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Smart Document Tracker

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Abstract: *The proposed system is smart document tracker. The document can either be a hard copy of the document or soft copy. The system deals with the hard copy of documents. Although nowadays all work is computerized but then too massive amount of previous data is in the system of hard copy. Users don't want to lose a track of the data. Further, elaborating on the title. This system is smart because of its unique feature of detecting whether that clip attached to file contain any paper in it or not? Now comes tracker. Tracker means the system is going to track that file containing document wirelessly. An accelerometer and a BLE module will work as a tracker and will provide the user with necessary information. This advanced system will help many as mismanagement and misplacing of documents is one big issue in big companies, banks etc.*

Keywords: *Accelerometer, Bluetooth, flex sensor, PSOC, tracker, document.*

I. Introduction

The world is moving away from traditional hardcopy documents to advanced softcopies which are easy to transfer and handle. But, still, there are many sectors or organizations where maintaining the hard copies of documents is mandatory (e.g. Banks, Police records, Courts, etc). At such places, we can see piles of files and paper bundles stacked together. In such systems, lots of manpower is needed and the documents can be altered or misplaced easily. [1]This system aims at solving this unavoidable problem using PSOC BLE. PSoC (Programmable System-on-Chip) is a family of microcontroller integrated circuits by Cypress Semiconductor. These chips include a CPU core and mixed-signal arrays of configurable integrated analog and digital peripherals

II. Ease Of Use

The proposed system being a SOC is very light in weight. It is very handy. The circuit is mounted on a plastic paper clip, which not >30 grams. The most important factor to be considered is that the system will hardly have any maintenance, except for the change of battery when the previous batteries expire. Secondly, this tracking system uses Bluetooth technology, so there will be no need for internet connection. It can be used in sectors where using the internet is not advisable, like banks, courts, ports, etc. where sensitive information is stored and the internet connection can lead to leakage of information therein.

III. Literature Review

According to PricewaterhouseCoopers, finding a lost document will cost a company $122 on average. It is also estimated that 7.5% of all company documents are lost completely. Let's assume your company works with 10,000 documents – an extremely light figure. That would mean, about 750 of those documents are doomed to be lost, ultimately costing your company around $91,500. Plus, if you had to recreate any lost documents, the time and supplies involved would make that number jump well over the $100,000 mark.

Or what if a customer calls in with questions about a specific invoice? With a paper based filing system, the employee taking the call would have to hang up, walk to the storage area, search for that specific invoice, walk back to their desk and return the call. What if they need a copy? Then that employee must walk over to the fax machine, send a copy, return to the storage area and refill the document. This process can take up to 20 minutes for one simple question.

IV. System Discription

A. *Bluetooth Low Energy*

BLE is Bluetooth 4.0 also called Bluetooth Smart. The primal reason of BLE is to produce energy-efficient smart devices majorly used for IoT purposes. Each BLE device is provided its own 128 bits unique identity number (UUID) which is given by Bluetooth Special Interest Group. The major advantage of BLE is that it can even work with devices with conventional Bluetooth which makes any BLE system versatile in nature. This also reduces the cost of any particular application. The power consumption is reduced by using low

power Bluetooth techniques such as Sniff, Hold, and Park. Due to which even a PSoC device can work for a couple of years on a single 3.3v Li-ion battery if programmed for full low power consumption mode.

B. *BLE Protocol*

Every BLE device has two roles to perform while communication. These two profiles are Generic Access Profile (GAP) and Generic Attributes (GATT). With each profile comes device role selection and by its role the services can be programmed or pre-established services can be used.

GAP: Generic access profiles are used to establish and maintain the connection between devices. A device can be Central or Peripheral or in rare cases both (not simultaneously). A Peripheral advertises the advertisement package to show its presence, this advertisement package can contain data, address, information, etc. A central device receives the advertisement and decides to either to connect the device or not or to ask some more information.

GATT: Generic Attribute profile contains information of services which give the device its task which it is going to perform (in this case to scan for students devices.) Just like GAP, GATT consists of two device roles Client and Server which mostly contradict with GAP roles i.e. GAP Central is generally GATT client. A Client can send requests to the server to perform attributes and can modify the attributes. A Server stores and executes the attributes.

C. PSoC Pioneer Board

The PSoC board consists of a Baseboard and a BLE device which can be seen in the below figure.

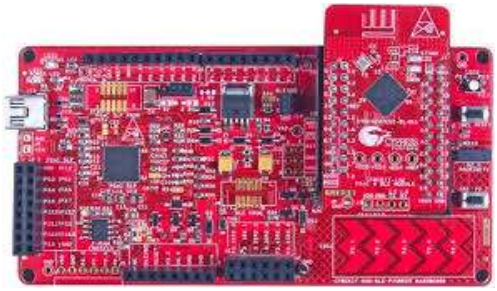

Fig 1: PSoC Pioneer Board

The PSoc BLE Pioneer Board has a PSoC 5 core which is generally used for board applications of controller and USB to UART conversion. Whereas main BLE module gives simple access to the new PSoC 4 BLE gadgets, while keeping up the recognizable CY8CKIT-042 PSoC 4 Pioneer Kit plan impression. Architecture of BLE module

V. Block Diagram

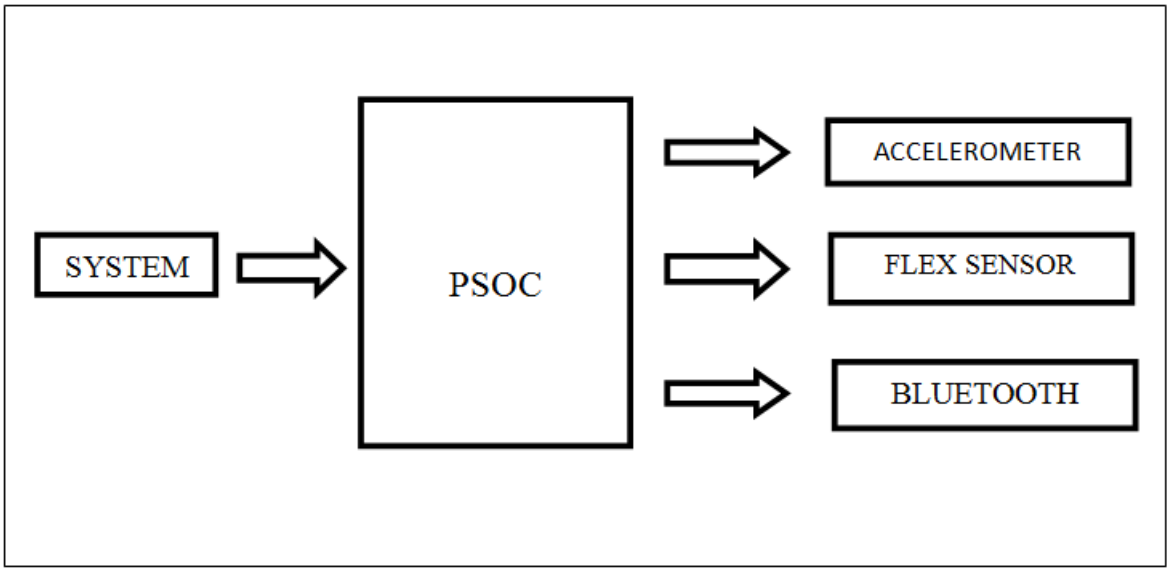

Fig 2: Block Diagram

VI. Methodology

Interface the accelerometer with the PSOC board. Interface the flex sensor with the PSOC board. Calibrate readings of axes of the accelerometer and different bending positions of flex sensor. Check the readings on Tera term or Putty software, to get the readings. After the desired readings are acquired mount the whole structure on the equipment i.e. clip. Test whether the expected results are obtained or not. If everything works in a proper way then move ahead for its separate independent power supply. Work on power supply circuit for the whole circuit.

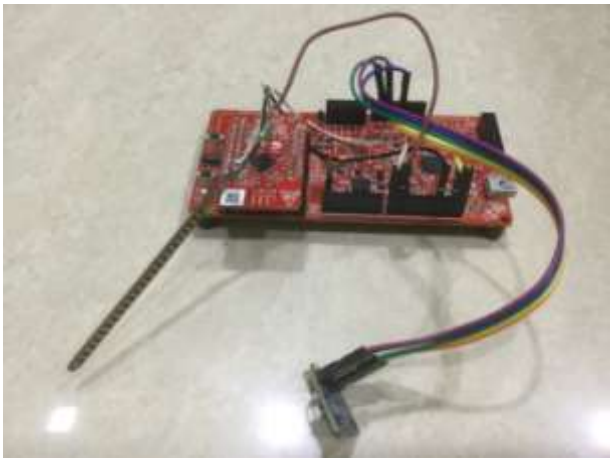

Fig 3: Circuit Setup

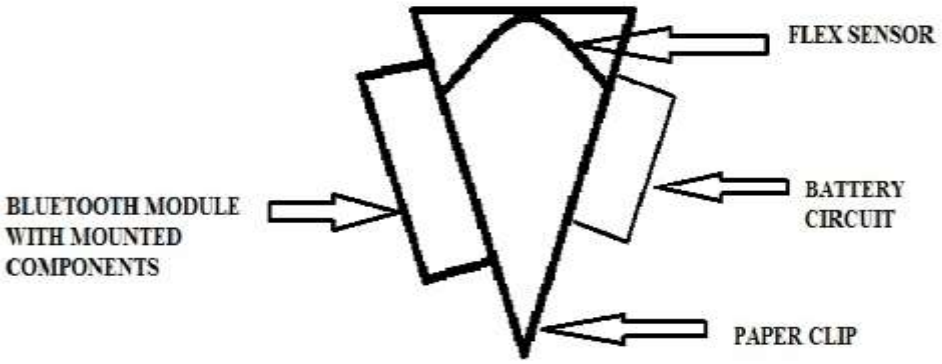

Fig 4: Proposed structure of hardware

VII. Results

The accelerometer and flex sensor when interfaced with the PSOC and calibrated display the following reading on the terminal. These readings are obtained when the system moves and accelerometer senses change in axes and the flex sensor shows change in resistance when the flex sensor is bend.

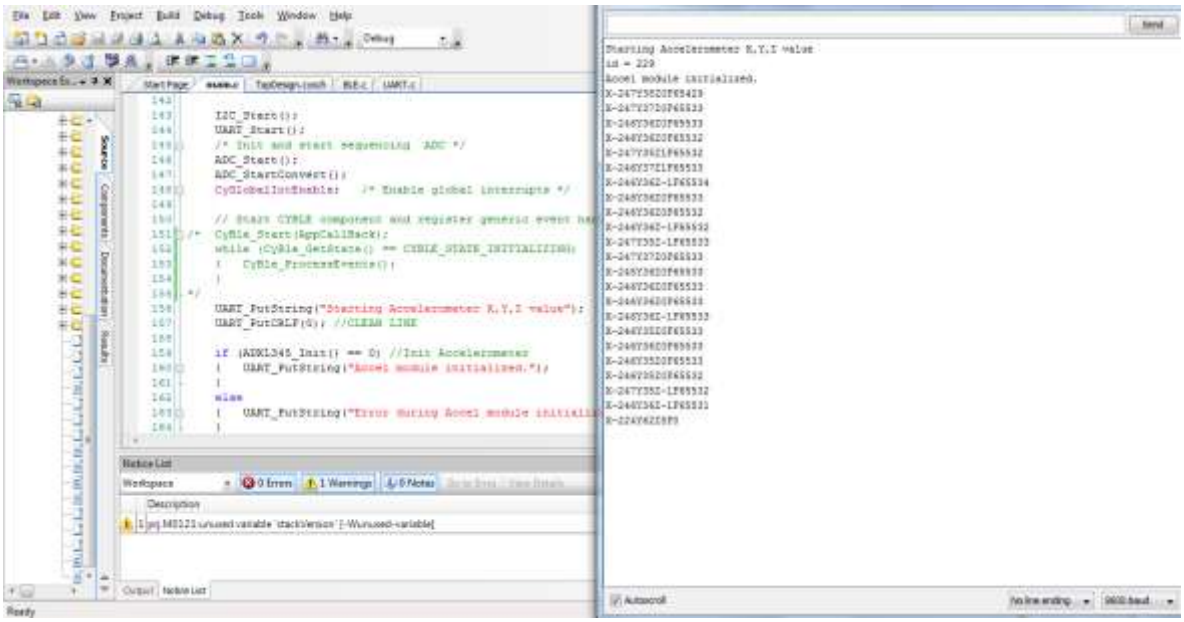

Fig 5: Readings

VIII. Conclusion

As this will the great product to track not only documents but also any moving packages in goods load and transport system. This product will definitely reduce the human efforts and time consumption to track or locate the object.

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