/id/Interfacing-SIM900A-GSM-Modem-with-Arduino>
- [10] Arduino SD Card and Data Logging to Excel <http://howtomechatronics.com/tutorials/arduino/arduino-sd-card-data-logging-excel-tutorial>.
- [11] <https://www.arduino.cc/en/Main/ArduinoBoardMega2560> Arduino Mega 2560 Hardware Board.
- [12] <https://www.arduino.cc/en/Main/Software> Arduino IDE Software ver1.8.2