Zelar@CB – IoT System to Care for Elder People Living in Isolated Rural Areas

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Abstract
Because senior citizens are at a higher risk of suffering serious complications from COVID-19, medical officials have cautioned them to stay at home. Their family and caregivers have also cut back on visits due to fear of spreading the virus to them. This situation has left many of the elderly increasingly isolated and without anyone to keep a watchful eye on their health. Zelar@CB is a wearable monitoring system that keeps track of a person's daily routine and alerts caregivers if it suspects something is amiss. The system detects unusual activity by monitoring the person's usage of electrical appliances to track if the user left the stove on or if there is a change in usage. The system sends an alert to family members or caregivers if it detects that. It can also detect when the user falls.
The system uses a LoRa Network, combined with a low-power wearable device that can be worn as a bracelet or embedded in clothing, and an energy monitor that connects to the user's electrical appliances. The wearable device is equipped with an accelerometer and a gyroscope. The gyroscope can detect if the user has fallen. The energy monitor is connected to the main electrical line of the home. The system monitors the power consumption of each electrical appliance and timestamps related to the users' daily activities. Zelar@CB also uses an artificial intelligence algorithm previously trained with data on the user's regular consumption of power.
The energy monitor uses Wi-Fi to send either an SMS or email alert, or a message through the mobile application we developed. Because the amount of data produced by the energy monitor is substantial, the monitor cannot use LoRa alone. The LoRa system implements a Fair Access Policy: 10 downlink messages and 30 seconds uplink time on air per 24 hours, perdevice. Although this is adequate for the rare fall detection events, it is not enough for regular energy consumption measurements.