Faculty of information technology

IS 1900-Bussiness Project

Multitasking cane

GROUP NUMBER: 10

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Signatures of supervisors: Date of submission:

1. …….. 11/30/2021
2. ……..

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3. 1.0. Introduction

People have to face many difficulties since their early old age. And some people have to face emergency accidents that make them even disabled. They want assistance for doing their day today activities, and it might even be a disturbance to people around them.

Most of the times their guardians are their children, and those people have their job and other social activities to attend. So, it's difficult for them to always guide and make sure elderly person's safety. Also, when people get old, they don't like to hear other people's opinion and follow their guide specially when those people are younger than themselves. They tend to do their things by themselves but make mistakes due to their older age. Specially they tend to forget things such as to take their medicine on time, and sometimes they may overdose their medicine and that can be life-threatening for them. They also like to hang out with their peers and chat with them. And sometimes they go to monthly clinics to be treated their chronic illnesses.in such cases if they left alone, they can be exposed to various accidents their poor eyesight and walking difficulties.

So, we decided to make their lives easier by inventing a Multitasking Cane with an obstacle indicator, a Medi box, a water bottle reminding system, a night light system and a text message notification system. Hence, any person with disabilities will be able to use this cane very easily with all these features and make their lives safer and easier. Also, their guardians can minimize the constant worry about them.

Although there are many competitive products in the market to our cane it is hard to find all the features our cane has in one cane at the existing products in the market. Although we have extra features in our cane, we hope to the same for the prices of other similar products available in the market.

3.0. Literature Survey

When we improve our project, we have come across many similar projects. By studying we identify some techniques from them. But our project is different than other projects because we add many features to our project. We can identify those differences as below.

2.0.1.FTC Smart Walking Stick

This walking stick is used to facilitate elderly people. Which is includes these functions. Such as a strong Aluminum body, an FM radio which is included as well to help keep the user entertained, an Emergency buzzer, LED night light system. We also add some of those features to implement our cane.

2.0.2. IoT-based Smart Cane

This cane was designed by a team of students from the American University of Sharjah. The design project features are voice alert feature that allows google maps, sensors, and cameras. Also, the handle of the cane has an emergency push button that allows the user to send alert signals to a guardian's mobile phone. This system is designed to help people with visual impairments. Also, this cane has an obstacle detecting system.

We can get these types of projects as similar projects of our multitasking cane project. But our project is different than those projects. Because our purpose, features, objectives are different from those projects. Our project has main five systems. Those are obstacle detecting systems, medicine reminder and storing systems, water bottle reminding systems, dark light systems, and emergency message systems. As well as we mainly focus on elder people because that they have many difficulties in their day today life. The main problem is getting medicine at the time. We got a better solution for that main problem. And we focus on their safety. And the special thing is this cane can be used also by blind people any retarded people.

3.0. Aim and Objectives

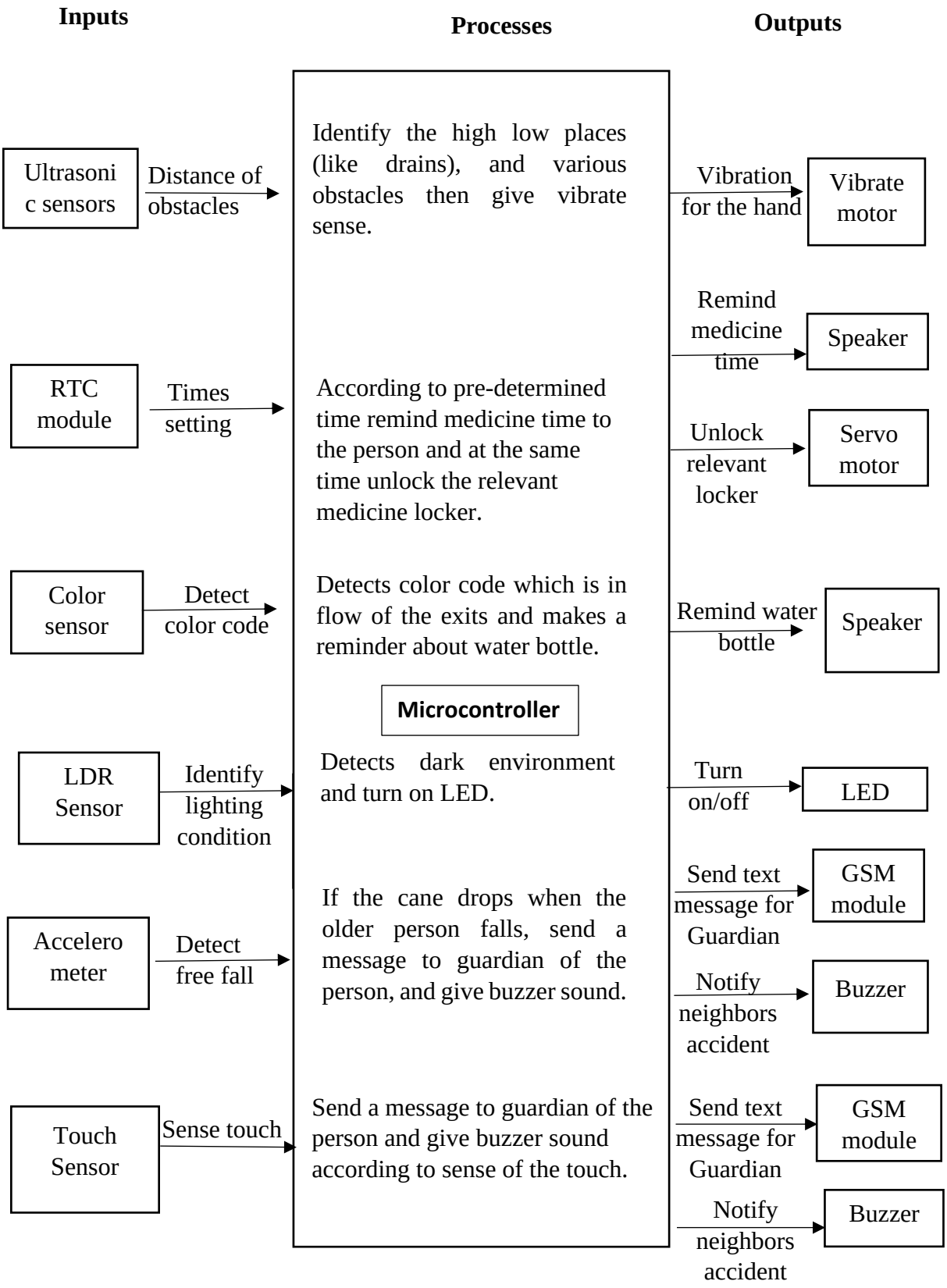
3.1. Aim:

Implement a smart cane to provide protection for the elderly and to facilitate their day-to-day activities.

3.2. Objectives:

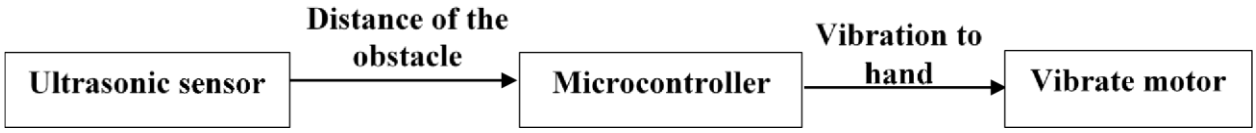
1. To identify obstruction when visually impaired people walk here and there for doing their daily activities.
2. To avoid vision problems at night and in dark places.
3. To add a water bottle reminding system.
4. To remind them of their medication schedule and make it easier to take their medicine.
5. To send a message immediately in an emergency.

4.0. System Description



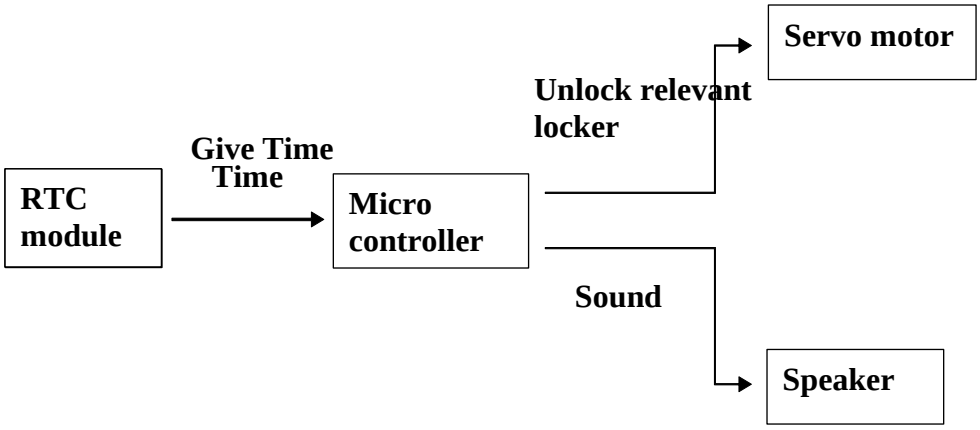
4.0.1. Obstacle Detecting System

Old people usually face too many difficulties because most of them have visual impairments. so, they cannot identify obstacles when they are walking along. So, we use an ultrasonic sensor system for our cane. The purpose of this sensor system is to identify the high places, low places (like drains), and various obstacles in front of them. And send a message about it to the person by using vibration technology Ultrasonic sensors detect the distance of the obstacles (1m before reaching them) and inform about to older person using vibrate motor (Informs with vibrate sense to the hand)



4.0.2. Medicine Remind System

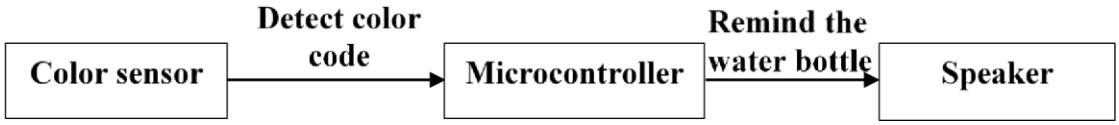
Old people not being able to get their medicine at the right times. Because of old people have memory impairments (dementia) and many diseases (diabetics, cholesterol, heart problems, etc.). so, providing proper medicine is very important but very difficult to handle when you are alone. Older people often carry a walking device with them. so, our purpose is to add a medicine box to the device and add a system that can inform at what time their medicine should be taken. According to our solution guardians can set three main times in which we need to give the right medicine at the right times for the old person. We add a box with separate three compartments. And those compartments are opened by using a servo motor according to a pre-set time, by using the GSM module. so, we set a time notification alarm system. These compartments can store pills according to the discretion of their guardians. This system reminds them of what times when they should take medication. This will reduce the risk of overdose medicine or taking the wrong pills. **User (Guardian of the older person) can give three times to RTC module. According to these time RTC module remind medicine time to person using speaker with sound. At the same time unlock the relevant medicine locker using servo motor.**



4.0.3. Water Bottle Reminding System

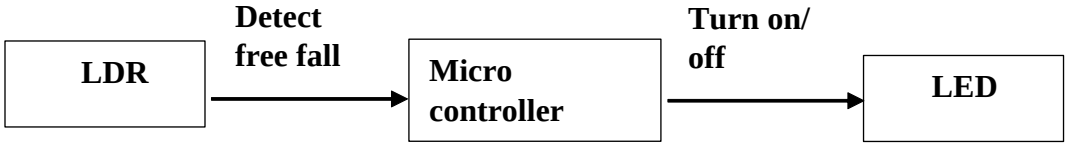
Water is the essential thing if they want to take medicine. It is not a big problem when they are inside of the home. But if they are outside, they cannot get water easily.

Color sensor detects color code which is in flow of the exits and makes a reminder about water bottle using speaker.



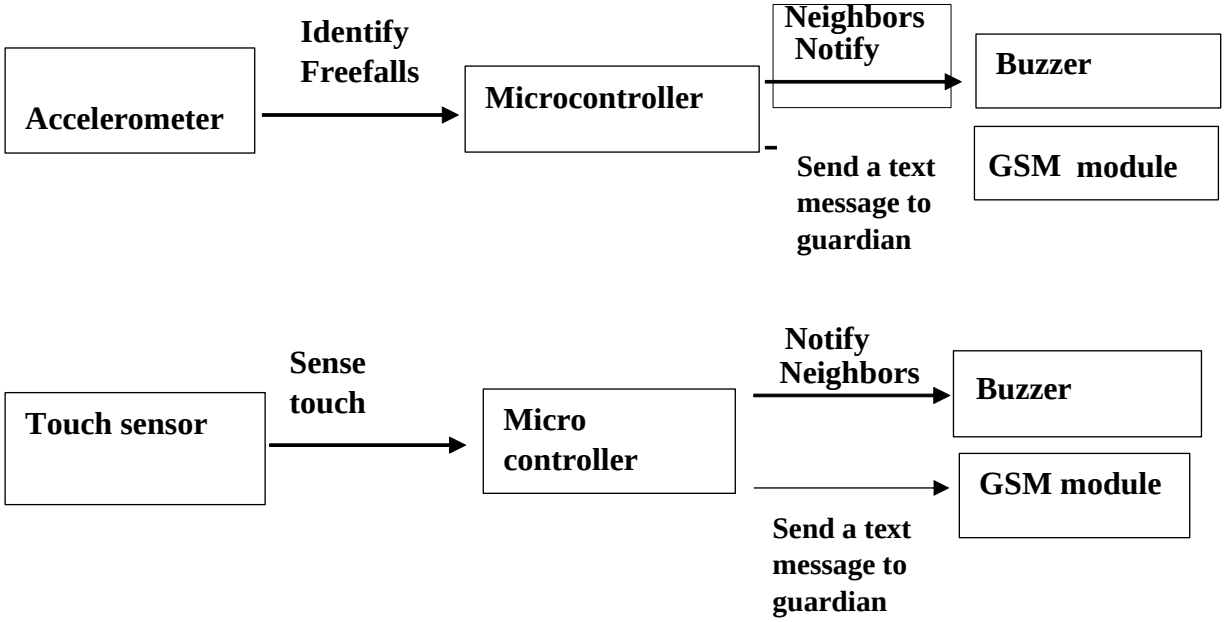
4.0.4. Night Light System

Old people must face many difficulties in dark places or at night. so, we decide to add a night light system to our cane. **LDR detects dark environment and tern on LED which is in the cane.**

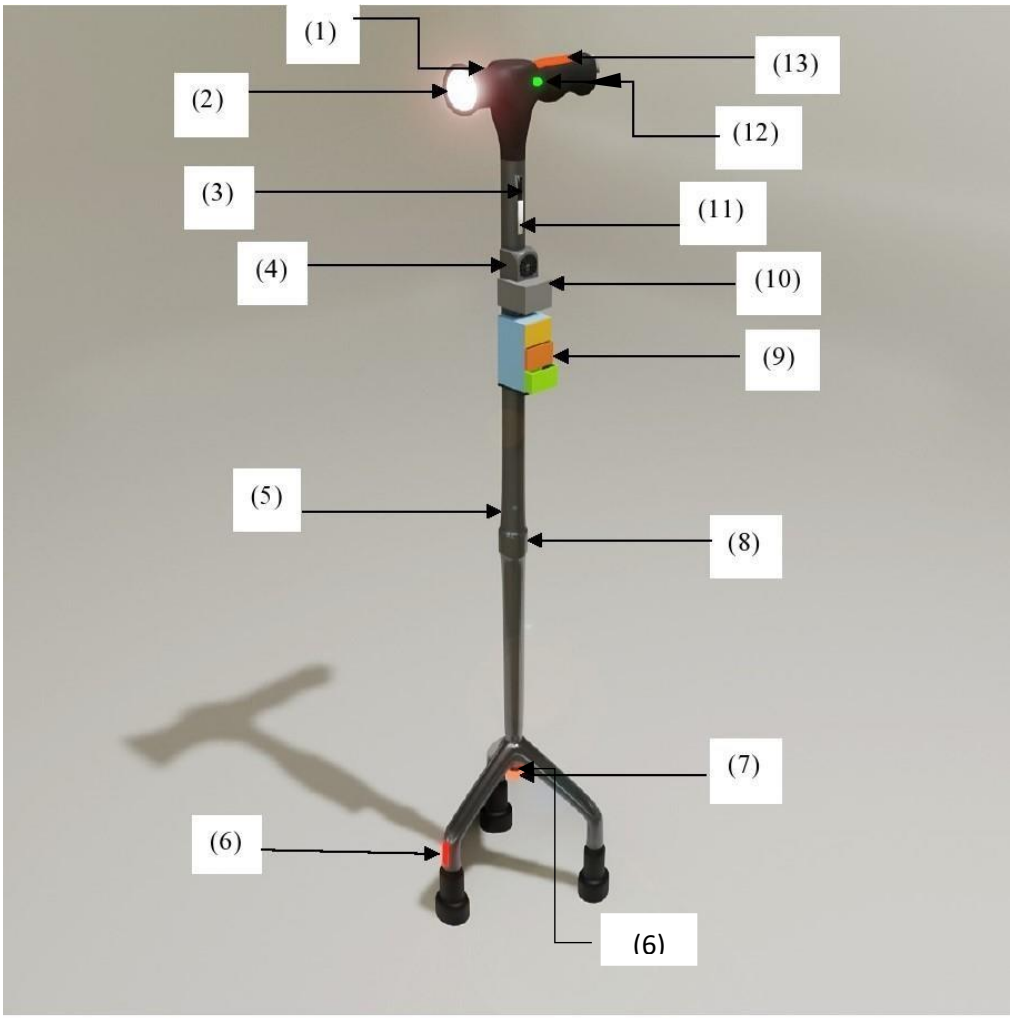


4.0.5. Emergency Message Sending System

When an older person wants to inform an emergency to their guardians who can use our text message system for it. We use touch sensor and accelerometer to detect the emergencies. When use the touch sensor, emergency message is sent by using the GSM module for their guardians. But sometimes they cannot use this touch sensor in the emergency. Ex: In case of drop the cane (when fallings) So, we decide to add accelerometer to detect the falling. If the cane drops when the older person falls, immediately accelerometer detects these fallings and send a message also the guardian of the person. And, by using buzzer we inform people around older person that he needs help.



4.1. 3D Diagram



1.LDR Sensor

2.LED Bulb

3.RTC Module

4.Speacker

5.Accelerometer

6. Ultrasonic Sensors

7.Color Sensor

8.Buzzer

9. Medicine Box

10.Circuit Box

11.GSM Module

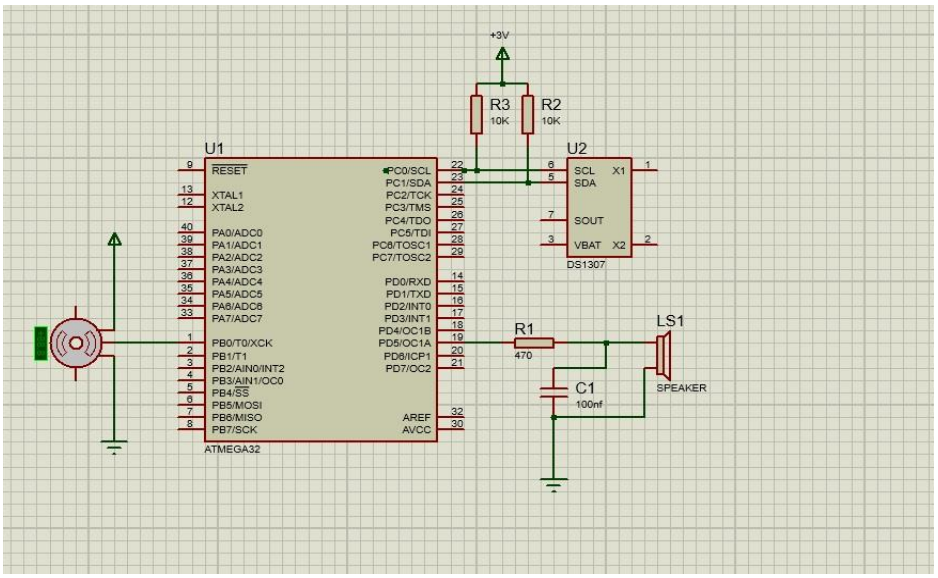
12.Switch

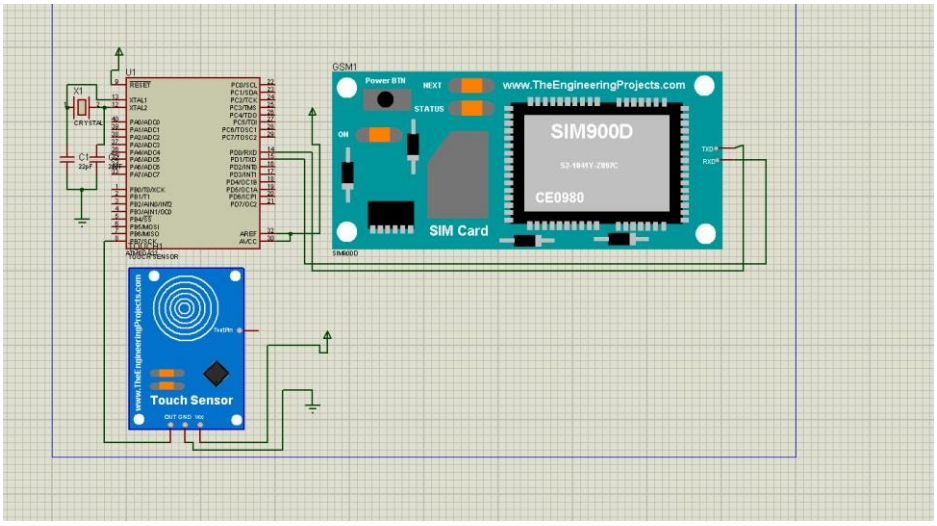
13.Vibrate Motor

5.0. Testing and Implementation

According to our multitasking cane project, we tested some parts and implemented some of them by using simulating software. But we could not totally implement those parts since we are furthermore studying those things. We have tested some coding parts for each individual system, but we did not test the total coding part.

As well as we implemented some circuit diagrams for individual parts.





6.0. Action Plan

	Group member	Task Duration	Duration	Starting Date	27-Sep	4-oct	11-oct	18-oct	25-oct	1-Nov	8-Nov	15-Nov	22-nov	29-Nov	6-Dec
1	205064P	SimulIDE Simulation testing	1 week	27 Sep											
		Programming and testing	3 weeks	3 Oct											
		Ultrasonic sensor, vibrate motor, Accelerometer	8 weeks	18 Oct											
2	205053G	SimulIDE Simulation testing	1 week	27 Sep											
		Programming and testing	3 weeks	4 Oct											
		RTC module, Servo motor	8 weeks	18 Oct											
3	205084C	SimulIDE Simulation testing	1 week	27 Sep											
		Programming and testing	3 weeks	4 Oct											
		Buzzer, LDR sensor, LED	8 weeks	18 Oct											
4	205086J	SimulIDE Simulation testing	1 week	27 Sep											
		Programming and testing	3 weeks	4 Oct											
		Color sensor, speaker	8 weeks	18 Oct											
5	205097T	SimulIDE Simulation testing	1 week	27 Sep											
		Programming and testing	3 weeks	4 Oct											
		GSM module, Touch sensor	8 weeks	18 Oct											

7.0. Cost Estimate

ultrasonic sensor (2)	**= RS. 400**
Color sensor	**= RS. 840**
LDR sensor	**= RS. 100**
Touch Sensor	**= RS. 100**
RTC module	**= RS. 110**
Servo motor	**= RS. 340**
Wires	**= RS. 150**
GSM module	**= RS. 840**
Buzzer	**= RS. 35**
Microcontroller	**= RS. 330**
Vibrate motor	**= RS. 130**
Accelerometer	**= RS. 480**
Speaker 01	**= RS. 50**
Torch Bulb 01	**= RS. 15**
PVC	**= RS. 300**
18650 batteries	**= RS. 350**
Total Cost	**= RS.4920**

8.0. Individual Contribution

Name : Madhuwantha S.N. (205064P)

My workforce : Ultrasonic Sensor and Vibrate Motor

Old people usually face too many difficulties because most of them have visual impairments. so, they cannot identify obstacles when they are walking along. So, we decided to use an ultrasonic sensor system for our cane. This sensor system can identify the high places, low places (like drains), and various obstacles in front of them. And send a message about it to the person by using vibration technology Ultrasonic sensors detect the distance of the obstacles (1m before reaching them) and inform about to older person using vibrate motor. We intend to use ultrasonic sensor, vibrate motor for that process.

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. High-frequency sound waves reflect from boundaries to produce distinct echo patterns. Therefore, we can easily identify obstacles by attaching this sensor to the cane. Our ultrasonic distance, level, and proximity sensors are commonly used with microcontroller platforms like Raspberry Pi, ARM, PIC, Arduino, Beagle Board, and more.

Our Short-Range sensors offer the opportunity for closer range detection where you may need a sensor that ranges objects as close to 2cm. These are also built with very low power requirements in mind, as well as environments where noise rejection is necessary. The ultrasonic (HC-SR04) sensor can be used to detect obstacles in front it, measure the distance from the object and take action based on the distance.in this part we will attempt to use the ultrasonic sensor (HC-SR04) to measure the distance of obstacles in front of them. After the identifying the obstacles, vibration of a person's hand through a microcontroller using a vibration motor is intended to indicate that there is an obstacle ahead.

Name: Karunarathne G.L.I.S. (205053G)

My workforce: (RTC Module, Servo Motor)

RTC Module

When designing the medicine box part, we want to remind time and unlock the relevant medicine locker. So, I decided to use the DS1307 module to implement my task. We want to accurately keep track of minutes, hours, and days for implementing our project. Due to some of the important features of the DS1307 module, it was selected by me. Such as the ability to generate programmable square waves, low current use (under 500nA in battery backup mode), I2C serial interface, capability to install a 3V CR2023 backup battery. It has X1 and X2, VBAT, GND, SDA, SLC, SQL/OUT, and VCC pins. When we design the Arduino RTC, we want to connect the SDA and SCL pins of the DS1307 RTC to the Arduino pins A4(PC4) and A5(PC5).

Servo Motor

I decided to use an SG-90 servo motor to implement a medicine box.

I began by researching the purpose and operation of these components using internet sources. Also, we looked at prices of similar components to the project. I went through the internet and found more frequently used RTC Modules. Then I studied about it. Finally, I select the DS1307 module to implement my task. Also, I found its features and I identify how I want to use this module to complete our task. I also studied relevant circuit diagrams and how I use the C programming language to complete our task. And also, I thought about the figure of the cane and how I manage my component without harm to it.

I am studying Servo motor and relevant speaker for to use our project. I already found many details about my components. But I want to confirm that details by studying furthermore. Also, I found information about microcontroller, and also, I am hardly studying about data sheets of those component and how I use my C language knowledge to do our total project completely and accurately. Also, I developed some coding parts of my task, but I could not complete them yet.

Name : Ranatunga R.J.K.H.N (205084C)

My workforce : Night light system & Accident alarm system

Night light system

We decided to introduce a light bulb system that can be used by older people at night. Connecting this to our cane can avoid the inconvenience of carrying a torch. We decided to use LED bulbs(3V) for this. It can be lit when needed to use by user.

Accident alarm system

A sound system is connected to the cane using a touch sensor to alert the user in the event of an accident. Touching this touchpad will trigger a buzzer sound and the guardian or a neighbor may know that the user is in danger.

LDR Sensor

LDR sensor has a resistance that changes with the light falls on it. When light falls on it resistance decrease and increases in the dark. During the dark LDR gives a high resistance as a result the voltage passing through the base will become less than 5V so the LED glows. And at bright places LED torch will turn off.

Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

Name: Rathnayaka R.M.S.S (205086J)

My workforce: Water bottle Reminding System

Color Sensor

A color sensor detects the color of the material. This sensor usually detects color in RBG scale. This sensor can categorize the color as red, blue or green. These sensors are also equipped with filters to reject the unwanted IR light and UV light. so we decided to use this sensor to detect when this older person is crossing the color line. Color sensors contain a white light emitter to illuminate.

Examples

Some of the examples of color sensors available in the market are TCS230, AS73211, TCS3200, TCS3400, TCS34715, TCS34727, colorPAL from parallax, SEN-11195, Lego Mindstorms EV3, etc.…

Besides RGB some color sensors can also detect different colors. so we decided to use like that sensor to avoid possible inconvenience.IR and UV radiations are to be filtered out to determine the accurate color of the material. Sensors also contain programmable light to frequency converters. These sensors are usually very thin and can be easily interfaced with a microcontroller.

So in this way the color sensor detects the color and intends to send a message to remind the water bottle through the microcontroller if the older person cross this color line.

Name : Samarawickrama S.G.D.N. (205097T)

My workforce: GSM Module, Touch Sensor

GSM Module

When making emergency alerting system, we want to send a massage to guardian of older person.so, I decided to use SIM900D GSM module to implement this task. This one can embedded in the customer applications. There are many features are in the SM900D. It can send voice, SMS, Data, and Fax in a small form factor and with low power consumption. It has a sim card holder and a battery holder. There are three LEDs on it and those LEDs indicate power states and by overserving can get visual feedback on what's happening with it. By using GSM module guardian can automatically receive a text massage.

Touch Sensor

Touch sensors work like a switch. When they are subjected to touch, pressure or force they get activated and acts as a closed switch. When the pressure or contact is removed, they act as an open switch. Capacitive touch sensor contains two parallel conductors with an insulator between them.

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