WEARABLE SENSOR DEVICES FOR KIDS SAFETY

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Abstract: This paper describes wearable sensor devices for the safety of children. The big advantage of the wearable devices is that they can be used in any mobiles and doesn't require costly android mobiles. The main aim of the device is to help parents track their children easily. At present, in the market, there are various wearables available which help to know the step by step activity of children using Wi-Fi and Bluetooth facility available on the gadget. In any case, Wi-Fi and Bluetooth have all the earmarks of being a questionable medium of correspondence between the parent and Kid. The parent can send a content with particular catchphrases for example, "AREA" "WEATHER" "UV" "SOS" "BUZZ" "MAPS ", and so on, the wearable gadget will answer back with a content containing the ongoing exact area of the child which upon tapping will give bearings to the child's area on Google maps application and will likewise give the encompassing temperature, time. The proposed idea consists of a GPS module which continuously monitors and take clear photos of the child's location. It also contains a DHT11 sensor and an LDR sensor which monitors surrounding temperature and light intensity. When temperature and light intensity crosses the optimum values, the device gets activated and alerts the guardian with a message, and a guardian can get the location in an app.

Keywords: IOT, Children, Arduino, Safety, Wearable.

I. INTRODUCTION

The inspiration for our task originates from expanding dangers of losing little children lives in various cases, for example, seizes, losing their ways or fell into bore wells. As of late, two children are seized and killed in New Delhi. As indicated by NRCB report grab cases are expanded by 7.5% today, i.e., 82,999 cases were reported. Alongside these numerous children fell into bore wells and losing their lives. As of late, a baby fell into the borewell in Hyderabad. So our thought is to execute preventive estimates that are to be done consequently. At this age of technological advancements, everything known to us by utilizing the web. We can take care of the issue by utilizing the web. At the point when a child gets outside, we settle the gadget to them as a wearable device. By this, we can get the area of the child in an application. Alongside this, we additionally get the child's encompassing temperature, light power as the child fell into the borewell the temperature in bore wells is high and furthermore light force is very nearly zero the parents get a caution to versatile to their twitter accounts so everybody can see. The gadget contains Node MCU module, which interfaces with LDR sensor, GPS module, and DHT11 sensor and an alert framework. The information from these sensors will initiate the hub MCU which this way actuates the alert framework, and the GPS module shares area to cloud

II. SYSTEM DESIGN AND ARCHITECTURE

Gps ACM (Automatic Child Monitoring) is primarily made out of three square elements of indicating n Fig. 1, the child Port will be connected with the child dress, the school unit will be accessible in the school for the database upkeep of every last understudy during the school timings and the home unit will be with the parents which is utilized to discover the area of the child in a cases if the child is missed in some crowdie places like stop, shopping center and so forth..,
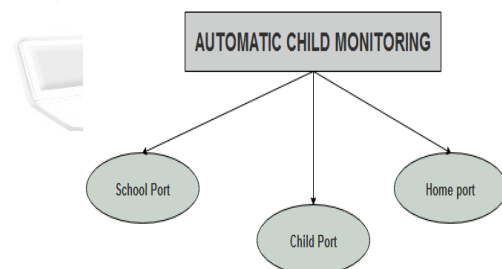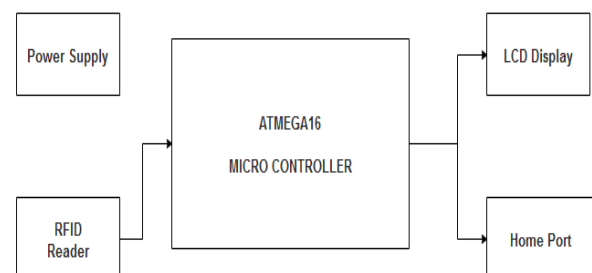

Figure 1: Block Diagram of ACM

Figure 2: Block Diagram of School Unit

The school Port square is clarified in Fig.2, which keep up the child databases. It comprises of RFID peruser which is

utilized to peruse the RFID card accessible with the child. Just with this card, the understudy accessibility is kept up.
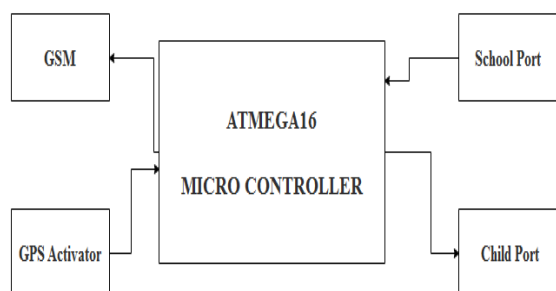

Figure 3: Block diagram of a home port

The home Port square is clarified in Fig.3, or, in other words, the parents. It serves to enacted the GPS module physically and discovers the area of the child if the child is being missed in any spots. The child unit is clarified which is appended with the child. It comprises of RFID card, GPS module which is utilized to discover the place of the child if the child is not found in group regions like stop, shopping center, shopping buildings, and so forth..,

III. HARDWARE SYSTEM DESIGN

A.GPS

GPS is a multiple– satellite-based radio situating framework in which every Gps satellite transmits information that enables a client to absolutely quantify the separation from the chosen satellite to his reception apparatus and to register position, speed and time parameters to a high level of accuracy[4]. GPS conveys with high affectability and precision with low power utilization. GPS module configuration is adaptable to oblige different RF obstruction.

B.GSM

The benefit of GSM is, with global meandering capacity in over 100countries, enhanced battery life, effective system structure for more affordable system extension, proficient utilization of range propelled highlights, for example, short informing and callerID. And also a wide assortment of handsets and adornments, high steadiness versatile fax and information up to 9600 baud, easy to use over air initiation, and all record data is held in a shrewd card, which could move from handset to handset is few among its benefits. The GSM module utilized in this venture is SIM300 which offers all highlights made reference to above and fills in as a medium among transmitter and beneficiary.

C. RADIO-FREQUENCY IDENTIFICATION (RFID)

Radio-frequency identification (RFID) is the remote application of electromagnetic fields to exchange information, for the motivations behind naturally recognizing and following tags appended to objects[2]. The tags contain electronically put away data. Electromagnetic acceptance from attractive fields fuels a few tags created close to the reader. A few sorts gather vitality from the cross-examining radio waves and go about as an inactive transponder. Different sorts have a neighborhood control source, for example, a battery and may work at several meters from the reader. Not like a scanner tag, the tag should not be inside the viewable pathway of the reader and might be implanted in the followed protest. RFID is one technique for Automatic Identification and Data Capture (AIDC). RFID tags are utilized in numerous businesses. For instance, an RFID tag joined to a car amid creation can be utilized to keep tabs on its development through the following construction system; RFID-tagged pharmaceuticals can be followed through distribution centers, and embedding RFID microchip in domesticated animals, and pets permit identification of creatures. Since RFID tags can be appended to money, apparel, and belonging, or embedded in creatures and individuals, the likelihood of perusing by and by connected data without assent has raised substantial protection concerns.[2] These worries brought about standard details advancement tending to security and security-related problems. ISO/IEC 18000 and ISO/IEC 29167 utilize on-chip cryptography techniques for unmanageability, tag and reader validation, and over-the-air security. ISO/IEC 20248 indicated an electronic mark information structure for RFID and standardized identifications giving information, source and perused technique credibility A radio-frequency identification framework utilizes tags, or names appended to the articles to be distinguished. Two-way radio transmitter-beneficiary called investigators or readers send a flag to the tag and perused its reaction. RFID tags can be either inactive, dynamic or battery-helped detached. A functioning tag has an onboard battery and intermittently transmits its ID flag. A battery-helped uninvolved (BAP) has a little battery on board and is actuated when within sight of an RFID reader.

A passive tag is less expensive and littler because it has no battery; instead, the tag utilizes the radio vitality transmitted by the reader. Notwithstanding, to work an uninvolved tag, it must be lit up with a power level of around a thousand times more grounded than for flag transmission. That has any effect on obstruction and an introduction to radiation. Tags may either be perused just, having an industrial facility relegated sequential number that is utilized as a key into a database, or might be perused/compose, where protest particular information can be built into the tag by the framework client. Field programmable tags might be composed once, read-numerous; "clear" tags might be composed with an electronic item code by the client. RFID tags contain no less than two sections: a coordinated circuit for putting away and handling data, tweaking and demodulating a radiofrequency (RF) flag, gathering DC control from the episode reader flag, and other specific capacities; and a reception apparatus for getting and transmitting the flag. The tag data is put away in a non-unpredictable memory. The RFID tag incorporates either settled or programmable rationale for preparing the

transmission and sensor information, separately. An RFID reader transmits an encoded radio flag to cross-examine the tag. The RFID tag gets the message and after that reacts with its identification and other data. This might be just a remarkable tag sequential number, or might be item related data, for example, a stock number, parcel or group number, creation date, or other particular data. Since tags have unique sequential numbers, the RFID framework configuration can segregate among a few tags which may be inside the scope of the RFID reader and perused them at the same time.

Readers

The kind of tag and reader can group RFID frameworks. A Passive Reader Active Tag (PRAT) framework has a detached reader who gets radio signs from dynamic tags (battery worked, transmit as it were). The gathering scope of a PRAT framework reader can be balanced from 1– 2,000 feet (0– 600 m)], permitting adaptability in applications, for example, resource assurance and supervision. An Active Reader Passive Tag (ARPT) framework has a functioning reader, which transmits examiner signals and furthermore gets confirmation answers from inactive tags. An Active Reader Active Tag (ARAT) framework utilizes dynamic tags awoken with a cross-examiner motion from the dynamic reader. A variety of this framework could likewise utilize a Battery-Assisted Passive (BAP) tag which acts as an inactive tag however has a little battery to control the tag's arrival announcing signal. Repaired readers are set to make a particular cross-examination zone which can be firmly controlled. This permits an exceptionally characterized perusing region for when tags go all through the cross-examination zone. Portable readers might be hand-held or mounted on trucks or vehicles.

D. ATMEGA16 MICROCONTROLLER

The ATMEGA16 is a low-control, superior CMOS 8-bit microcontroller with 8K bytes of in-framework programmable Flash memory. The gadget is fabricated utilizing Atmel's high-thickness nonunpredictable memory innovation and is good with the business standard 80C51instruction set and stick out. The on-chip Flash enables the program memory to be reinvented in-framework, or by a customary non-unpredictable memory developer By joining an adaptable 8-bit CPU inside framework programmable Flash on a solid chip, the Atmel ATMEGA16 is an incredible microcontroller which gives a very adaptable and savvy answer for some implanted control applications. The ATMEGA16 gives the accompanying standard highlights: 8Kbytes of Flash, 256bytes of RAM, 32I/O lines, Watchdog clock, two information pointers, three 16-bit timer/counters, a six-vector two-level intrude on design, a full duplex sequential port, on-chip oscillator, and clock hardware. Also, the ATMEGA16 is planned with a static rationale for activity down to zero recurrence and backings two selectable programming power sparing modes. The Idle Mode stops the CPU while permitting the RAM, clock/counters, sequential port, and interfere with the framework to keep working. The Power-down mode spares the RAM substance yet solidifies the oscillator,

handicapping all other chip capacities until the point when the following hinder or equipment reset.

Features
Advanced RISC Architecture

- 131 Powerful Instructions – Most Single-clock Cycle Execution
- 32 x 8 General Purpose Working Registers
- Fully Static Operation
- Up to 16 MIPS Throughput at 16 MHz
- On-chip 2-cycle Multiplier
- 16 Kbytes of In-System Self-Programmable Flash program memory
- 512 Bytes EEPROM
- 1 Kbyte Internal SRAM
- Write/Erase Cycles: 10,000 Flash/100,000 EEPROM
- Data retention: 20 years at 85°C/100 years at 25°C(1)
- Optional Boot Code Section with Independent Lock Bits
- In-System Programming by On-chip Boot Program
- True Read-While-Write Operation
- Programming Lock for Software Security

IV. EXPERIMENTAL ANALYSIS AND OUTCOME

The child Port which is attached to the child dress have an RFID card and will be activated when the child leaves from home to the school. If the child reaches the school and the RFID reader is reading an RFID card then no problem, the child is safe. In the case, if the child doesn't reach the school on time and the card is not being read then the controller waits for some time, and it sends information to both the caretaker in the school and also for the parents.
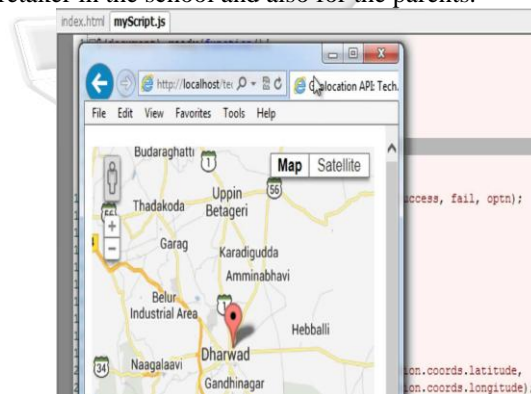

Figure 4: child position

The GPS module available with the child also gets activated and sends the location information to the parents mobile. The Fig.4 shows the position of the child by the GPS module.

The home unit in which parents are noted, as already said the information regarding the child missing and position of a child when the child is being missed will be received in the mobile unit which the parents have. The automatic and manual operation of GPS is done by this mobile which is

handled and controlled by GSM module. The Fig.6 shows a GSM module.

Figure 5: GSM module

The school Port which has RFID reader to check the children availability. It maintains separated databases for all students. If the child is found missing it ill automatically intimate to the caretaker whose is available at the school and also to the parents.

V. CONCLUSION

The child safety wearable device is capable of acting as a smart IOT device. It provides parents with real-time location, surrounding temperature, humidity, light intensity.The smart child safety wearable device can be enhanced much more in the future by using highly compact ATMEGA16 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory.

VI. FUTURE WORK

For reconnaissance of the Child's environment, to get a more explicit photo of the area, the wearable gadget can likewise contain a camera module joined in it. Versatile is given a preview alternative on tapping on that the surroundings depiction is acquired to the portable.

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