

The logo for GadgEon, with 'Gadg' in blue and 'Eon' in orange.

Engineering Smartness

# FALL PROTECTION SYSTEM

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Version 01



# Fall Protection System



A US based Medical start up in developing a wearable device wanted to develop a hip protection wearable system . This device is now commercially available in the US market and has won multiple major technological awards.

## Solution Description

- A smart wearable belt with cloud connectivity has been developed, tested, and deployed in the field
- The solution has the following major components:
  - The wearable belt with two controllers. A real time unit handles the fall detection and airbag deployment. Another processor for wireless communication with cloud application
  - A cloud/Web UI application for registering caretakers, configuring email and mobile numbers, register and manage wearable belts so on
- Technology Used:
  - Node.js, MQTT, AWS IOT, Lambda, Dynamo DB, iOS/Android, Linux

## Outcome and Benefits Delivered

- Elderly people are prone to falls and consequent hip breaks. The fall protection system is a smart connected wearable device that detects the fall and deploys an airbag that inflates and protect the hip from the impact of the fall.
- System designed for real time and reliable performance using dual processor architecture.
- The system is connected to cloud application. In case of an event, the notification is sent to support personnel for assisting the patient.
- Low battery consumption due to power-optimized design



# The Solution / System Description

The wearable belt system has multiple components

## **Wearable Belt:**

The wearable belt has two controllers. A real time unit handles the fall detection and airbag deployment. Another CPU (Communication Unit) for wireless communication with cloud application.

## **Real-time unit**

The real time unit is based on STM32F4 MCU which uses an inertial sensor from ST for fall detection. Airbag actuation is controlled by firmware running on the STM. STM also communicates to communication unit over UART interface.

## **Communication Unit**

The communication unit is based on Intel Edison running Embedded Linux. It has Wi-Fi capability to connect to an Access point. The unit has built in Audio codec, LED's and Vibration motor for providing audio, visual and haptic alerts and feedback to the user.

When an event is detected, the system sends the alerts to cloud application over the Wi-Fi connection. The device will also generate audio and visual alarms when a fall is detected. The unit also uploads log data to cloud platform for further analysis. The unit monitors the battery level using a fuel gauge and alert user when battery is low.



# System / Architecture Description

## Cloud Application:

The web UI application is used for registering caretakers, configuring eMail and mobile numbers, register and manage wearable belts etc. UI is developed in Angular framework. The UI will allow the caretakers to configure notification mechanism, control device settings (alert volume, LED brightness etc) based on their needs.

The cloud application is developed in Express.js framework and is hosted on Amazon Web Services. Upon detecting a fall, the belt will send the event details to the cloud and cloud server will intimate the event to its users via eMail and SMS (AWS SNS and AWS SES). Cloud server will also send the real time updates like belt buckled, unbuckled, charging etc. The cloud will also store the log files from the devices as well. AWS S3 is used as file storage. The DynamoDB is used as backend database for the system.

**THANK YOU**



**For More Details, Let's Connect**



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