IBM NALAIYA THIRAN

PROJECT REPORT

Team ID	**PNT2022TMID41838**
Project Name	**Project – IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION**

TEAM LEAD : Delcypriya A

TEAM MEMBER 1: Dhangamalar D

TEAM MEMBER 2: Durga K

TEAM MEMBER 3: Devi

Abstract of the Project

This paper is based on IOT (Internet of Things). As we know in present era everything is based on digital technology. Human being is going to connect each other by using mobile network. This paper proposes an SMS based solution to reduced parentsinsecurity and schools to track children's in realtime.

Different devices are connected with a single device through. The concerned device is connected to mobile via SMS. The device can be used by stockholders to track children and get real time data. The main Advantage of the proposed system is send location by using mobile network (GSM). Here a prototype model (device) is created which is hardware based. The work comprises ARDUINO UNO as microcontroller, along with GPS and GSM module.

This device will also have the facility of different status of children by measuring the speed of hand movement of children.

1.1 Introduction

1.1.1 Background

“Nowadays, crimes always occur. This scenario not involves by adults only, but also happen to children. Parents concern more about serious cases such as missing children, abduction and rape. The crime also involve by school children have been reported in newspapers. Although the school have guards that posted on school grounds 24 hours a day, that simply not enough to monitor the student. To overcome these problems the authorized need to provide additional security measure”

“Some parents do not have the privilege to send or fetch their children at school. Parents usually give a hundred percent of trust to their children to travel themselves. Those children would have to travel by bus, bicycles or walking. Children who travel to and from school by themselves without monitor by their parents are exposed to danger along the way.” Besides that, parents usually received late

information if anything happen to their children such as accidents or involved in criminals.

School principals and teachers also wait there student until to get in school. So, they waste a lot of time.

Development IoT based children monitoring in school will help parents to ease their worries. The system requirement for tracking the child and describe the implementation feature. To implement such system a GPS with high accuracy is required, if the low accuracy GPS is used in this system,. System may give some error of that child location. In this system we send the message name TRACK to the device and the GPS of that device send the longitude and latitude to the GSM module , GSM module receive the information about longitude and latitude of that child location , further this message will be send to the user for tracking the location of that lost child. The Arduino is a small micro controller which is used for controlling whole process in this system .This paper provides the concept for developing a low cost, high accuracy and user friendly system by using Google map. Google map can improve the accuracy of GPS. This paper presents research that applies

Google map to describe the Child Tracking System. Improvements are proved by Google map that make high accuracy.

1.1.2 Problem Statement

More family's spent their time for work and social duties but since Children are gift of GOD they need care of family. The current situation of our country is not confortable for monitoring children in school. With the absence of child monitoring system it is hard to monitor the where about of children.

The poor performance of family's and school to monitor the children's by Collaboration. The use ofmanual system to connect family's and there students most of time teachers or other persons are intermediate between the students and family. In our country families and their children have no direct contact in school when they need to contact their children if the families came to school.

Lack of child monitoring in school affect the child's behavior. Under age children may be premature in the way they act and

places to be. Most of human behavior is shaped in childhood stage, in order to get morally acceptable behavior child monitoring system is necessary.

Children are prone to many accidents. Safety of children is very critical since children cannot protect themselves.

1.1.3 .Objective

Propose IoT Based Children Monitoring System in School in ETHIOPIA context.

1.1.3.1. Specific objective

- To track and get exact location of children
- It increase the interaction of family's with their children
- They whole day information about children
- To store and retrieve the necessary data on the families mobile phone using real time sensors
- Child has the ability to connect different sensors
- Family's Feeling safe about children
- Allows a parent to more easily locate the troubled child

1.1.4 Requirement analysis

The requirements of the project are categorized under hardware and software tools required as follows.

1.1.4.1 Software tools required

Software tools used for this system development are all free as stated below.

Table 1 software tools required

List no	SW Tools required	price
specification		
1	Operating system	Window 10 Free
2	IDE	Arduino 1.8.5 Free

Table 1:SW specification

1.1.4.2 Hardware Tools Required

Table 2 Hard ware tools

List no	HW Tools required	price
1	Arduino Board	UNO R3 board 500
2	GPS Module	NEO-6M-O-001 400
3	GSM/GPRS MODULE	SIM A6 pro 700
4	RAM	4GB
5	Hard disk	500GB

Table 2:HW specification

1.1.5 Methodology

Based on the problem statement the project is proposed to develop smart agriculture:

- **Gathering information**: previously there were approaches that were implemented to solve child monitoring system.

Many schools and families use different types of approaches to locate and monitor children.

- **Modeling**: Based on the information we have gathered through interviewing the problems of the current monitoring system in our context designed the flow chart, system design and ER diagram for the project.
- **Hard ware and Software**: the hard ware construction and software implementation with Arduino software.
- **Evaluation and Conclusion**: Based on the proposed system conclusion and evaluation of work is done.

Development process of the system

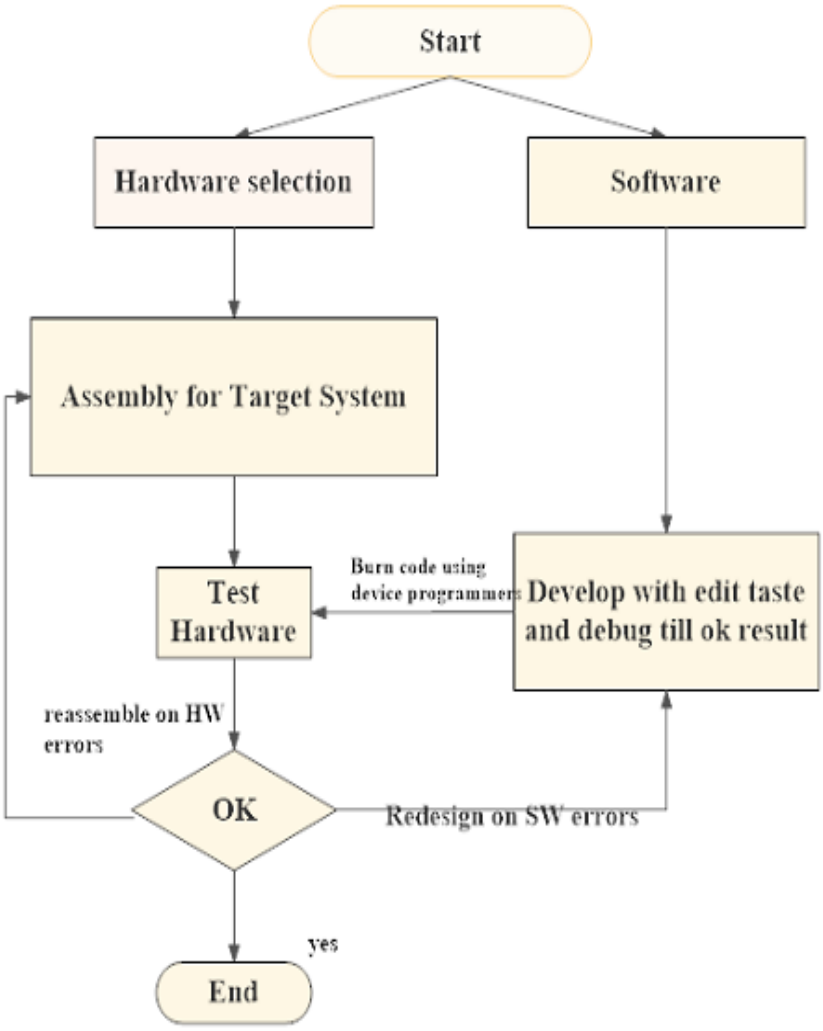


Figure 1: project organization

1 .1.6 Scope and Limitation

Scope

The scope of this project is limited to develop SMS platform and Hardware implementation prototype. The project contribution is

sensing the children status and displaying the output. This system also provides the real time data to be available on mobile phone, so that it can send text message all the sensors data gathered from the children.

Limitation

The major challenge may be to spread the knowledge and awareness about the system to the various stakeholders, particularly the family's .The cost of infrastructure modernization and maintenance is another challenge. In order to use this system the family's need to link with global network and technology this may lead to go for hardest work. The other limitation of this project is the availability of global network around the rural area of the country.

The A6 GSM/GPRS module only work on 2 G(second generation) network and NEO GPS module work on high strength of USART.

1.2 LITERATURE SURVEY

1.2.1. Existing Systems:

Some of the systems that have been implemented to make the IoT based Children Monitoring System in School used as literature survey.

IOT Based Smart GPS Device for Child and Women Safety Applications

“Android based solution to aid parents to track their children in real time. Different devices are connected with a single device through channels of internet. The concerned device is connected to server via internet. The device can be used by parents to track their children in real time or for women safety. The proposed solution takes the advantage of the location services provided by GSM. It allows the parents to get their child‘s location on real time by SMS.This device will also have the facility of Emergency help key (SOS), if anyone presses the key, automatic help message will be sentto 3 registered mobile numbers on Server.” [1]

Children Tracking System using ARM7 on Android Mobile Terminals

“The proposed system includes a child module and two receiver modules for getting the information about the missed child on periodical basis. The child module includes ARM7 microcontroller (l pc 2378), Global positioning system (GPS), Global system for mobile communication (GSM), Voice playback circuit and the receiver module includes Android mobile device in parent’s hand and the other as monitoring database in control room of the school.”[2]

Crossbow Motes technology

“Crossbow Motes are very small devices that contain a microprocessor, radio transceiver, and interfaces to connect simple sensors such as smoke, temperature. The Crossbow Motes device; these Motes are a new and quickly-growing technology. But there are some disadvantages to use these devices such as: Finite Coverage, affected by trees & walls High cost.” [3]

Gotcha® System

“Gotcha it is child monitor that helps parents to protect their children at malls, supermarkets, parks, or everywhere. Gotcha alerts the children and parent whenever they wonder farther than a safe distance. Gotcha is an invisible electronic leash between parents and their kids.” [4]

Global Positioning System (GPS) Technology

“GPS is a lightweight device that attaches to the child and is designed to help parents or guardians keep track of their children and prevent this kind of tragedy. The device alleviates the stress and panic that appear when children get lost, or are difficult to reach. It emits a series of loud beeps, allowing parents to find their children quickly and easily. This is also an ideal solution for disabled adults, the elderly and daycare centers.” [5]

1.2.2 Proposed System

Most parents care about their children school safety, so we propose an idea to solve the problem. We invent the device in this project Smart tag for children. And put some sensors in it.

The sensors will detect children’s status then send text message. They check the children status on mobile phone.

I proposed new futures from the existing system if the student has no in school compound it send the location of student to school principle or class monitor teacher.

The sensors I use GPS (NEO-6M-O-001) the sensor display value on the text message. There are four status of children was displaying on text message. Four statuses are “Sleeping”, “Studying”, “Exercising”, and “Dangerous”.

If the data detected by NEO-6M-O-001 is change continuously more than 3 seconds, the status will change to “Exercising”. If the children don not exercise the status will be change to “Studying”. According to the GPS we can know the children rout from home to school. If the children absent from school or out of school during class the status change to “Dangerous” we can track the children. When during Dangerous mode the tag send text message to their families.

The three statuses are depending on speed. The NEO-6M-O-001 is measure speed by kilometer by second.

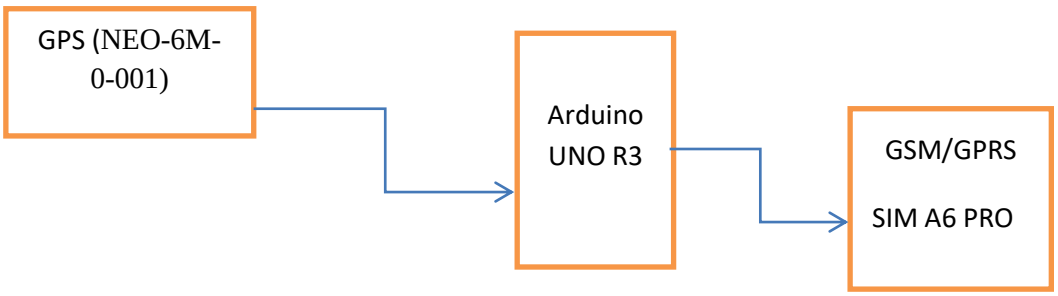


Figure2: Block diagram

ARDUINO UNO-R3

The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital input/output pins, 14 digital input and output pins, 6 analog inputs, a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a reset button. The ATMEGA 328P has 32kB of flash memory for storing code.[9]

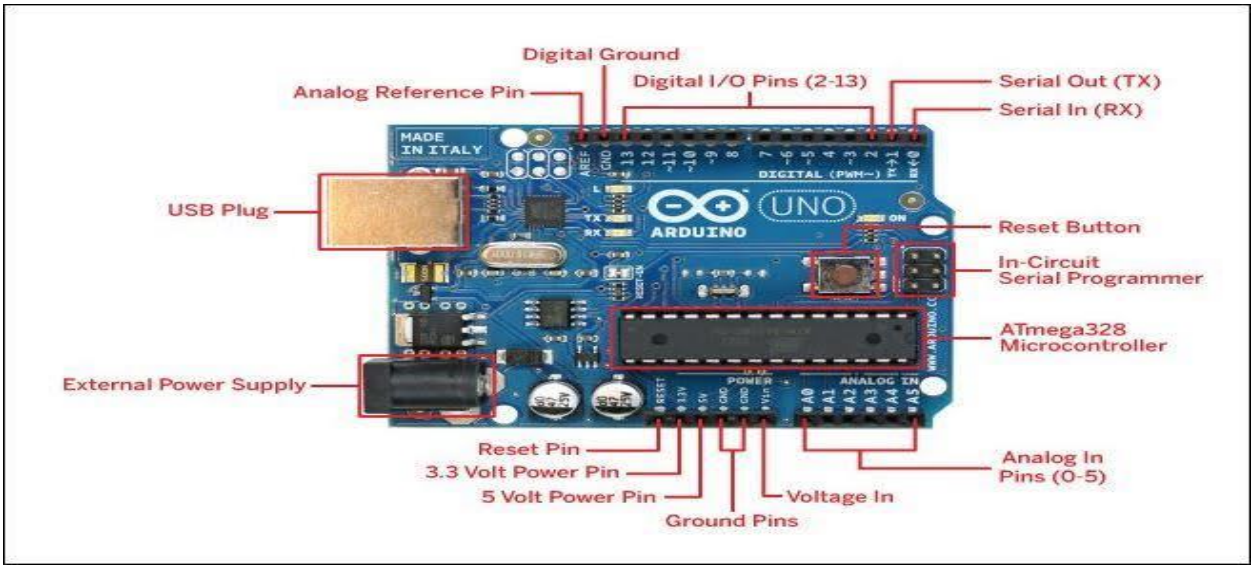


Figure 3: Arduino UNO R3

A6 GSM/GPRS MODULE

The module works to add both GSM features (voice call or SMS) and GPRS features. The advantages of these modules are the VCC and TTL serial level that have 5V voltage level. Module to accomplish almost anything a normal cell phone can; SMS text messages make or receive phone calls, connecting to internet through GPRS, TCP/IP, and more. To top it off, the module supports quad-band GSM/GPRS network.[10]

Figure 4: A6

NEO-6M-0-001 GPS MODULE

The NEO-6M GPS receiver module uses USART communication to communication with microcontroller or pc terminal. It receives information like longitude, latitude, altitude, UTC time etc.NEO-6M GPS module that can track up to 22 satellites and identifies locations anywhere in the world. [11]

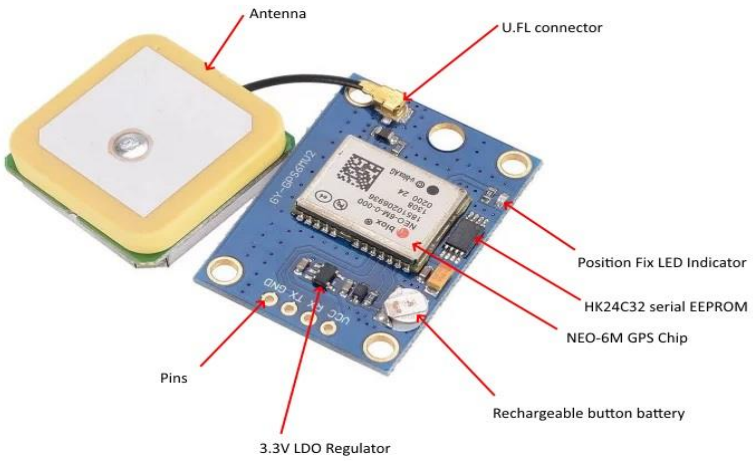


Figure 5: NEO-6M-0-001

Communication Technologies:

To achieve communication abilities many technologies and standards have been proposed. Mobile-phone technologies (2G/3G/4G), Wi-Fi enabled Arduino like Wemos D1, Ethernet Shield, GSM Module.

4.2.3. Feasibility

Economically (Real life implementation)

Since this project proposes prototype model for evaluation purpose it need to be studied in the future work for the

implementation purpose. All the materials we have used for the project model are not the actual materials to be used in the real life. Economic feasibility will be handled by taking school field study sample.

Economically (Development consideration)

The cost of proposed system in terms of developing is described in **Chapter one page 20** system requirement analysis part. Total cost estimation according to the design of the system is **1600 ETB**. The School monitoring system with the mobile sender device has the advantages for availability, management and running costs comparing with the previous monitoring system.

With the implementation of the system the contribution to economical case would be efficient management of time, and human resource

Technically:

Since we use accurate sensing materials the necessary data are gathered in technical way due \to this controlling of children status and check their security is also technically feasible. The

school monitoring system with the website has the advantages for availability, management and running costs comparing with the previous monitoring system.

Behavioral /political feasibility:

The proposed system is behaviorally feasible and cannot cause any harm in the environments. The project would be beneficial because it satisfies the need of the customer.

The project is free from any political issue this means the project cannot interfere with any political issue and in reverse case any political issue cannot interfere with the project.

1.3. SYSTEM ANALYSIS & DESIGN

1.3.1. Requirement Specification

1.3.1.1. Functional requirement

- The system shall allow the user or family's to register phone number.
- The system shall provide report for the ongoing day to day activity both for the schools and families.

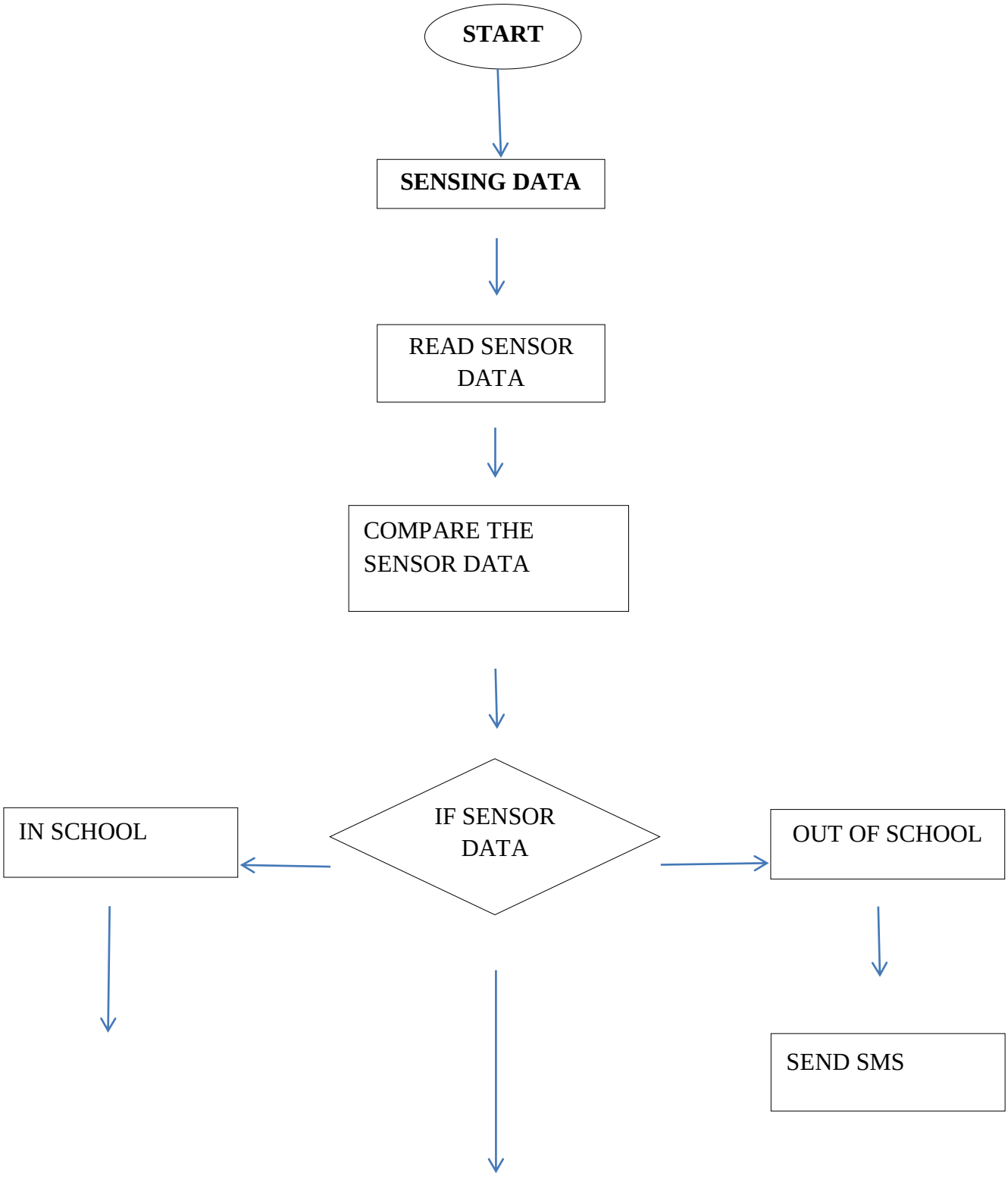
- The system should provide all the sensed data from each sensor send by text message.
- The system shall check the sensed data with the threshold value of each input.
- The system shall notify the user while the input value exceed or become below the threshold value.

1.3.1.2. Non Functional requirement

- The system shall give the accurate result for different factors using sensing material as a result their will not be any distractive damage.
- The system shall be maintainable whenever faller occurs.
- Sometime the GPS module works on rainy condition.
- The system is cost effective comparing to the features it provides.
- The system shall be usable within a few minutes training.

Flow Chart Diagram

Children monitoring flow chart


START
SENSING DATA
READ SENSOR DATA
COMPARE THE SENSOR DATA
IF SENSOR DATA
IN SCHOOL
OUT OF SCHOOL
SEND SMS

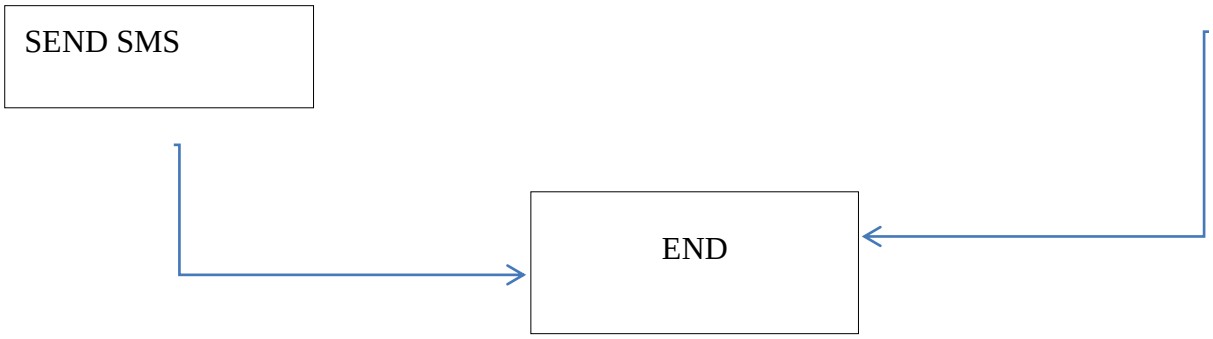


Figure 6: FLOW CHART

1.3.2. Algorithms

Children monitoring System

Step 1: Start the process.

Step 2: Initialize power is supplied to microcontroller and sensors.

Step3: Check the speed and location of the children.

Step 4: Send all data gathered by text message.

Step 5: Display real time data that is sent to mobile phone.

Step 6: Check if the location will be different from set location.

Step 7: send text message.

Step 8: After the process completed, it moves to original state.

Step 9: Stop the process.

1.4. RESULTS AND DISCUSSION

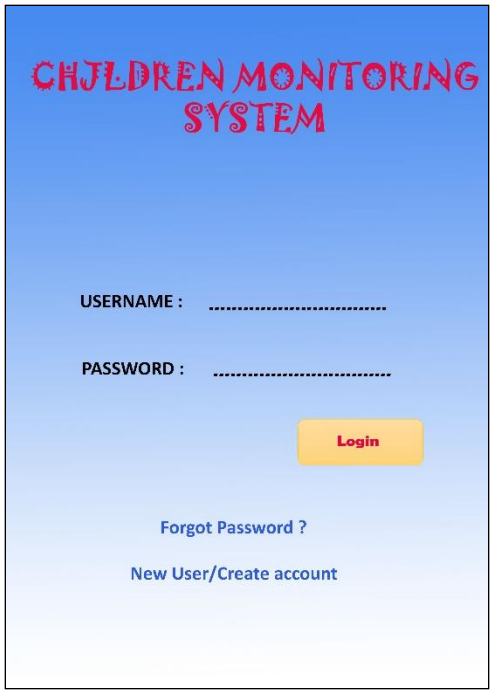
1.4.1. DISCUSSION

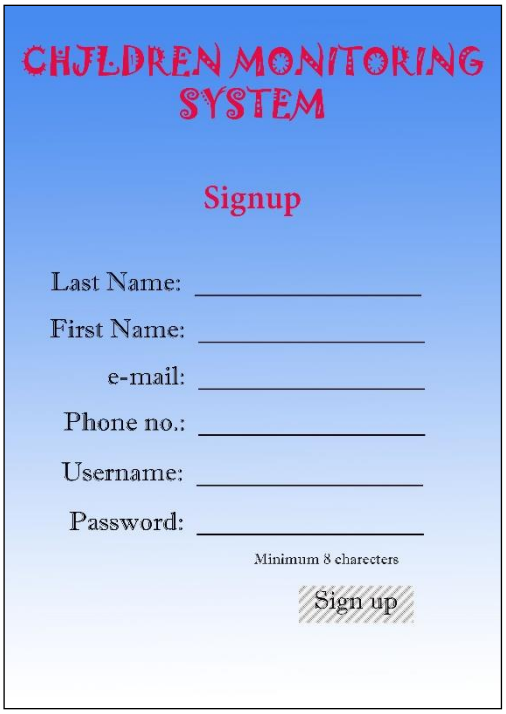
When the children during movement the NEO-6M-0-001 measure the speed by kilometer by second (KMPS) and it compare with threshold value. Depend on the measured value it conclude the status and send text message for family.

It also detects the location and tracks the children. It have the location of school if the current location of the children is not same with school location it send the current location of the children.

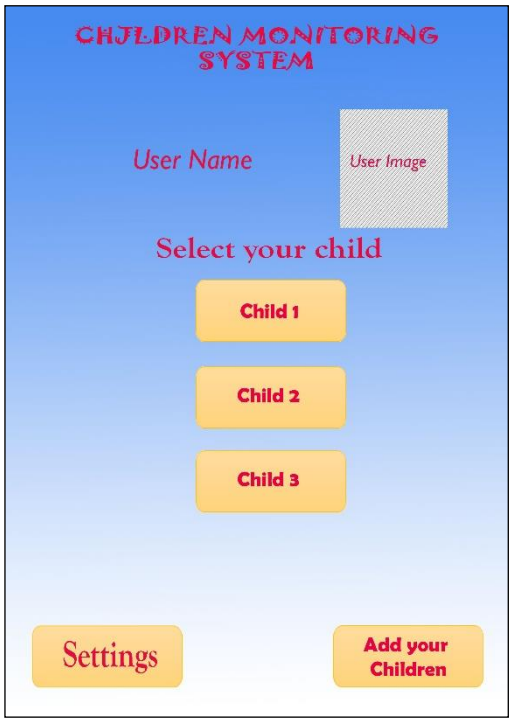
1.4.2. Result

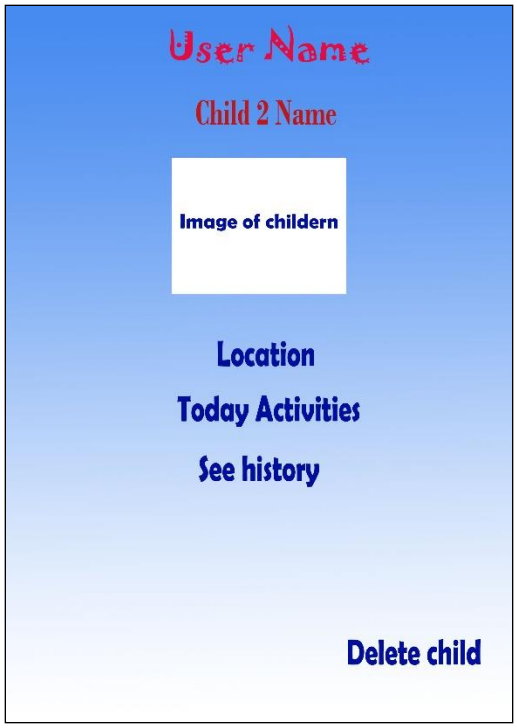
Some result from children monitoring system

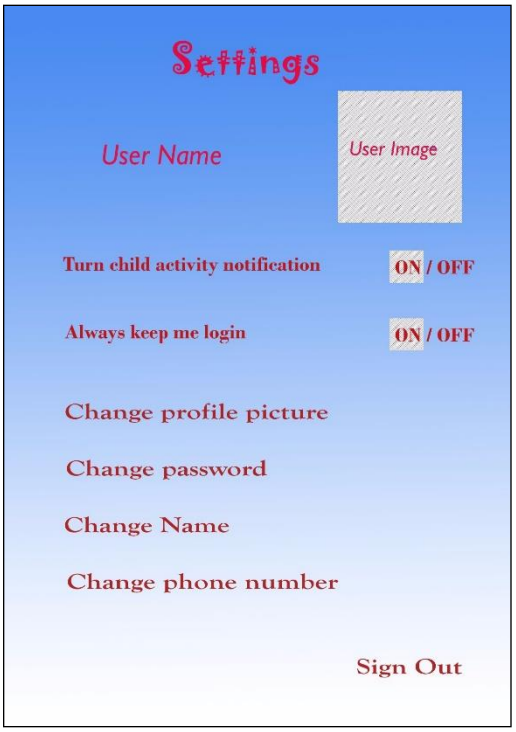

CHILDREN MONITORING SYSTEM
USERNAME :
PASSWORD :
Login
Forgot Password ?
New User/Create account


CHILDREN MONITORING SYSTEM
Signup
Last Name:
First Name:
e-mail:
Phone no.:
Username:
Password:
Minimum 8 charecters
Sign up


CHILDREN MONITORING SYSTEM
Forgot password
e-mail:
Note: Please provide your mail reset password link will be sent to your mail.
Submit


CHILDREN MONITORING SYSTEM
User Name
User Image
Select your child
Child 1
Child 2
Child 3
Settings
Add your Children





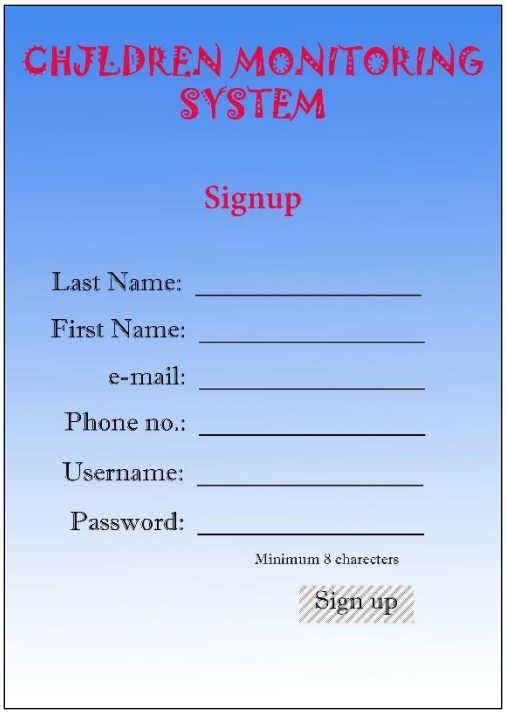
User Manual

Install the application

Download and install the application.

Register for the application

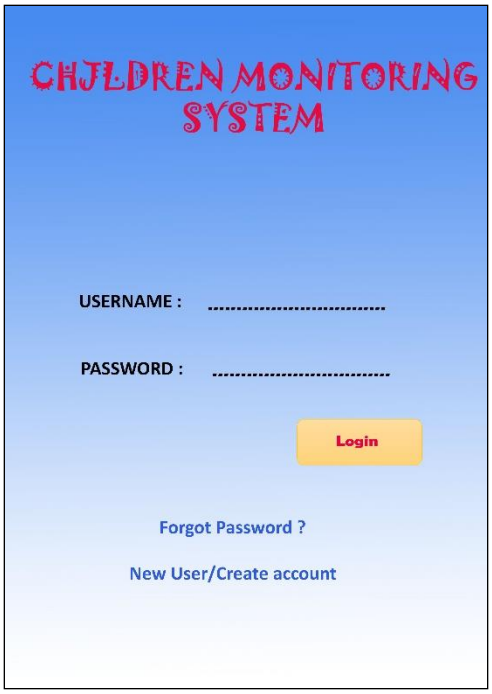
Launch the application and ‘New User/Create account’ link in the page is displayed. Click on the link and it will redirect to ‘Register’ or ‘Sign up’ page as below.



Fill all the mandatory fields and click on ‘Sign up’ button.

Login

After successful registration, Login page is displayed with username and password fields as below

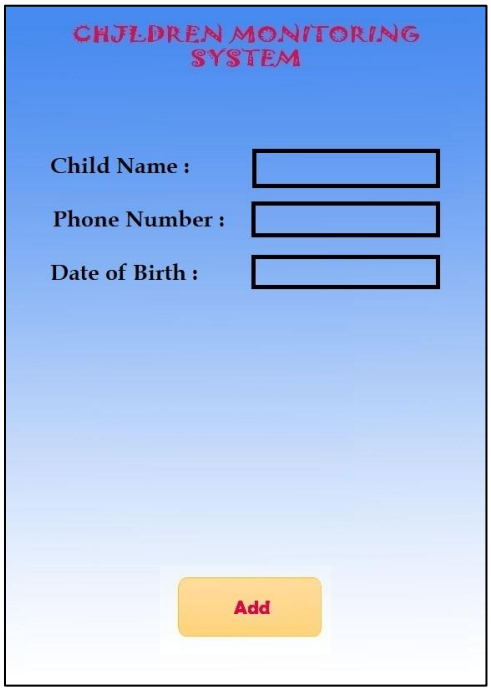


Enter the username and password given while registering the application and click on Login button.

Add a Child

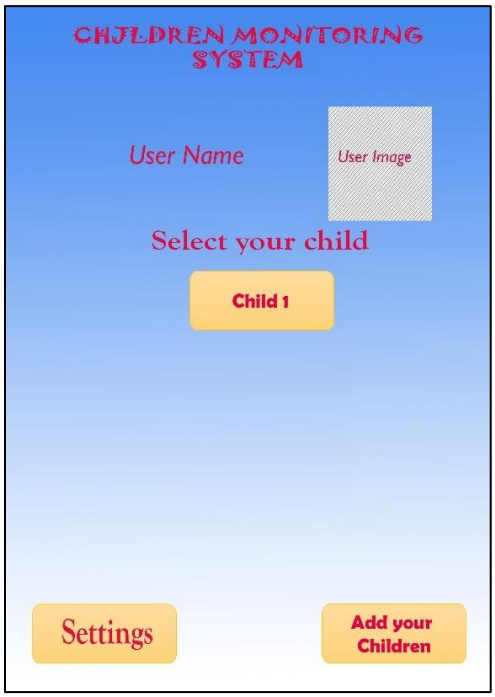
After you login to the application with your username and password, Home page is displayed with details as below.

Click on the ‘Add your children’ button and a page is displayed as below. Enter the details and click on ‘Add’ button.

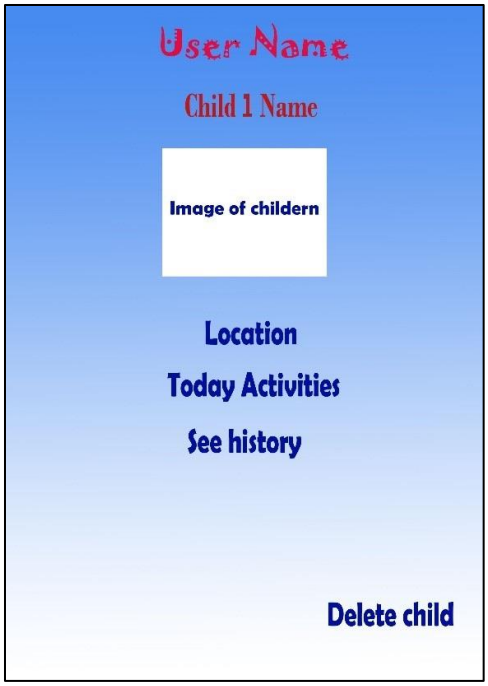


Track location of the child

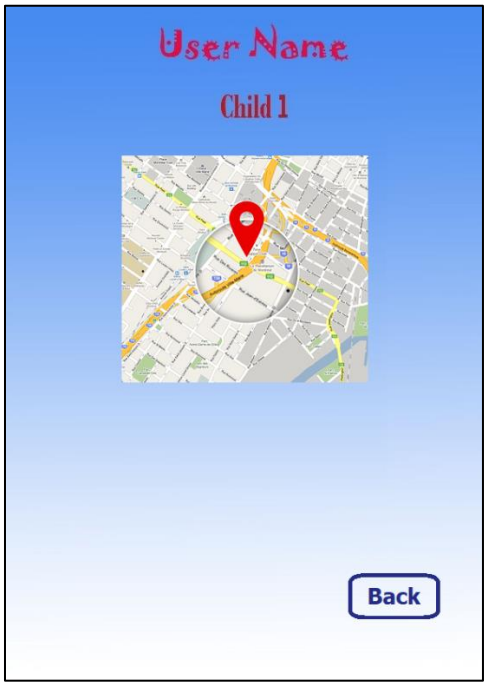
After adding a child, Home page is displayed with your added child for example, Child 1 as below.



Click on ‘Child 1’ button and Child page is displayed with details as below.

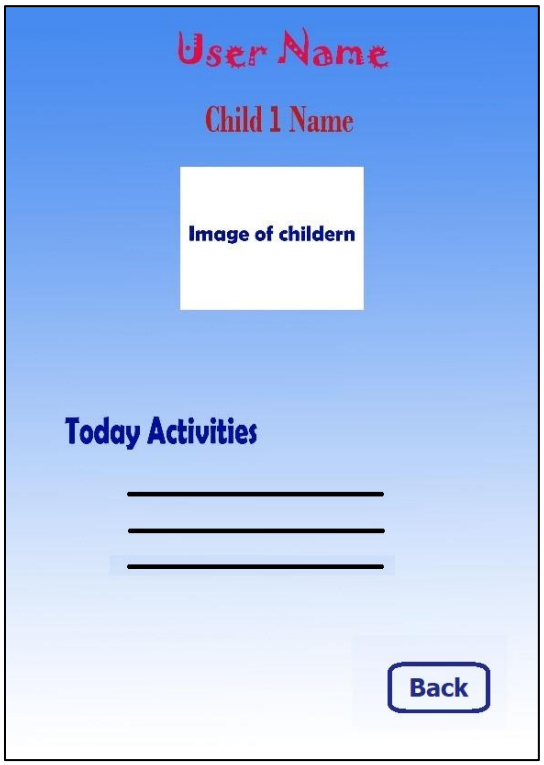


Click on the Location and view the child location as below.



Trackactivities of the child

Click on the ‘Today Activities’ button and list of child activities are displayed as below.

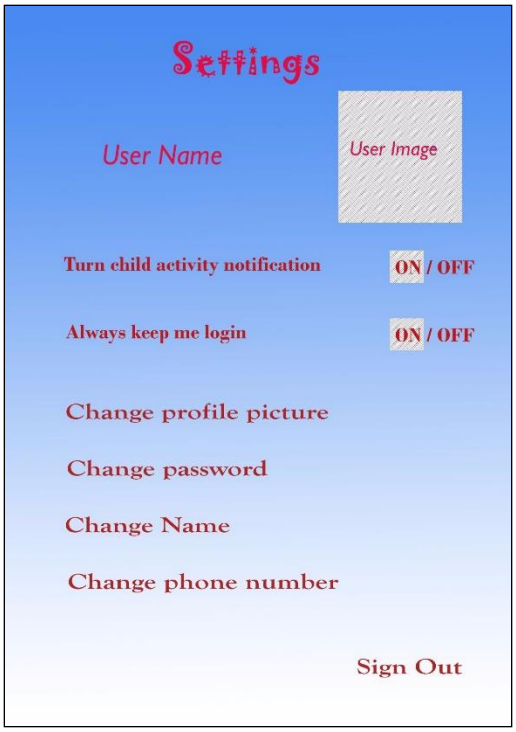


Trackhistory of the child

Click on the ‘See history’ button and details of child i.e. the list of dates with detailed information is displayed as below.

Change Settings

Change the user (parent) details with image, username, turn off notifications, change password, change name, change phone number and change profile picture options in the Settings page.



System Manual

Application Requirements

Requirement SNo.	Name	Description
1	Desktop i.e. Windows or Mac	Desktop or Laptop/ Hardware in order run the application
2	Android Device	Android mobile device with latest version
3	iOS Device	iOS mobile device with latest iOS

		version

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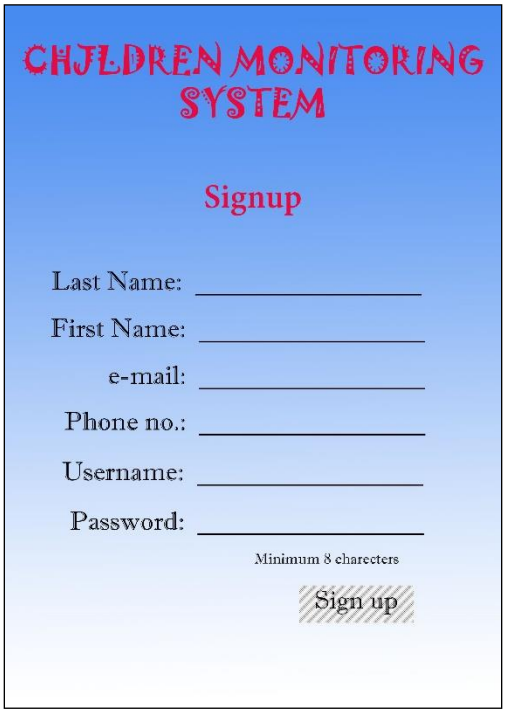

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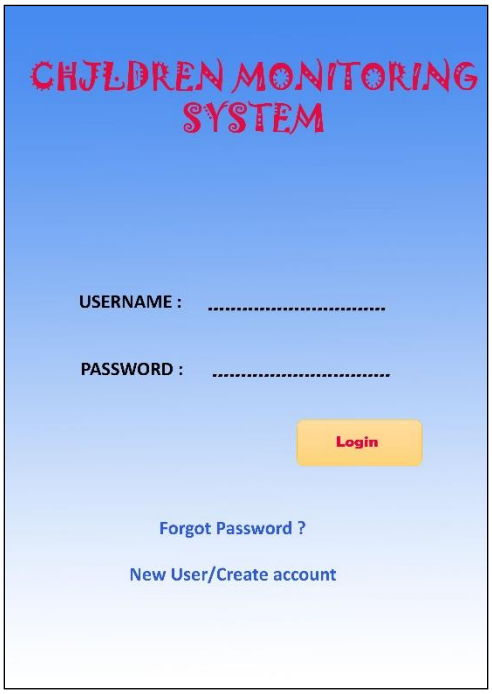

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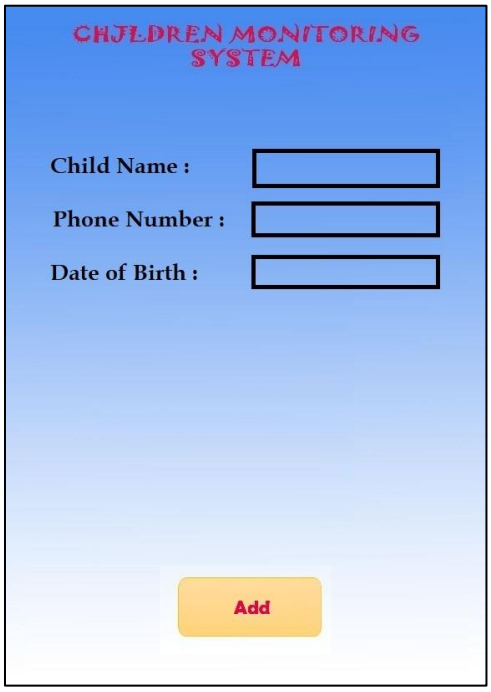

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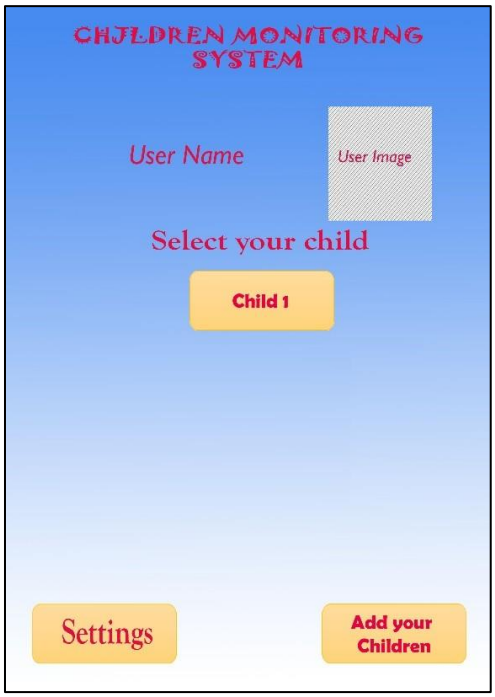
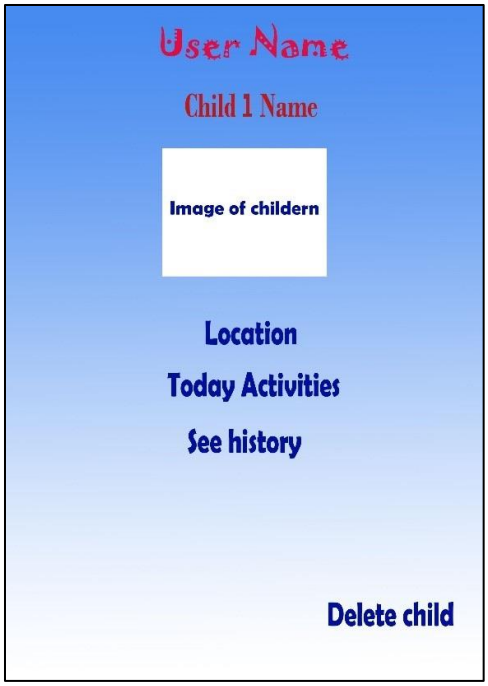
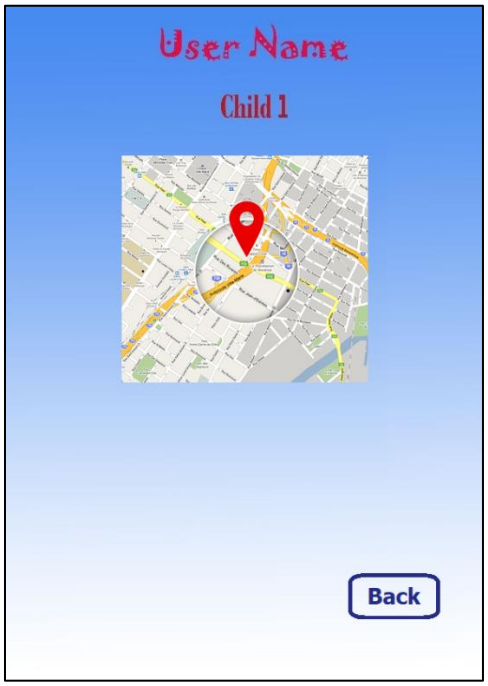


Click on ‘Child 1’ button and Child page is displayed with details as below.

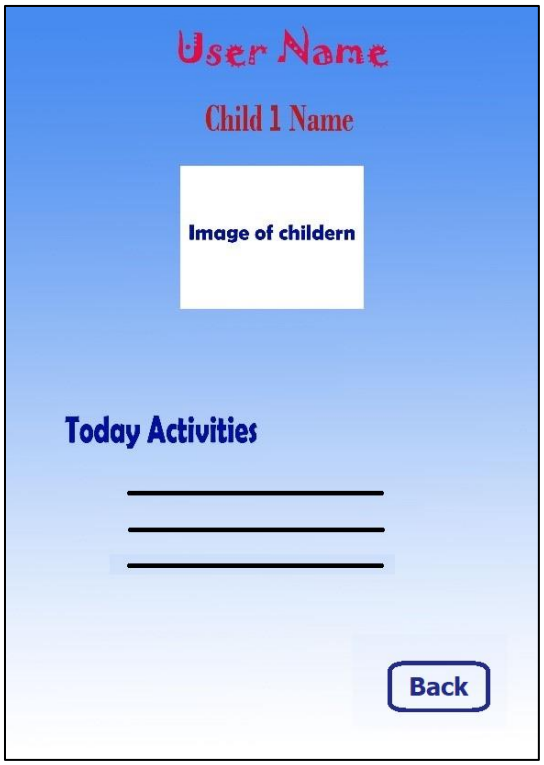


Click on the Location and view the child location as below.



Trackactivities of the child

Click on the ‘Today Activities’ button and list of child activities are displayed as below.

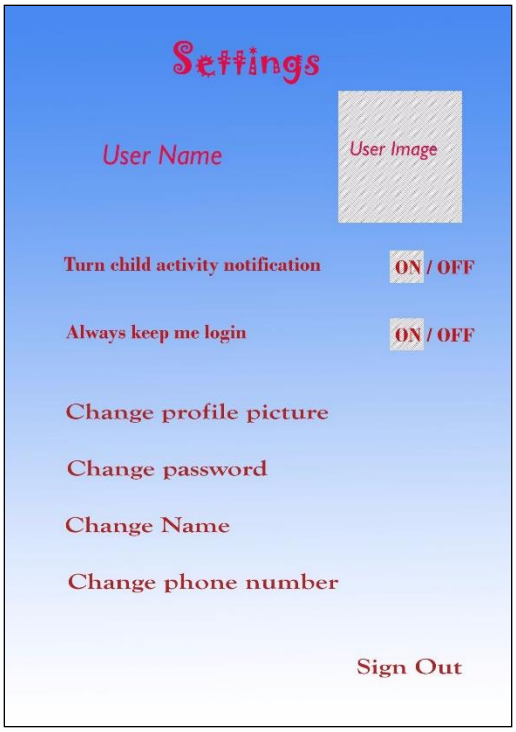


Trackhistory of the child

Click on the ‘See history’ button and details of child i.e. the list of dates with detailed information is displayed as below.

Change Settings

Change the user (parent) details with image, username, turn off notifications, change password, change name, change phone number and change profile picture options in the Settings page.

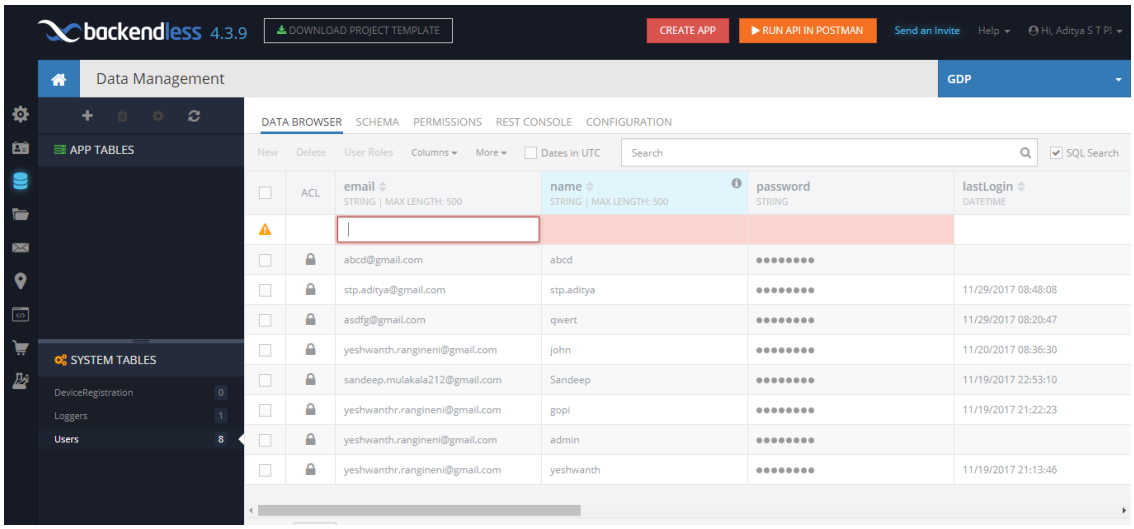


Add a User/ Delete a User

Add a User

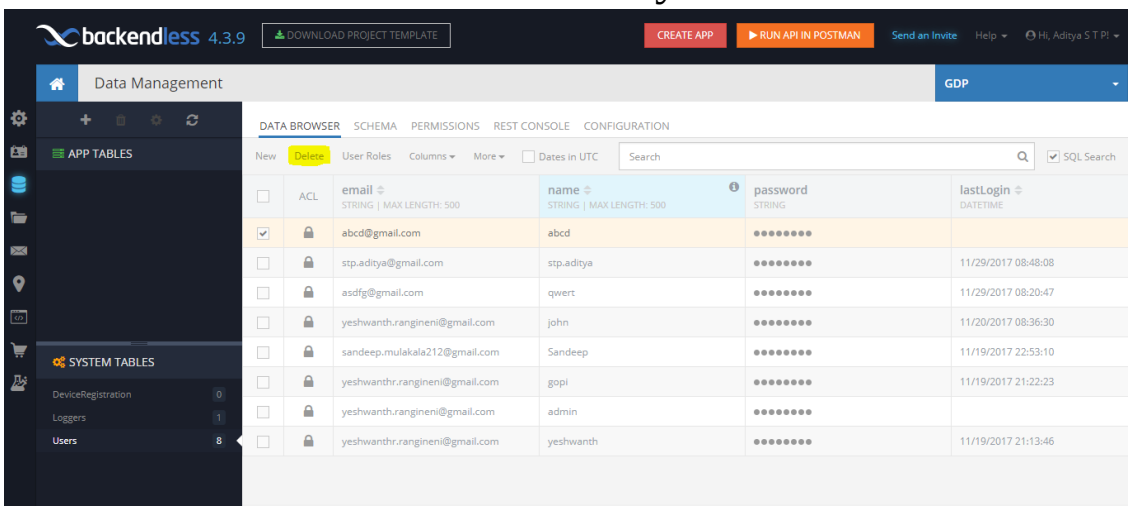
Admin can add a user directly in the Backendless. First login into the Backendless application and select the

respective project. Click on Data icon and select ‘users’ from ‘System tables’ section. Click on ‘New’ button and enter email, name and password fields and the user with email id is successfully added to the database.



Delete a User

Admin can delete a user directly in the Backendless. First login into the Backendless application and select the respective project. Click on Data icon and select ‘users’ from ‘System tables’ section. Select a user with checkbox beside it and click on ‘Delete’ button and the selected user isdeleted successfully from the database.



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