

A SOPHISTICATED IOT HAND STICK FOR AGED PEOPLE

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Abstract - The advancement of science and technology using the present trend is pacing at high speed. The present trend is Internet of Things (IoT) based technology, applied in various applications like operation of household appliances, agriculture implements etc. This makes the work easier and faster with saving of considerable amount of energy. In the present work, a prototype hand stick is designed based on IoT equipped with the GPS locator, SMS alert, Medicine reminder and a LED torch light system. This will enable the aged persons to carry out their routine duties with ease, comfort and convenience. A Global Position System (GPS) locator is fixed to the conventional hand stick. With this the location of the person can be easily traced out by the family members. In case of any threat or emergency, an SMS alert shall be sent to the mobile number fed into the device on pressing the switch provided on the hand stick. The IoT hand stick is equipped with a simple medicine reminder device. By feeding the stipulated time of medicine, the device will give a buzzer sound. The timings can be further altered if required. As an additional feature to this hand stick a LED torch is installed on it. A switch is provided on it to switch ON or OFF the torch whenever necessary. Thus this compact, handy, and user friendly hand stick mounted with IoT device can make the lives of the aged people safe, secure and comfortable.

Keywords: NX 10.0, Arduino Microcontroller, GPS module, GSM module, Google Maps, Medicine reminder (Buzzer)

I. INTRODUCTION

Advancement of age makes the people to be dependent on other. So, people seek the help of their offsprings in their old age. Old people lack in sight, hearing, strength and above all the ability to walk around without any help. So, they take the shelter of their children. When alone if they have to perform their routine work, it is not easy to them. Hence man has devised a supplements like hearing aids, walking sticks etc., The walking stick has become an integral part of the old people by which they take its support to walk around, to sense objects, to balance etc., Walking sticks give greater stability and balance for the user, providing a wider base of support whilst maintaining good posture. They give the user greater confidence when walking, and assist with pain reduction and weight redistribution, due to the frame or stick being leant on for support. Older or Aged people using walking sticks are a common sight on any street. Walking sticks are used to aid balance, take weight and to continue to allow their users to walk. In older people, the risk of falling increases with increasing age. Physiological changes associated with ageing, reduce balance, increase reflex times and thus, increase the risk of falling. The walking stick can assist older people to maintain balance and minimize the risk of falling. Walking sticks are available with different material, model, design, length, cross section, thickness, aesthetics, economics etc., It is not that easy to select a hand stick by a person, various parameters have to be considered for selection and use. But people ignore and neglect these parameters and casually purchase the walking hand sticks. The walking stick has three main parts, they are:

1. Handle - by which the stick is held.
2. Shaft - straight part of the stick.
3. Ferrule/Tip - A ferrule is usually rubber to protect the end of the stick and give user better stability.

Internet of Things:

The Internet of things (IoT) is the network of physical devices, vehicles, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to collect and exchange data. A thing in the internet of things can be many different types of things. It can be smart phones, tablets or sensors, but we should not limit ourselves to simply phone and tablets because with the development of the internet and telecommunication technologies in general, the types and numbers of different devices which are capable of communicating and connecting with each other are constantly growing.

Objective:

- The suggested device uses GPS module and can detect the location of the user in terms of latitude and longitude. The location of the user can be sent to family as SMS by using GSM module. In operation the location of the user will be measured by GPS module and this location is taken by the microcontroller and fed to the GSM module.
- When the emergency switch is pressed, SMS to the predefined mobile number will be sent.
- The medicine reminder will remind the user about the medicine timing with the help of buzzer sound.
- The LED torch which is installed on stick can be used by the user whenever necessary.

II. MODELLING AND ASSEMBLY OF WALKING STICK

Modeling is done using NX 10.0. NX (Next Generation) is an advanced high-end CAD/CAM/CAE, since 2007 owned by Siemens PLM Software. Siemens NX software is an integrated product design, engineering and manufacturing solution that helps you deliver better products faster and more efficiently. NX is a Feature based Parametric and Associative modeling. One of the important and unique features which NX offers apart from Design Features and Freeform Modeling is Synchronous Technology. With the options available in 'Synchronous Modeling group' of the ribbon bar in the 'Modeling Application' tab, the user can modify complex 3D models without the model history tree and without knowing the feature relationships and dependencies. This application provides solid modeling, assembly

modeling, drafting, finite element analysis, NC and tooling functionalities for mechanical engineering. The modeling and assembly of IoT Hand Stick is Shown in Fig.1

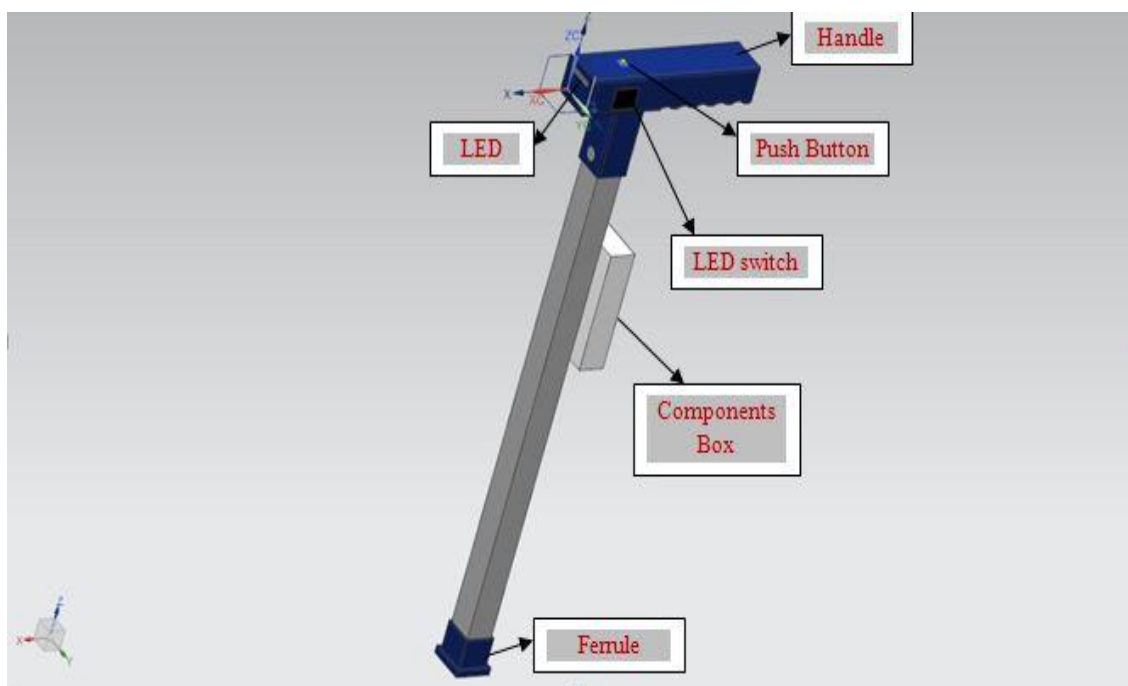


Fig 1: Modelling and Assembly of IoT Hand Stick

III. DESCRIPTION OF PROTOTYPE MODEL

Aluminum has lower density and higher thermal co-efficient. Hence aluminum material sticks are opted for the prototype construction. An embedded system is a system which is going to do a predefined specified task. It is even defined as combination of both software and hardware.

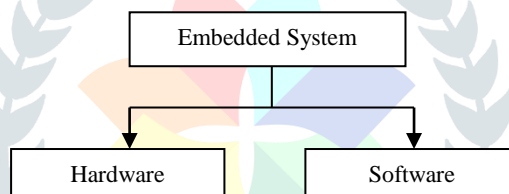


Fig 2: Block diagram of Embedded System

A. Hardware Components:

The main basic components are:

- Arduino microcontroller
- GPS module
- GSM module
- Buzzer
- LED

B. Software description:

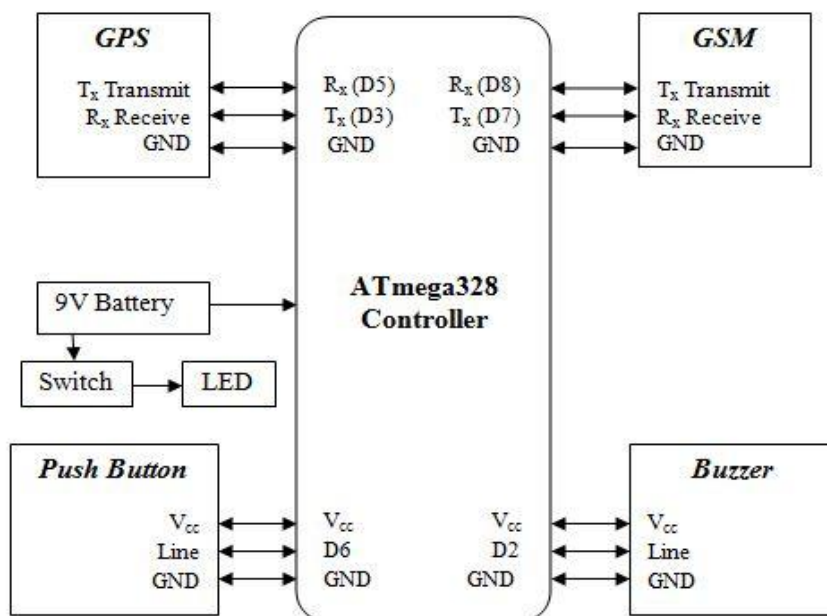
- Arduino IDE:

The Arduino Integrated development environment (IDE) is used to write the code. IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and is also capable of compiling and uploading programs to the board with a single click. There is typically no need to edit make files or run programs on a command-line interface. The coding is programmed in C programming language and uploaded to the Arduino board.

- Google Maps:

Google map for Android is used to display the location of the hand stick on a Smartphone application. The Google maps handle access to the Google Map servers, displays map with user location.

The block diagram of the IoT Hand Stick circuit is shown in Fig.3. The block diagram shows the overall view of the system. The blocks that are connected here are Microcontroller, GPS, GSM, Buzzer, Push Button, Power supply.



Power Supply:



Fig 3: Block Diagram of IoT Hand Stick Circuit

The hardware interfaces to microcontroller are GSM modem, GPS Receiver, Buzzer and Push Button. As shown in the block diagram the GPS modem is interfaced to the Arduino controller, Tx and Rx of GPS are connected to Rx (D5 Pin) and Tx (D3 Pin) of Arduino respectively. The GSM modem is interfaced to the Arduino controller as Tx and Rx of GSM are connected to Rx (D8 Pin) and Tx (D7 Pin) of Arduino respectively. The Buzzer is interfaced to the Arduino controller, as V_{cc} and Signal of buzzer are connected to V_{cc} and D2 pin of Arduino respectively. The Push Button is interfaced to the Arduino controller as V_{cc} and Signal are connected to V_{cc} and D6 pin of Arduino. The common GND is shared to all hardware interfaces. A 9V power supply is given to all sections. A Program has been developed in the Arduino IDE software and uploaded to the Arduino board.

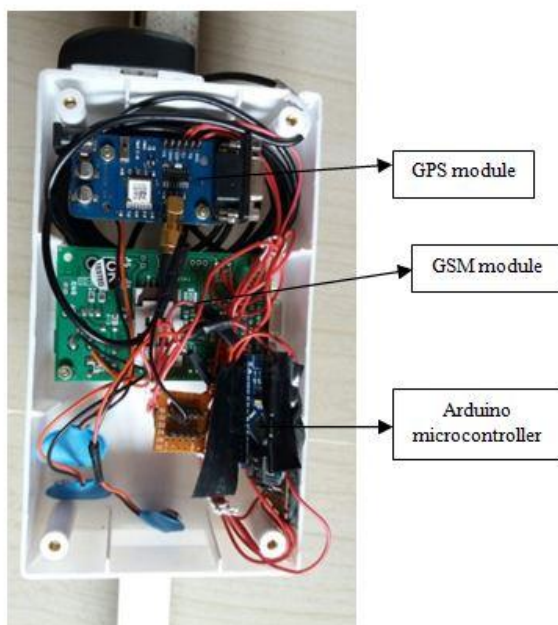


Fig 4: Circuit of System



Fig 5: Prototype of Hand Stick

IV. WORKING OF MODEL

1. Whenever the push button is pressed, the location (Latitude and Longitude) of user is sent to the mobile number, which is predefined in the program, as SMS which is used to locate the exact position of the user on Google Map.
2. A Medicine reminder is also equipped with the Hand Stick. The medicine timings are predefined in the program. GPS modem provides the time which is used by the controller to give a buzzer sound as an alarm to remind the user about medicine timing.

- As an additional feature to this hand stick a LED torch is installed on it. A switch is provided on it to switch ON or OFF the torch whenever necessary.

V. RESULTS

1. Demonstration of GPS and GSM modules:

In order to demonstrate operation of the GPS and GSM modules, a smart phone is configured with Google map application. The location of the hand stick and the mobile to which the SMS is sent appears on Google map. Fig. 6 shows the SMS received and hand stick location on Google maps.

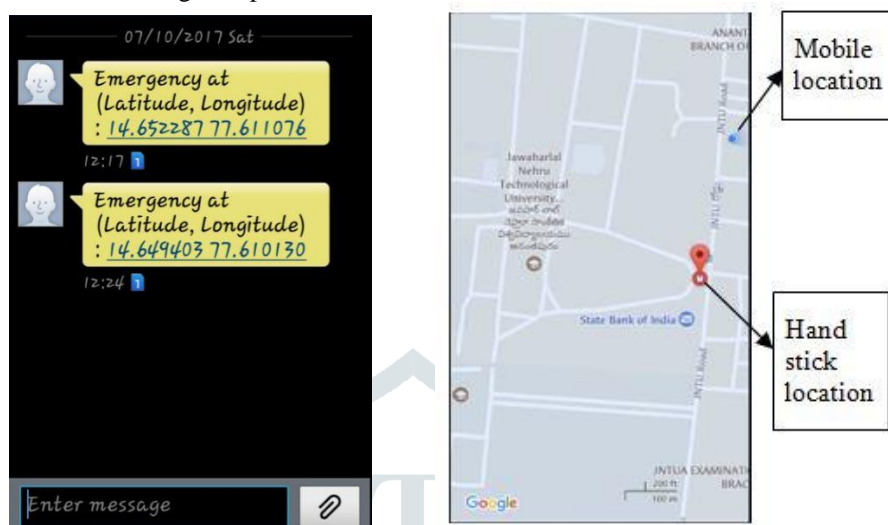


Fig 6: Demonstration of GPS and GSM modules

2. Demonstration of Medicine Reminder:

The medicine reminder is tested with the stipulated medicine timing provided in the Arduino code. The results are provided in the Table1.

Table 1: Test of medicine reminder

S.No	Medicine Timing	Buzzer Timing
1	9:15	9:15
2	13:30	13:30
3	20:15	20:15

From the above table it is observed that the medicine reminder of the IoT Hand Stick is working as per the requirement.

VI. CONCLUSION

In the present work an attempt is made to design and model a sophisticated IoT had stick which is very useful for the aged and physically challenged society. The main features of this work are a GPS and GSM system is there in which a circuit is programmed such a way that by the press of the button a message consist of latitude and longitude can be sent to the concerned number fed in to the program. Therefore when the person using the stick then he/she can press the button and the message goes to the concerned number showing the location of the person. The second feature is a medicine reminder in which the time for which the medicine has to be consumed can be programmed and a buzzer will ring at that time to take the medicine. The third feature is an LED light which can operate by switch ON or OFF. Therefore these three features are mounted on the hand stick which is made so easy to operate and is user friendly.

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