

INTERNET OF CAUTION AND CONTROLS

Submitted By

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ABSTRACT:

Safety of Men and Material is highly sensitive issue in all small to heavy construction activities. Workers working at any height more than 180 Centimeters are always prone to some kind of risk. If they fall from any height more than 1.8 meters as per standards, they can be a victim of minor to major injuries. We work for our living and all types of construction works are for the development and comfort of our society. The people involved in such activities are also a part of it, and their safety is always the priority of any industry.

Lots of training programs are being run for different level of workers, and they are equipped with different PPEs (Personal Protective Equipments) before all such risk oriented activities. But still due to human error, lack in alertness, awareness, skills, preparation, willingness to work, fitness, mental or physical health etc., or avoidance of these things including safety norms they suffer from accidents leading from minor to major injuries.

IoT (Internet of things) is a new technology, which is making all tasks more easy and perfect by making a network of things together operating precisely. This perfect performance can make any system safer, more secure and smarter. In this paper I have tried to make a model of safety systems smarter by using some available technologies and gadgets.

KEYWORDS:

Risks, IoT, IIoT, Caution, Control, Action, Alarm

OBJECTIVE:

The main objective of the following paper are as following..

1. To identify risks before starting any work.
2. To identify factors causing risks.
3. To identify factors and devices to minimize risks.
4. To develop a model of safety for safe work operations.

MAN AND MACHINE:

According to Cambridge Dictionary an Engineer is a person, whose job is to design or build machines, engines, or electrical equipments, or things such as roads, railways, or bridges using scientific principles. They do such things for the welfare and comfort of our society. Machines, Engines or Electrical equipments generate lots of power, which is always more than the limits of normal human beings.

A normal man's power has an average value of around 75 watts or 1/10 Horse Power approximately, therefore such Machines, Engines or Electrical equipments are always a big risk, when we use them for some of our own purpose. So use of such equipments is always restricted to some specific

operations only. We normal human beings with an average power of 75 Watts are very flexible, and can perform lots of tasks together as per variable or flexible requirements, while Machines can't.

So where is the difference? This difference is clear, if we compare them on a few parameters. Here's a basic comparison...

S. No.	Parameters	Machines	Human Beings
1	Have a definite body shape	Yes	Yes
2	Use Fuel	Yes	Yes
3	Restartable	Yes	No
4	Are able to think	No	Yes
5	Have Senses	No	Yes
6	Have feelings	No	Yes
7	Have Emotions	No	Yes
8	Have Intelligence	No	Yes
9	Rescue others from Hazardous Conditions	No	Yes
10	Connect with each other	No	Yes
11	Walk around the work place	No	Yes
12	Watch around the work place	No	Yes
13	Run Continuously	No	Yes

Here after comparing both Machines and Human Beings on 13 simple parameters it is clear, that while both have a definite shape, and both run on some kind of fuels, they differ in 11 parameters out of 13 considered. If somehow we minimize this difference by putting some sense, thought, emotion, intelligence etc. into machines, they will definitely be more likely and thus beneficial to human being.

WHY DO ACCIDENTS OCCUR?

The most basic reasons for any accident are as following...

1. Human Error
2. Lack of alertness
3. Lacking in skills and training to perform a specific work
4. Unawareness about risks involved
5. Avoiding preparation against risks
6. Avoiding safety norms
7. Working when unwilling to work
8. Working when unwell or sleepy
9. Lack of physical fitness
10. Lack of mental fitness
11. Consumption of Alcohol
12. Poor working conditions
13. Unsafe Tools and Plants

These are some very basic things we avoid before starting any kind of work, and become a victim of accidents. When we prepare to go to some God's place like Temple, Church etc., we follow a certain system like everybody does. In Temples we can't dare to enter without bath, and remove our Chappals or Shoes outside the God's area. We enter bowing our heads with all devotion, and never dare to avoid a single rule. We never play with mobile like electronic devices in God's compound.

It is all because that's the place of worship. We caution ourselves against lots of things, and avoid almost every worldly thing, which may be anyhow pleasing our senses. It's a well known proverb, that

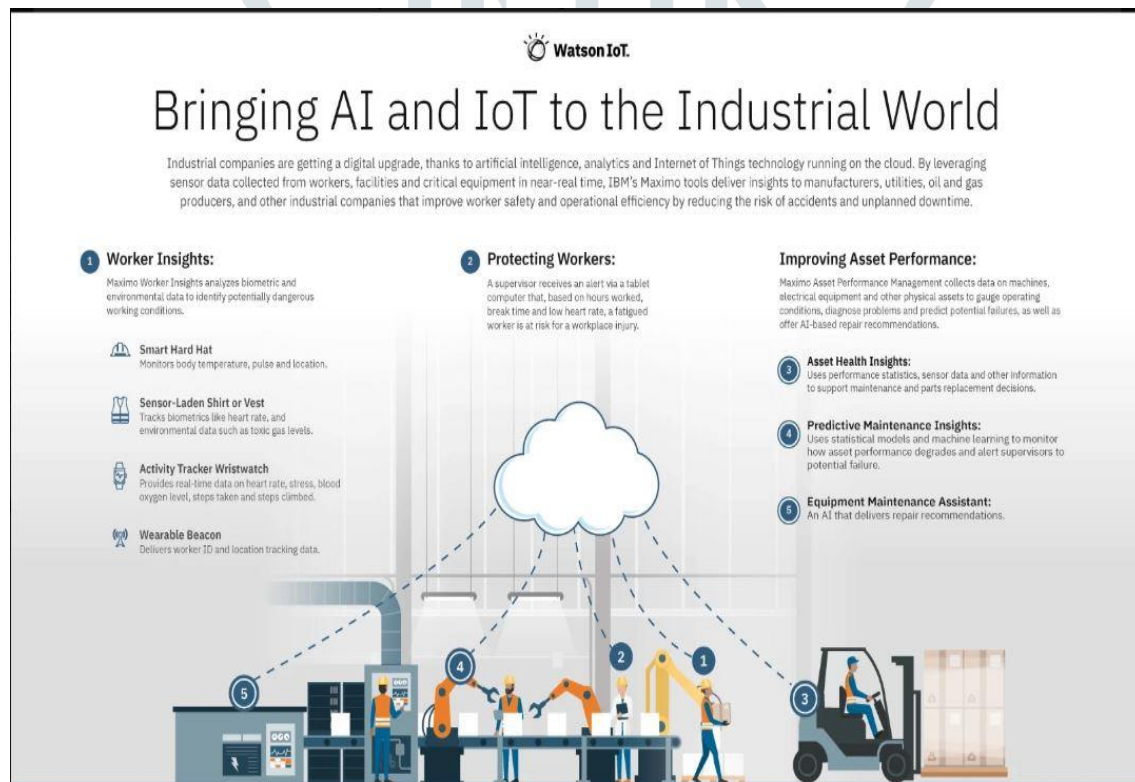
Work is Worship, but who cares? This carelessness leads towards accidents, and the workplace turns into a place of high risk and hazards.

Where is the difference? We are sincere with our faiths, but not with our duties and responsibilities. We don't care about risks involved in certain activities, which makes the real difference, and we are prone to accidents. Here if we follow certain basic principles, we definitely can keep ourselves safer.

Often we lack in alertness, awareness, skills, preparation, willingness to work, fitness, mental or physical health etc., or avoid these things including safety norms. We feel that for a simple task there is no need to get into any procedure. We follow easy steps at the risk of our life, and avoid any complications, which definitely make things more complicated. To avoid such risks involved in any task we need some alerting devices, warning gadgets etc. to alert and warn us before and during the work, which will definitely be helpful in reducing risks and accidents.

WATSON IoT PLATFORM:

IBM has announced collaborations with Garmin, Guardhat, Mitsufuji and Smart Cone to help organizations monitor their workers' safety with Watson IoT. It is a platform, which is upgrading Industries digitally by bringing AI (Artificial Intelligence) and IOT (Internet of things) together running on the Cloud. IBM's Maximo Tools deliver insights to manufacturers, utilities, oil and gas producers and other industries, which helps to improve workers safety and operational efficiency by reducing the risks of accidents.



IBM Maximo Worker Insight puts compliance at the center of safety, making it easier to identify and eliminate hazards in the workplace. It combines IoT data from wearables, environmental sensors and other data, with advanced analytics. You'll get real-time insights, putting time and place into context, along with trending and forecasting analyses, and worker information. This powerful solution helps workers Think, Inform and Act. It also enables supervisors to use predictive information to address issues before they become problems. [1] Some of the wearable and sensors are as following...

1. **SMART HARD HAT:** Monitors body temperature, pulse and location.
2. **SENSOR LADEN SHIRT OR WEST:** Tracks biometrics like heart rate and environmental data such as toxic gas levels.

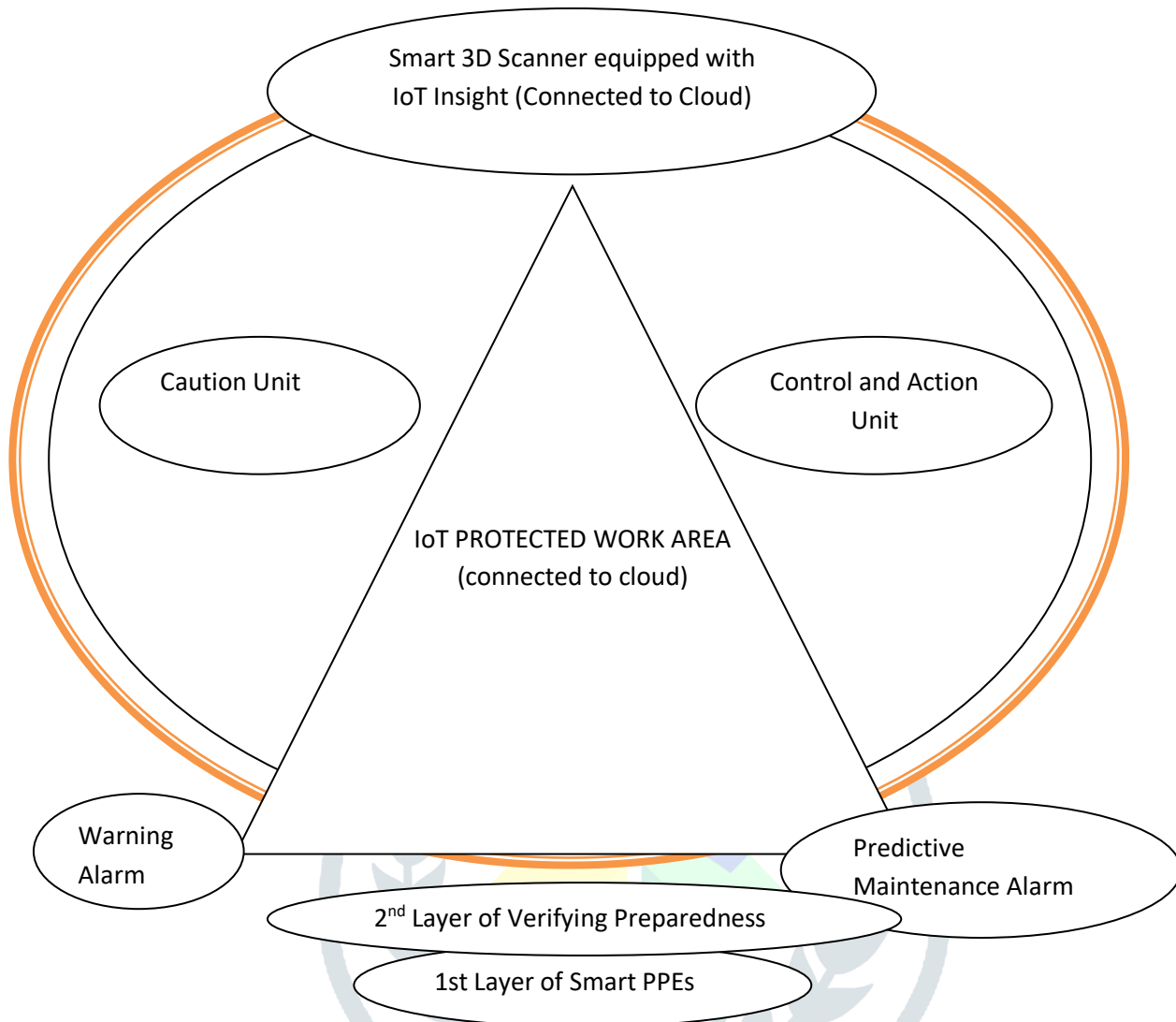
3. **ACTIVITY TRACKER WRIST WATCH:** Provides real time data on heart rates, stress, blood oxygen level, steps taken including steps climbed.
4. **WEARABLE BEACON:** Delivers workers ID and location tracking data.
5. **ASSET HEALTH INSIGHTS:** It is used to collect uses performance statistics, sensor data and other information to support in timely maintenance and parts' replacement.
6. **PREDICTIVE MAINTENANCE INSIGHTS:** Such Insight uses statistical models and machine learning to monitor, and alert supervisors before potential failure.
7. **EQUIPMENT MAINTENANCE ASSISTANCE:** It is an Artificial Intelligence (AI), which recommends for repairs when required.

INDUSTRIAL INTERNET OF THINGS:

The Industrial Internet of Things (IIoT) is transforming the competitive landscape. As the world becomes increasingly connected, digitalization is a key differentiator that will enable companies to remain competitive. Using IIoT data from billions of intelligent devices generating massive volumes of data, digitalization promises lower costs, improved production quality, flexibility, efficiency, shorter response time to market demands, and also opens up new business opportunities.

According to digitalcontrol.org *IOT incorporates functions that enable the users to connect all objects with internet. Its basic functioning is to capture and communicate data with M2M communication, sensor data and automation technologies. It is transpired to be a strong economic driver over the next decade. It is estimated that IOT connected devices will reach up to 200 billion by 2020. The use of IoT technologies in the industry is ever increasing as it minimizes manual effort and increases efficiency. [2]*



A MODEL TO MAKE WORK ENVIRONMENT SAFER:**1ST SECURITY LAYER:**

1st Security Layer will equip all the workers with smart PPEs (Personal Protective Equipments), and will permit and assist them to enter into next security level, if they are found to be fit to proceed for work.

2ND SECURITY LAYER:

2nd Security Layer will recheck and verify their preparedness at all levels variable according to type and scope of work, and will allow them to enter into web protected area with Caution and Control.

SMART 3D SCANNER:

FARO provides a full portfolio of turnkey, 3D measurement solutions for actionable manual and automated inspection of any part, component or final assembly to streamline and maximize efficiencies across the manufacturing process. SCENE Web Share Cloud is cloud-based hosting solution from FARO® for easy and secure sharing of scan data worldwide via the internet. FARO Visual Inspect is a powerful mobile solution to control production processes. It allows for intuitive viewing as well as the use of complex 3D data of parts and assemblies and additional information such as process and workflow details on an iPad. [3]

Faro 3D measurement solutions, visual inspect solutions etc. are smart devices to control production manufacturing and construction processes with high accuracy, and can identify any deficiency within time, which may be very helpful in detecting and warning about the risks involved. These in time data solutions further help us to minimize risks in time.

CAUTION UNIT:

In the diagram above a caution unit has been considered, which will respond with reference to data input received from different scanning devices. A sharp measurement of different aspects of work under progress can be well monitored in the caution unit, which will be greatly helpful in cautioning control unit.

CONTROL AND ACTION UNIT:

Control and Action Unit will monitor all the activities in and outside the protected work area, and will respond time to time as per inputs received from different devices.

WARNING AND PREDICTIVE MAINTENANCE ALARMS:

These alarming units will alarm workers including Caution and Control units with different alarming sound and lights, which will help motivating workers by making performance alarms. These alarms will warn them also as per conditions, which will help and assist them in resolving the issues at the earliest.

THE BEGINNING:

We are now in a smart age, a smart period. Our Ideas, Thoughts and Actions all have been more precise and digital. We plan for Smart Cities, Smart Gadgets and Smart living. This concept of Smartness is basically related to our dream desire to have a balanced lifestyle, where everything will run smoothly, The rush in all types of movements will come under digitally smart control systems, and we will definitely be able to live a life more fast, secure, healthy and happy in comparison with the present normal conditionss.

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