Remote Monitoring and Discrete Data Capture of Joint Pain and other Parameters via the NokiaN900 Device: Enhancing Patient/Physician Interaction

TN Nagabhushan, S.P.Shiva Prakash
Nokia Mobile Innovation Lab,
Dept. of Information Science & Engineering,
Sri Jayachamarajendra College of Engineering, Mysore, India
tnnagabhushan@gmail.com,
shivasp26@gmail.com

Suresh Chande
Nokia MeeGo device R&DDevices,
Helsinki, Finland
suresh.chande@nokia.com

Dr. Prabhu Shankar
Dept. of Pediatrics
Emory University,
Children's Healthcare of Atlanta,
Atlanta, USA
prshank@emory.edu
prv_shankar@yahoo.com

HUMAN JOINT SYSTEM - HOMUNCULUS

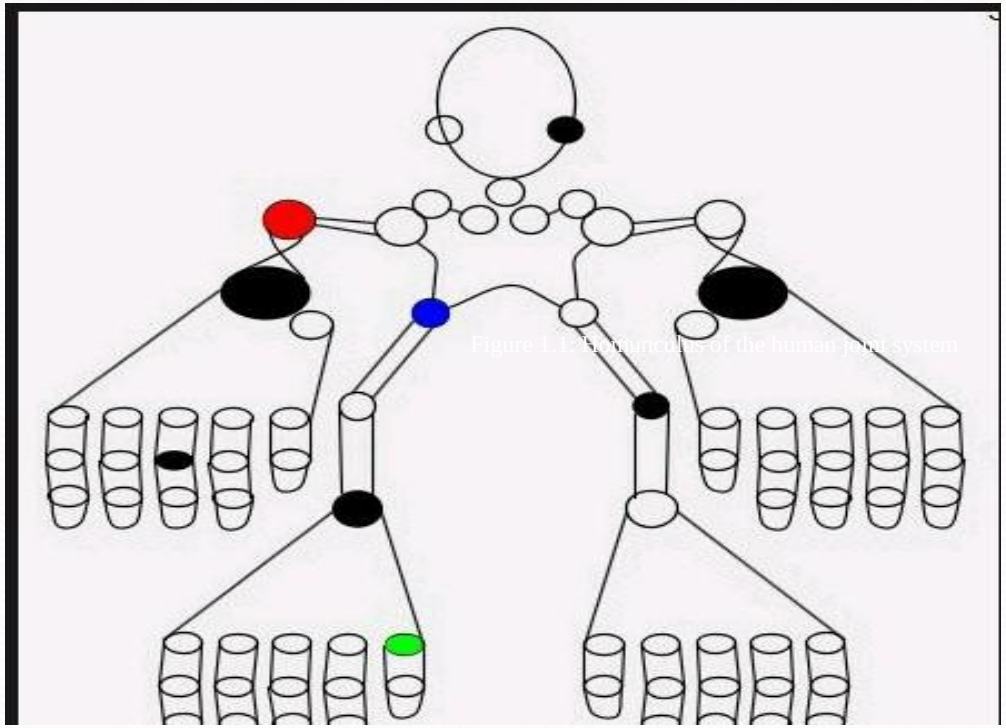


Figure 1.1: Homunculus of the human joint system

ACKNOWLEDGEMENT

AUTHORS GREATFULLY ACKNOWLEDGE Dr Catherine for permitting us to use the human homunculus GUI.

Catherin,
Catherine Burns, PEng,
Director, Centre for Bioengineering and Biotechnology,
Director , Advanced Interface Design Lab, Univ of Waterloo 200 University Ave West, Waterloo, Canada N2L3G1

Agenda

Introduction

Design of GUI and workflow.

Architecture

Implementation.

Testing

Conclusion

INTRODUCTION

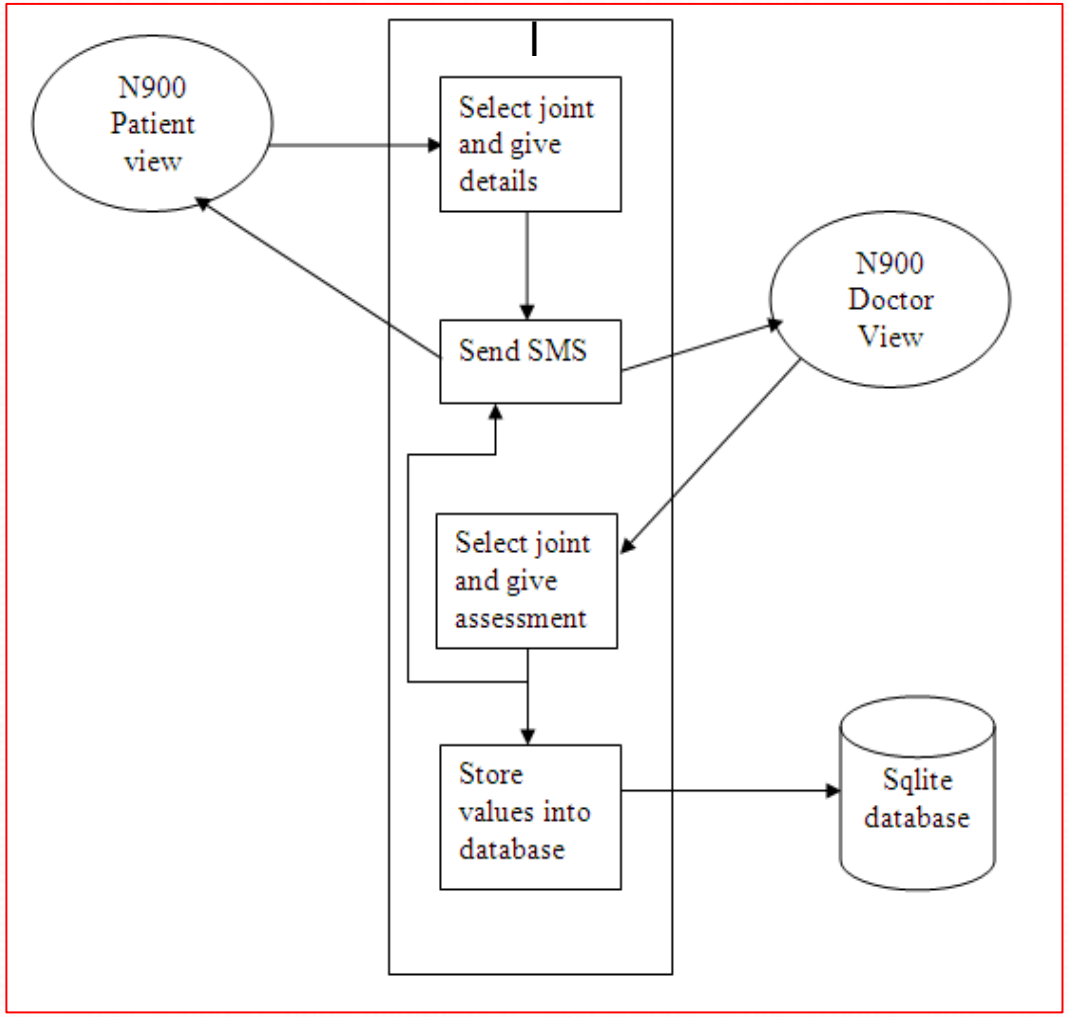
1. **Entities- Doctor and Patient**
2. **Device- Mobile**
3. **Communication - SMS**

Design

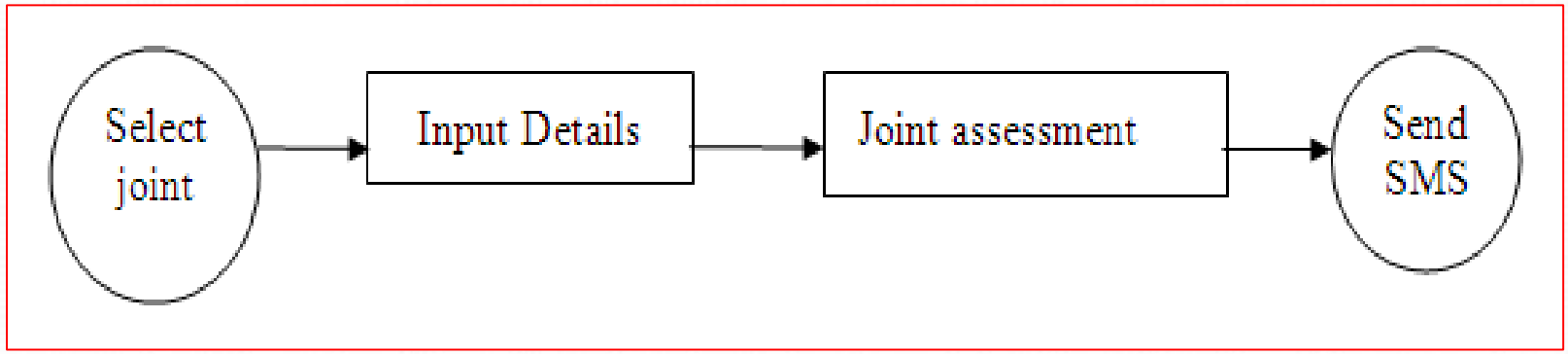
Three Modules

- **Patient assessment**
- **Doctors assessment**
- **SMS**

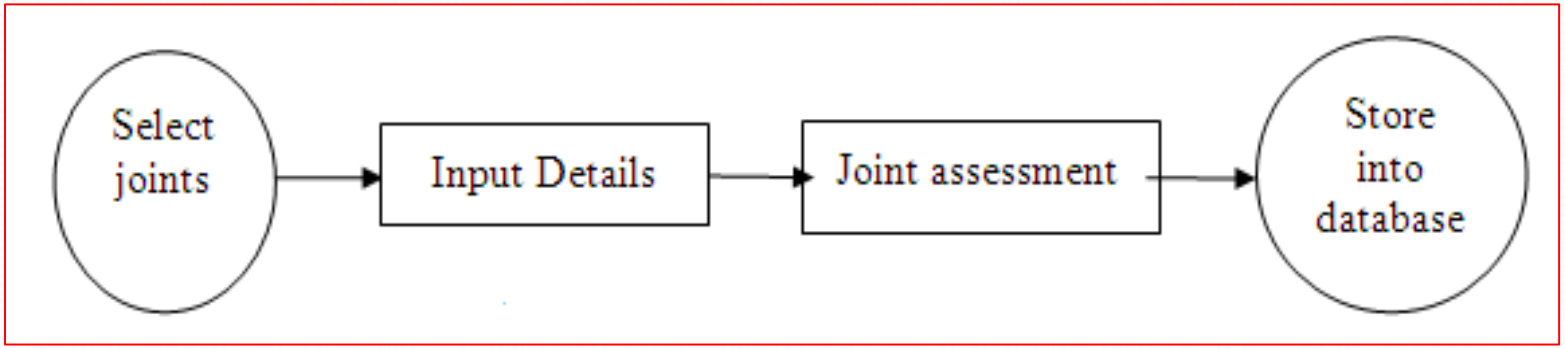
Architecture



Design - Patient assessment

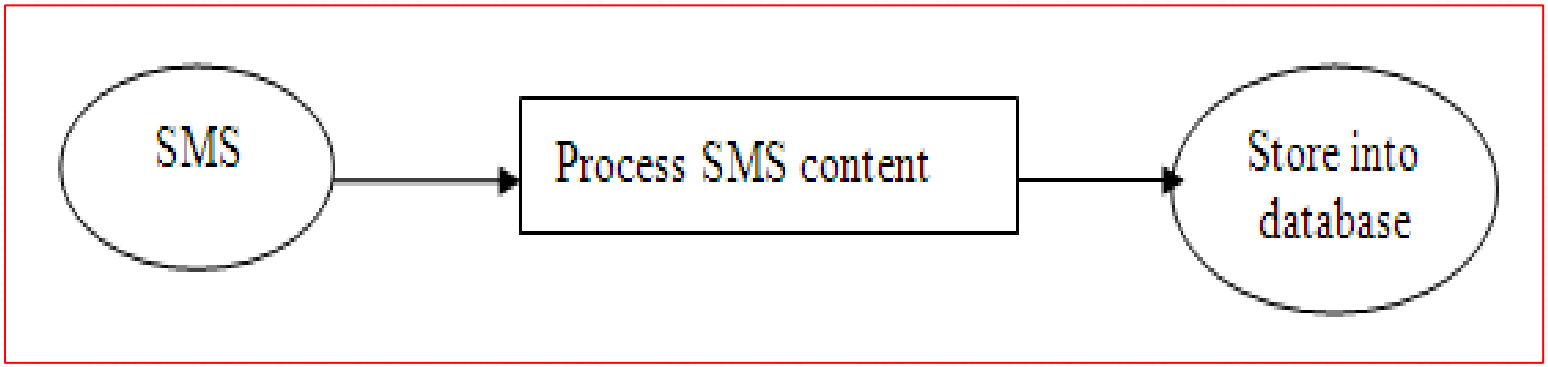


Design - Doctors assessment



Design - SMS Module

Process Involved



System Features

Provides skeletal interface for selecting joints.

Provides different attributes for assessment of joints.

Tenderness

Swelling

Limited range of movement (LOM).

SMS based update to the doctor.

Provides Graphical analysis to the doctor for patient assessment.

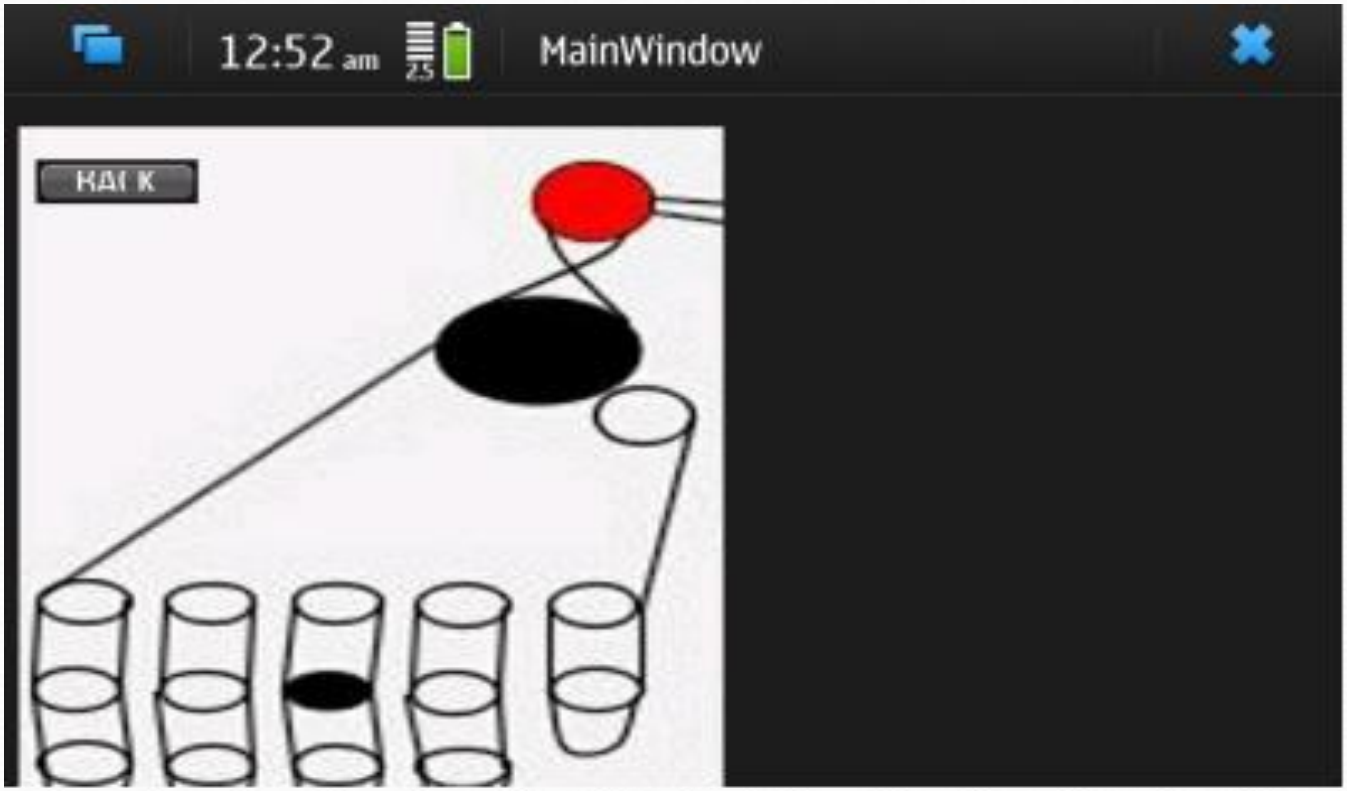
SQLite Database backend support.

Implementation

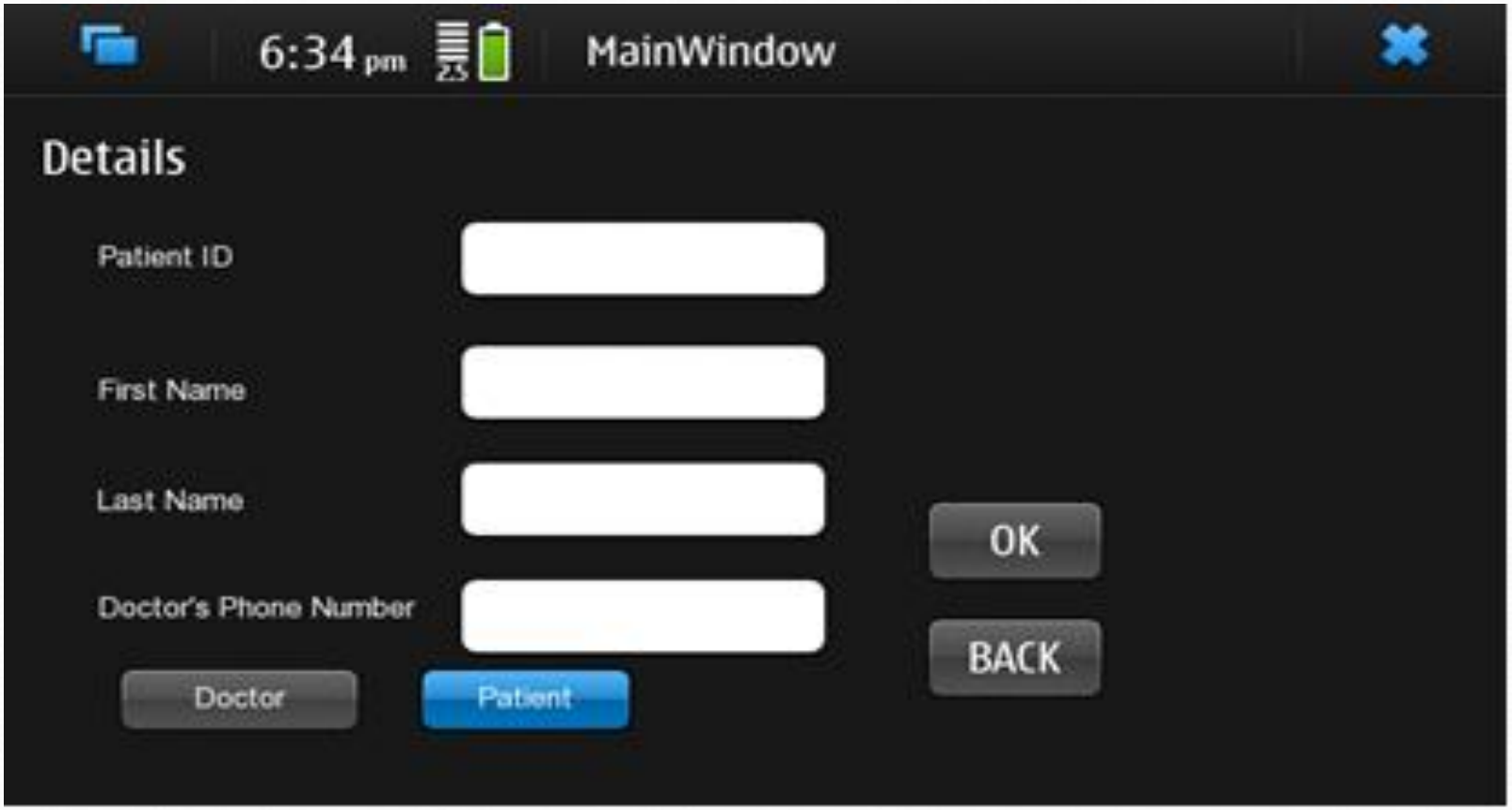
1. Qt for Front End GUI

1. Sqlite for Backend

Doctors view



Patient view



Database Structure

Three tables.

- **Values_patient**
- **Graphdatabase**
- **Details_Patient**

Patient's Details Stored

Patient id (primary key)	First name	Last name	Phone number
101	shiv	Prakash	9945099450
102	prakash	SP	9009009101
103	Prashanth	Bhat	9738553865
104	Anurag	B	9343297599
105	Charan	Pai	9480104627

Patient's Data Stored

Patient id	Joint id	Tender	Dt right	Dt Left	Crepitus	Tenderness	Dec_ Exten	Dec_ Flex
101	12	5	7	7	8	7	8	7
102	9	8	8	7	6	8	7	8
103	7	8	7	8	8	6	7	7

Patient's Data Stored

Dlf Right	Dlf left	Dlr right	Dlr left	Dec_all_ranges	Lim_range_ move	Retained_	Lordosis	Swelling
7	8	6	5	4	7	4		6
6	7	5	7	5	8	7		6
8	6	7	7	8	7	6		5

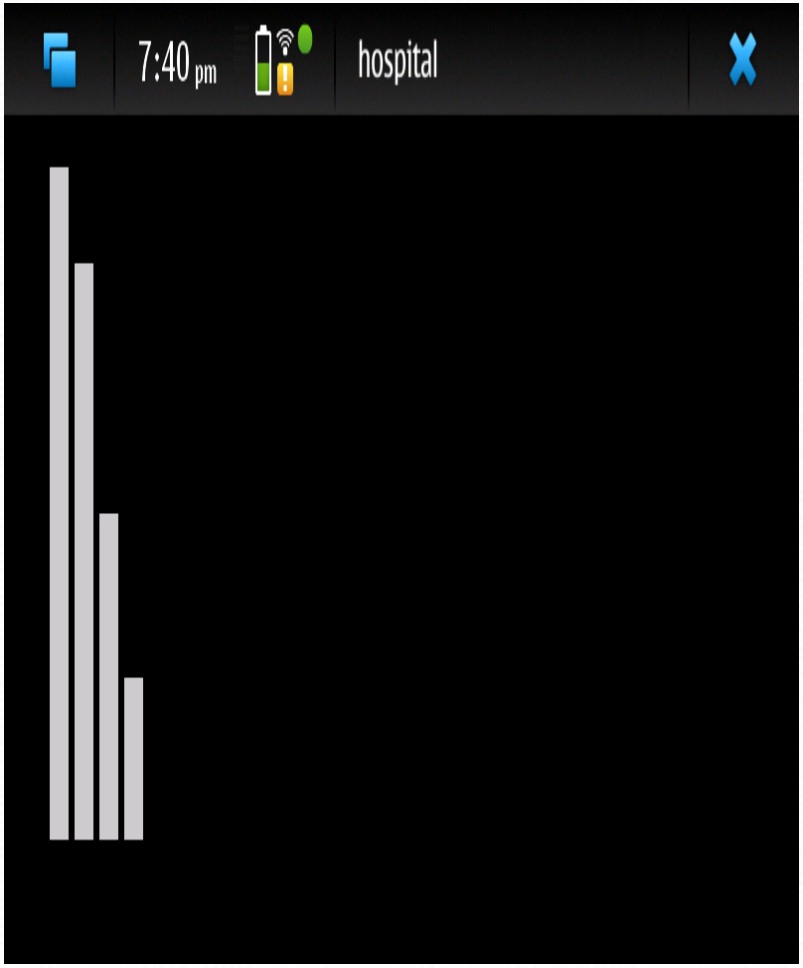
Tess_1+	Tness_2+	Tness_3+	Tness_4+	S_1+	S_2+	S_3+	S_4+
7	0	0	0	0	0	7	0
0	8	0	0	0	7	0	0
0	0	8	0	6	0	0	0

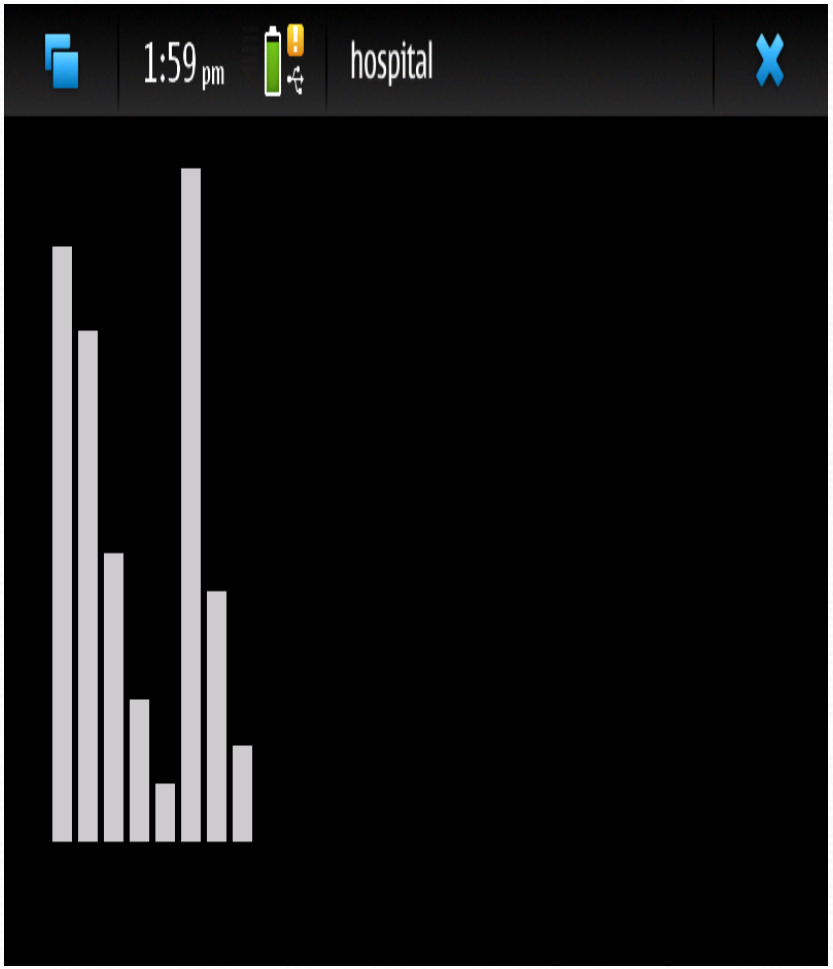
Patient's Data Stored

Limited_ROM_1plus	Limited_ROM_1plus	Limited_ROM_1plus	Limited_ROM_1plus	Not_Assessed
8	0	0	0	1
7	0	0	0	3
0	6	0	0	1

Graph

x-axis = date : y-axis = severity value





CONCLUSION AND FUTURE WORK

- innovative application

- Highlights the Nokia N900 cell phone’s ability to capture the patient's subjective assessment of severity of joint pain and the doctor's objective evaluation of the patient’s affected joints.

- Experiment in real healthcare environment

- Try on other OS plat form such as Windows 7

Thank You