



SMART HELMET: AN APPLICATION OF IOT

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Abstract: Main objective of smart helmet is to provide a means and apparatus for detecting and reporting accidents. With the rapid increase in number of 2-wheelers, frequency of accidents is increased rapidly. A major cause of the fatalities occur because either the person was not wearing a helmet, or his accident was not reported in time, and he could not be saved because of the delayed admittance to a hospital, or because he was riding while drunk. So efforts should be made to avoid accidents and to minimize their consequences. Today we are living in a world where the conditions of the road have no importance for people and they are regularly violated. In addition, its human nature to resist what is imposed on them. So there is a need to make smart helmets using IOT.

Keywords: Internet of Things(IoT), Smart Helmet, Cloud Computing; Hypertext Transfer Protocol; Internet of Things, Sensor; alcohol Sensing;

I. INTRODUCTION

It is a fact that young generation prefers bikes and motorcycle than four wheelers. A survey indicates that more than 70% of the riders avoid wearing helmet without any specific reason Speed driving and drunk driving have become common issues. Due to lack of experience or focus and violation of traffic rules, result in severe accidents.

The Global status report on road safety 2015, reflecting information from 180 countries, indicates that close to 1.25 million people die every year as a result of road accidents.

Near about one fourth of the people involved in accidents are motorcyclists. The main cause of death in two-wheeler drivers is over speeding and careless driving. Number of lives could have been saved if emergency medical service could get accident information and reach in time to the scene. Up to 75% of all deaths occur within the first one hour of impact. Thus, in this crucial phase of time, if proper aid reaches the victims, mortality rates can be reduced. In this survey we focus on to build an Internet of Things (IoT) application that leverages on ubiquitous connectivity, sensing and data analytics that are the basis of IoT applications.

The IoT is made of smart machines communicating and interacting with other machines, objects, environments and infrastructures. The huge volumes of data thus generated, is processed into useful actions that can “command and control” things, to make our lives much easier and safer [3]. IoT applications focus on numerous benefits like the capability to remotely monitor, manage and control devices, and to get new insights and useful information from massive streams of real-time data. The foundation however lies on the intelligence of the embedded processor.

II. LITERATURE SURVEY

There are many companies who does the production of smart helmet. Smart helmets are autonomous and user friendly in nature. The helmet can be connected to internet to perform wide range of functions such as traffic monitoring, GPS guidelines, In-built headphones etc. Flexible inner layer of smart helmet becomes tuff during an accidental situation along with this the device is designed to give complete safety measures which includes sending an emergency message to friends and family in critical situations with a single press. Smart helmets are gaining popularity in various sports events as well as by bike riders across the globe. Smart helmets possess various features like engine control system, inbuilt cooling fan, inbuilt Bluetooth system, accidental alert system, cell phone charging with the solar power use. These features are attracting the consumers interest towards the adoption of smart helmet technology, the product is designed to provide security, safety and

comfort journey to the rider. To create a tremendous demand of smart helmets in the future. the future trend of using smart wearable for personal safety along with the rising concerns of consumers for road safety is expected.

Company	Speciality	Cost(dollars)	Disadvantage
Lumos Helmet	Lights with signal	180	lights invincible in daytime
Coros Linux	Music facilities	180	cant hear outside noise
LifeBeam	video capture	200	bit slow
LivMap	Projector	200	Costly
Cross helmet x1	360 vision	1599	Costly
Classon	keeps track	149	less e_cient

A. Different Smart Helmets:

a) Lumos helmet



Figure 2.1: lumos helmet.

Lumos is the world's first smart bike helmet that beautifully integrates lights, hard brake, turn signals, and helmet into a single cohesive whole. Features 48 individual LEDs in the front and back to ensure your visibility on the road. Be seen, be safe. Lumos comes in a one size fits most and will adjust to a head measurement of 54cm 62cm. They may add additional sizes including a kids size in the future. Bright white LEDs in the front, red in the rear, and left and right turn signals proved illumination that stands out and is easily understood by other road users. The helmet includes a small wireless handlebar remote which activate the turn signals. The water resistant helmet and remote are powered by a rechargeable battery. The helmet is available in three colors: Pearl White, Charcoal Black, and Cobalt Blue.

b) Cross helmet



Figure 2.2: cross helmet.

Motorcycles have evolved faster than helmets have. The CrossHelmet brings state of the art technology to a safety staple that has remained stagnant for years. Our product combines integrated head-up display with 360 range of vision, sound management, and Bluetooth features to riders. It is the smartest motorcycle helmet ever.

The helmet works by syncing wirelessly with your phone (using Bluetooth) and a free iOS or Android app. The app can connect to Strava, or you can use the inbuilt GPS to track your route or provide navigation. The helmet straps have built-in bone conduction speakers that sit on the forward strap portion, contacting your cheekbones, to allow you to listen to music, podcasts or take calls.

c) L.lifeBEAMs

LifeBEAMs wearable Smart Helmet is enabling cyclists around the world to train for their maximum effort. Bike rides have officially become Smarter, no more restricting fitness gear. Whatever fitness goals you may have, LifeBEAMs wearable Smart Helmet combines accuracy, knowledge and results in every bike ride. Track and exceed your limits with accurate measurements of your heart rate, steps, and calories Andrew Artishchev the founder of LiveMap told TechCrunch at CES 2018 his company has enough runway to certify the helmet for use in America and enter production. He insists that his company has the proper design and management to get LiveMap certified and on the market. LiveMap is targeting a US launch with the fully-integrated, intelligent, augmented-reality helmet, a rider only needs to think about a single device. Because it's integrated into the helmet, he's never going to leave it behind, lose it, or, worse, have it stolen, while he goes to refuel, have a coffee or smoke, while taking a break on his journey. Charging is simple, with a single device and can take place at home or en route.



2.3. L.lifeBEAMs

B. IOT based Smart Helmet

The increased complexity associated with integrating monitoring, deployment, and ticketing systems results in ineffectual delivery of alert, straining the competent working of the helmet. The major problems that needed to be overcome include alert fatigue, possibility of missing an event, sending the message to a wrong person, increased time for information transfer and incident resolution.

In order to overcome these drawbacks, we make use of an incident resolution platform PagerDuty. We make use of the PagerDuty REST API to inform the emergency contacts whenever an accident has been detected. The monitoring tools send PagerDuty a trigger event to report a new or ongoing problem. Incoming events that are sent via the API are routed to a PagerDuty service and processed. Usually a customized API is created by making the system make a simple HTTP call or run a command-line script.

The REST (Representational State on Demand) is an architectural style based on which the protocols are designed. It is resource-based and the resources are identified by URIs. The representation is transferred between client and server in the form of either JSON or XML. PagerDuty REST API accepts JSON and form encoded content as input and the output is in JSON.

III. WORKING OF SMART HELMET

Whenever the rider passes through the range of RF transmitter balance is automatically deducted from its wallet known as E-Wallet. indicator, DC motor. The R F receiver receives the encoded binary data transmitted by the RF transmitter and provides it to the decoder. The decoder decodes the incoming digital data and provides four bits in the MCU, only if the address bit of the encoder and the decoder match. This is done to ensure the safety and security of the system. Thus matching of encoder and decoder increases the security and integrity of the system. The MCU controls the DC motor upon receiving data. If the sensor detects that the rider is wearing the helmet, then the engine is turned on and also if the MQ6 sensor detects alcohol, the module installed on the bike turns off the engine to avoid any accidents and so that the drunken person takes appropriate measures to reach his destination. Decoder HT12D decodes all incoming data and then forwards it to the microcontroller for implementation.

The AT89S52 is a programmable microcontroller with a small instruction set. It controls the working of the module by analysing the input data stream and then giving correct control signals. Voltage regulator 7805 is used to regulate the erratic voltage received from the power source. The 7805 voltage regulator gives a 5V output. The above components together make our helmet smart and work in synchronization to ensure a safe and comfortable experience for the user. Also whenever the rider enters the speed range of speed limiter its maximum speed limit is set and whenever that limit is exceeded LCD displays overspeeding and alarm buzzes.

IV. IDEAS FOR SMART HELMET

We could surely use some innovative ideas to improve helmet technology. At today's era of technology upgradation of system is required. For our system like smart helmet we can add many features which could be very beneficial for the riders.

1. The helmet that's like Google Glass

When pedestrians get a bit lost, they can pull out a smartphone and open Google Maps. This is nearly impossible (and very dangerous!) as a cyclist. That's why a London-based ideas lab called the Future Cities Catapult has prototyped a helmet that comes with a Google Glass-like visor to help cyclists navigate the city with better ease and safety.

The helmet could use data from bike and street maps to highlight direct routes, warn about danger zones, and detect blind spots around large vehicles. "If these displays talked to the city around them if they knew where the cyclist was and what they were looking at they could give much more subtle spatial and contextual information that builds on the surroundings of the cyclist."

2. The invisible airbag helmet

For anyone who hates helmet head but also the idea of bicycling around unprotected, the Hovding helmet is a compelling innovation. Hovding is essentially an airbag for your head. It comes in the form of a collar you wear around your neck that's stuffed with an airbag and sensors that register your movement 200 times a second. If the sensors recognize abnormal movement, the airbag deflates in one-tenth of a second to absorb the impact shock and protect your head, face, and throat. Aside from being a stylish option, the Hovding has some impressive safety specs. According to one test, the Hovding is three times more protective than the best mainstream helmets on the market. It costs around 299 euros, or dollar 340. Unfortunately, once it inflates, it can't be used again.

3. The helmet that tells cars where you are

Volvo is taking steps to make it nearly impossible for drivers and cyclists to sneak up on one another. The Volvo Car's Safety system, standard in all new XC90s, detects cyclists and warns drivers when they're nearby, even auto-braking to avoid crashes.

At CES this year, the car maker unveiled the second part of its plan: a connected helmet that communicates with the smart car system and vibrates or illuminates when a vehicle is approaching or a crash is possible. The logistics are a bit complicated; the cyclist and driver would both need to use a smartphone app to track their position and send it up to the Volvo cloud. Right now it's just a concept and still just for Volvo, but it's a good demonstration of how cars and bikes can co-exist in the future.

4. The helmet that measures your heart rate

Many athletes use chest straps loaded with sensors to measure their heart rate and overall performance. A startup called LifeBEAM wants to get rid of the strap by integrating these same sensors into a bike helmet. The company was originally

designing a sensing platform to be used on astronauts and pilots, but pivoted to focus on cyclists. The LifeBEAM helmet, which sells for dollar229, has a built-in heart rate sensor, calorie counter, and performance analysis, all of which can be beamed to smartphones and smartwatches for analysis later. Oh, and it protects your head.

5. The helmet that tests for concussions

Students at Oregon State University teamed up with Intel last summer to create a sensor-packed smart helmet that knows when a crash has occurred and, depending on the severity of the injuries, can call an emergency contact and send a text message including the location of the crash. The helmet also connects with an app that asks the rider a series of basic questions similar to those a doctor might ask during a concussion test, like "what month is it?" Acting as a sort of "black box" for bicyclists, the helmet also collects and stores information about the location and severity of crashes.

6. The helmet that reads your mind

You want your bike ride to be safe, but also enjoyable. A helmet called the MindRider "tracks, in real time, how your rides, movement, and location engage your mind." Its creators basically took a standard EEG brainwave sensor and combined it with a regular bike helmet. The info collected on your ride gets sent back to an app that maps the trip, showing "Sweetspots" when you felt relaxed and "Hotspots" of intense focus. Using the data, you can avoid the most stressful routes next time you're out for a ride. MindRider didn't have a particularly successful Kickstarter campaign, but its creators are now using the helmet to track patterns for cyclists in NYC.

7. A Smart Helmet That Gives Riders Eyes in the Backs of Their Heads

Like Skully AR-1, the augmented reality gadget-helmet that aims to protect motor cycle riders heads better and smarter than ever before. Yes, smart. The helmet puts real-time video of everything thats happening behind and around them on an always in-focus transparent screen, inside the tinted visor, directly in their _eld of vision. Described by a former Tesla tech as a smartphone for helmets, the Skully doesn't just show riders tra_c (and any other potential road hazards) in front and behind them on its trademarked Synapse Smart Heads-Up Display System. It also delivers turn-by-turn GPS navigation and live tra_c and weather conditions.

CONCLUSION

Smart helmet is an effective solution to many problems. Wearing the helmet and being sober are necessary conditions for the bike to start, reducing the possibilities of accidents. Even if a person takes caution sometimes accidents do occur. Here our engine cut off feature reduces the chances of fatalities significantly. The smart helmet acts as a virtual policeman keeping the drivers in check and making roads safer.

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