Universiti Malaysia PAHANG

RESEARCH REPORT UMP GRANT

Laporan Prestasi Skim Geran UMP

RECEIVED 15 JUN 2020 TTO

Final	√	Progress		*Progress Period :* ______	√ *Please tick*

PROJECT DETAILS *(Keterangan Projek)*

A	**Grant No**	UIC180901
	Faculty/CoE	Faculty of Mechanical and Automotive Engineering Technology
	Project Title	Add-On-E-Wheelchair Conversion Kit with IOT Patient Monitoring System
	Project Leader	Dr. Mohamad Heerwan Bin Peeie
	Project Member	1. Dr Syafiq Faudzi Bin Kamarulzaman 2. Dr Muhammaz Izhar Bin Ishak 3. Nurul Nadia Binti Nor Hamran 4. Abdul Nasir Bin Abd Ghafar 5. Wan Hassan Bin Wan Hamat

PROJECT ACHIEVEMENT *(Pencapaian Projek)*

ACHIEVEMENT PERCENTAGE				
Project progress according to milestones achieved up to this period	**0 - 25%**	**26 - 50%**	**51 - 75%**	**76 - 100%**
Percentage (please state %)				100%

EXPENDITURE *(Perbelanjaan)*

C

Budget Approved *Peruntukan diluluskan*	**Amount Spent** *Jumlah Perbelanjaan*	**Balance** *Baki*	**% of Amount Spent** *Peratusan Belanja*
RM30,000	**RM28,656.60**	**RM1,343.40**	**95.52%**

RESEARCH OUTPUT *(Output Penyelidikan)*

D

NO OF PUBLICATION

KPI FOR NO OF PUBLICATION

	ISI	Scopus	Index Proceedings	Others
KPI				
Achievement				

The contribution of funder (UMP, MOHE, MOSTI, Industry etc.) as the fund provider must be acknowledged at all times in all forms of publications. Please state the grant number (RDU/UIC) and grant name.

	ISI	**Scopus**
Number of articles/ manuscripts/books *(Please attach the First Page of Publication)*	1. - 2. -	1. - 2. -
	International	**National**
Conference Proceeding *(Please attach the First Page of Publication)*	1. - 2. -	1. - 2. -

HUMAN CAPITAL DEVELOPMENT

KPI FOR HUMAN CAPITAL DEVELOPMENT

	PhD Student	Master Student
KPI	-	-
Achievement	-	-

Human Capital Development	**Number**				**Others** (please specify)
	On-going		**Graduated**		
Citizen	Malaysian	Non Malaysian	Malaysian	Non Malaysian	
PhD Student					
Masters Student					
Undergraduate Student					
Total					
Name of Student: **ID Matric No:** **Faculty:** **Thesis title:** **Graduation Year:** **Name of Student:** **ID Matric No:** **Faculty:** **Thesis title:** **Graduation Year:** *** enter for more space*					

INTELECTUAL PROPERTIES

KPI FOR INTELECTUAL PROPERTIES

Patent, Copyright, Trademark,Industrial Design: ___________

Patent, Copyright, Trademark, Industrial Design ect	Copyright: Design of Conversion Kit for Electric Powered Wheelchair Registration Number: LY2019000449

OTHERS

KPI FOR OTHERS

Prototype, Technology,Collaborations etc: ___________

Prototype, Technology, Collaborations etc	

ASSET *(Aset)*

E

Bil	**Peralatan** *(Equipment)*	**Model**	**No Daftar Aset** *(Asset Tagging No)*	**Amount** (RM)	**Lokasi** *(Location)*

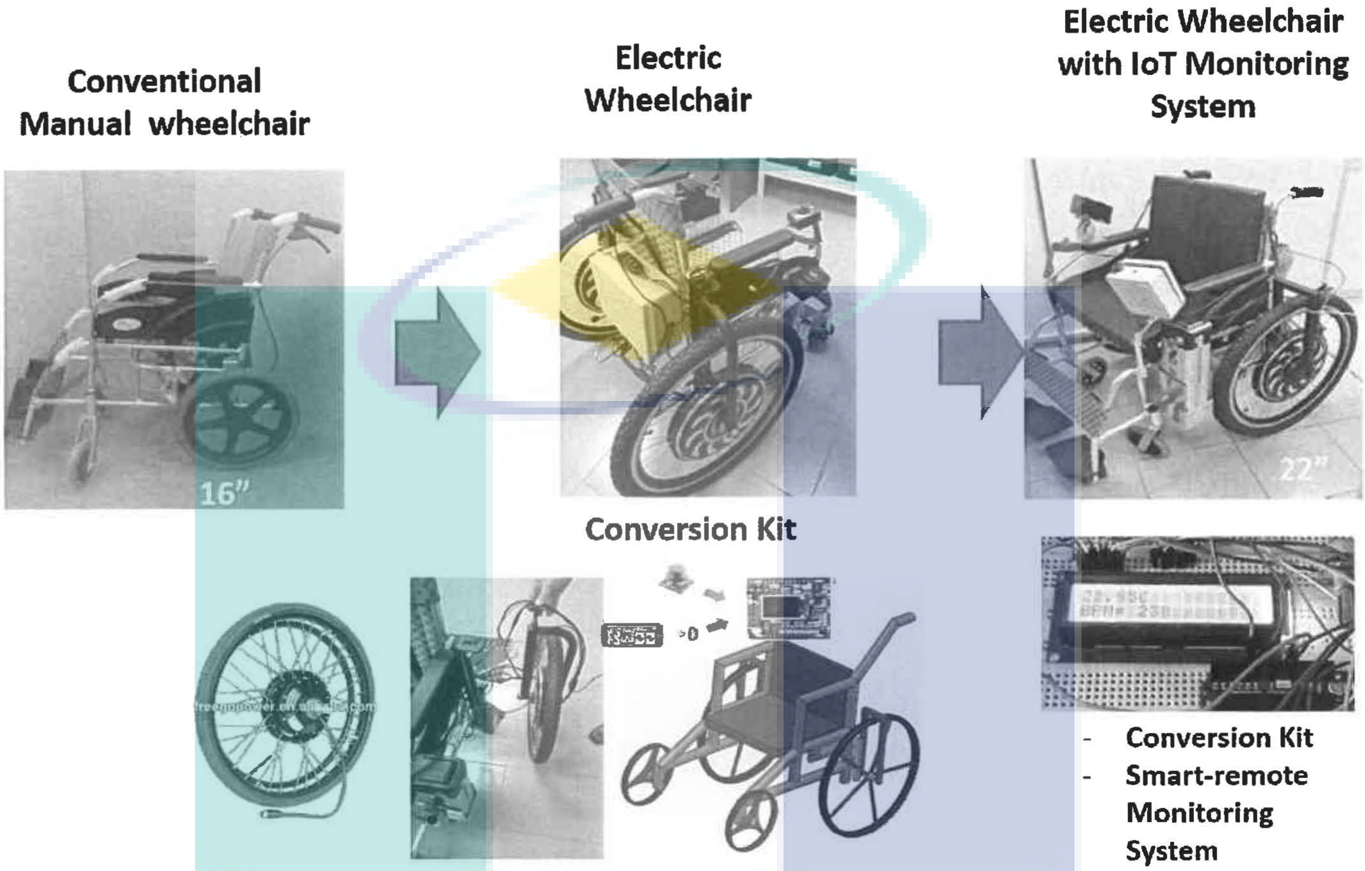
PRODUCT DESCRIPTION FOR UMP R&D DIRECTORY (SHORT & BRIEF) *Only for Final Report*

F

Manual wheelchair users have difficulties in moving independently and they may need help from others. On the other hand, electric wheelchairs are expensive. Therefore, in this project, a conversion kit is designed to modify any ordinary manual wheelchair to be an electrical wheelchair. Using the manual or electrical wheelchair independently rise up another problem which is the lack of patient monitoring. To solve the problem, the second proposed add-on system aims to provide a smart remote monitoring system for wheelchair users using IOT.

PRODUCT PICTURE FOR UMP R&D DIRECTORY *Only for Final Report*

G



SUMMARY OF RESEARCH FINDINGS (*Ringkasan Penemuan Projek Penyelidikan)*

H

From this project, a kit conversion kit has been designed and attached at the manual wheelchair. The advantages of the conversion kit are the height and the width are adjustable. In the conversion kit, the joystick also has been installed to manoeuvre the wheelchair. The IoT system consists of a heart rate sensor, GPS, wifi module and microcontroller, which is Arduino. The data from the sensor and GPS is transferred to the phone by wifi module. From the results, the heart rate and the location of the user can be known. By knowing the heart rate, if the user is in a bad condition, the family members and caretaker can refer to the doctor immediately.

PROBLEMS / CONSTRAINTS IF ANY *(Masalah/ Kekangan sekiranya ada)*

I

The main problem of this project is in fabricating the conversion kit because it consumes a lot of time and manpower. There are several critical parts need to be fabricated and use wire cut, lathe machine and welding. The technical staff helps us in wire cut, and the student using the lathe machine and welding with permission from the technical staff.

Date : **13 April 2020** *Tarikh*	**Project Leader's Signature:** *Tandatangan Ketua Projek*

COMMENTS, IF ANY/ ENDORSEMENT BY FACULTY (*Komen, sekiranya ada / Pengesahan oleh Fakulti*)

J **Recommend / ~~Not Recommend / KIV / Need Ammendment~~**

good project. Recommended

Name:
Nama:

Signature:
Tandatangan:

PROFESOR DR. MAHADZIR BIN ISHAK @ MUHAMMAD
DEKAN
FAKULTI TEKNOLOGI KEJURUTERAAN MEKANIKAL DAN AUTOMOTIF
UNIVERSITI MALAYSIA PAHANG
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Date:
Tarikh:

**** Dean/TDR/Director/Deputy Director**

COMMENTS, IF ANY/ ENDORSEMENT BY RMC PNI (*Komen, sekiranya ada / Pengesahan oleh RMC PNI*)

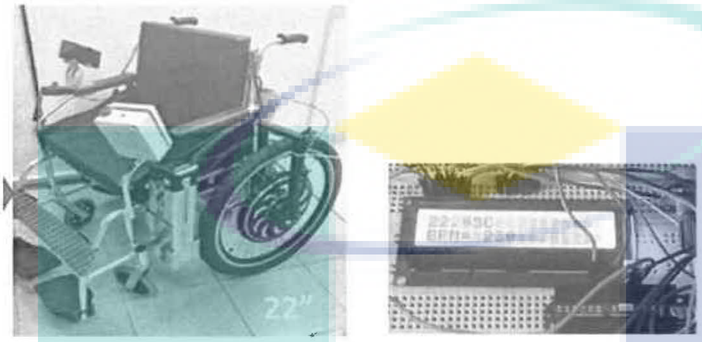
K **Recommend / Not Recommend / KIV / Need Ammendment**

Name:
Nama:
PROF MADYA DR. AHMAD TARMIZI BIN HARON
Dekan Pengkomersialan
Jabatan Penyelidikan & Inovasi
Universiti Malaysia Pahang

Signature:
Tandatangan:

Date:
Tarikh: 2/7/20

ADD-ON E-WHEELCHAIR CONVERSION KIT WITH IOT PATIENT MONITORING SYSTEM



Name of Project Leader: Dr Mohamad Heerwan Bin Peeie
Name of co-researchers: Dr Abdul Nasir Bin Abd Ghafar, Dr Syafiq Fauzi Bin Kamarulzaman, Dr Muhammad Izhar Bin Ishak, Nurul Nadia Binti Nor Hamran, Wan Hassan Bin Wan Hamat
Faculty of Mechanical and Automotive Engineering Technology, Universiti Malaysia Pahang
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Field: Vehicle Dynamics and Control

ABSTRACT (120 words)

Electric Powered Wheelchair (EPW) can be considered as a special Electric Vehicle (EV) because it is used by senior citizens, disabled drivers/users who have special needs. Using manual or electric wheelchair independently can lead to a lack of user monitoring. Wheelchair users are also subjected to fatigue and emergency health situations. In this study, an add-on smart monitoring system is installed at the wheelchair to help users to use the wheelchair independently and safely. The system integrates health-related sensors with a computer, a mobile phone and an alarm system. The tested prototype uses two sensors, namely, temperature sensor and heartbeat sensor. The system is extendable and more sensors can be added. The temperature sensor is used to sense the body temperature, which is a basic parameter for monitoring and diagnosing human health. Heartbeat sensor is used to measure the user Mean Arterial Pressure (MAP). It can be connected to a personal computer to show the cardiograph. Body temperature and MAP data are acquired by an embedded system and displayed on a Liquid Crystal Display (LCD). Data are also sent to the cloud for Internet of Things (IoT) monitoring. In emergency cases, an alarm signal is triggered. Moreover, a notification Email and SMS messages are sent to the people in charge of monitoring the user. The system was tested and validated as a real-time monitoring system.

1. INTRODUCTION

Independent mobility is very important for human beings to fulfil their needs. Some people use wheelchairs to improve their limitation in mobility due to their disabilities. However, some wheelchair users cannot use it independently and therefore they might need help from others who are not always available. Therefore, they need an assistive device that able to detect the surrounding environment, choose the path and move along it while avoiding any obstacles.

The number of registered disabled people in Malaysia has increased by 15% between 2014 and 2015. Moreover, it increased by 29% in 2016. Among them, 35% are having physical disabilities [1], which cause limitations in mobility. Besides to the disabled people, there are others with mobility impairment, like senior citizens or people who have health complaints. People, in general, tend to move independently to do their daily routines such as take a bath, settle the home chores, use the toilet or have food. Many disabled people need a wheelchair as an essential assistive device to move around [2]. A manual wheelchair provides an affordable solution for users. Unfortunately, it is still not sufficient and many users may need help from others to push the wheelchair. Electric Powered wheelchairs (EPW) are developed to improve the mobility of the users. Most of the EPW provides a human-machine interfacing device that is easy to use. The most popular one is the joystick [3]. However, some of the users cannot use the conventional joystick to control the wheelchair due to some disability such as spinal cord injury, amyotrophic lateral sclerosis, and cerebral palsy. Few cases and constraints were discussed in a previous study [4]. For example, some people cannot use both their hands and legs, and therefore they need other solutions. Not getting the suitable facilities and devices may lead to limitations in mobility and hence, the possibility of involvement in activities without help is decreased. Alternative controlling interface devices such as chin-joystick, hand-glove control system, hand gestures, Electroencephalography control (EEG) and voice controller are suggested by many researchers [5].

Although such interfacing devices seem to be a solution for many cases, still there are some limitations and risk factors. For example, in the voice control system presented in [6], the input voice commands are transmitted wirelessly to the wheelchair. The user should say 'FORWARD' to make the wheelchair moves forward. Similarly, if the order is 'BACKWARD', 'RIGHT' and 'LEFT', the wheelchair is supposed to move accordingly. The main problem is in recognizing the voice command accurately. Wrong recognition may lead to severe accidents. In EEG, the electrodes are attached to the scalp to translate all the brain activity into commands that controlled the wheelchair. Brain-Computer Interface (BCI) provides another alternative as it can translate any information from the brain directly and usually used for the paralyzed people who are suffering from severe neuromuscular disorders. This disorder affects the nerves and makes the patients unable to control their lips movement. Such cases need more special and advanced assistive devices to help them.

In summary, although there are many types of interfacing devices, the problem still arises when some of the disabled people are unable to use any of the presented devices. On the other hand, family or medical assistance staffs are not always available to help. Therefore, a fully or semi-autonomous wheelchair is suggested as one of the best solutions to be developed. "Autonomous" means a vehicle's ability to move and reach a targeted place without human intervention [7]. An autonomous wheelchair can define its location and move towards the desired location on its own. There are three basic subsystems required to enable a wheelchair to move autonomously [8]. First is the self-positioning subsystem, where the wheelchair needs to know its current location. Most popular localization and self-positioning methods use Global Positioning System (GPS) [9]. The main problem is the accuracy and consistency of GPS reading. Second is the path planning, where the wheelchair is supposed to be able to find the best path to reach the destination. Some researchers also consider a trajectory control system as one of the basic systems. Lastly, the wheelchair needs to have the ability to detect the obstacles that present along the path, avoid them and re-plan the path to continue its way towards the destination. Most of the object detection and pathfinding algorithms are not accurate or not suitable for real-time applications. This project is an innovative preliminary design for a conversion kit to convert an electrical wheelchair to become an autonomous vehicle. It focuses on the accuracy of localization and path planning.

2. RESEARCH METHODOLOGY

The system is an add-on device to be integrated as a part of a more general smart EPW project. The general architecture of the project is shown in Figure 1.

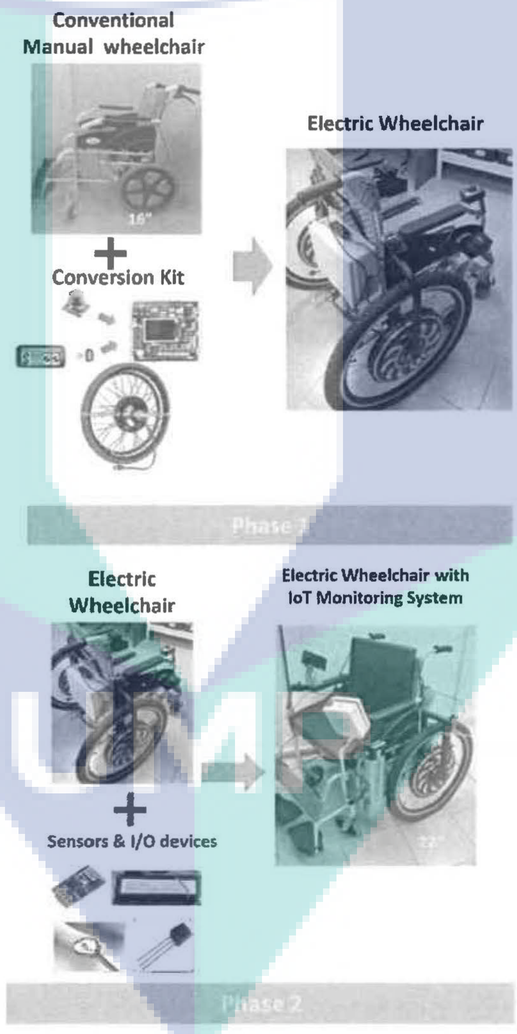

Figure 1: The general smart EPW system.

The project comprises two phases. The first phase aims at designing a conversion kit, which is cheap, adjustable, customizable and practically designed according to the needs of the wheelchair users. Using a manual or EPW independently causes a problem related to the lack of patient monitoring. To solve this problem, the proposed add-on system in the second phase aims to provide a remote monitoring system for wheelchair users using the IoT concept.

Figure 2 shows an overview diagram of the monitoring system. For testing purpose, a simple prototype that comprises two essential sensors is presented in this paper. The first sensor is used to measure body temperature, which is the basic parameter for monitoring and diagnosing human health. Heartbeat sensor is used to measure heartbeat rate and the patient/user Mean Arterial Pressure (MAP). In this project, SEN-11574 heart sensor is used. The sensor is based on the principle of photoplethysmography. It measures the change in volume of blood through any organ of the body of the user, which causes the changes to occur in the light intensity through the vascular region of the organ. The signal pulses are the same as the heart rate pulses.

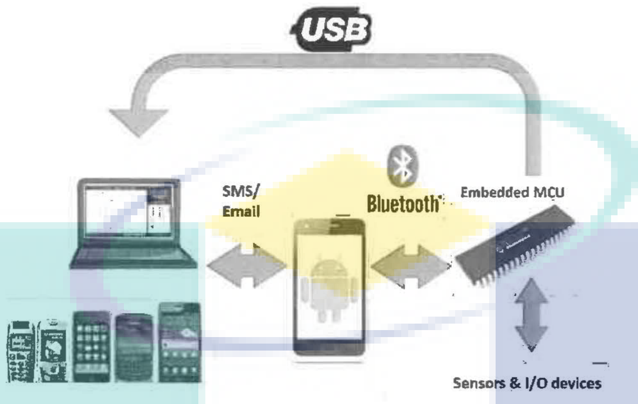

Figure 2: The monitoring system overview diagram.

The temperature sensor and heartbeat pulse sensor provide analog signals, which are the input for the controlling unit. The MCU converts the input data from both sensors to digital values. The values are shown on a 2 × 16 LCD module, as shown in Figure 3. Moreover, the system can be connected to a computer/laptop to draw the cardiograph, as shown in Figure 4.

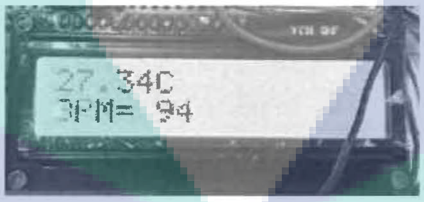

Figure 3: Sensor readings are shown on LCD.

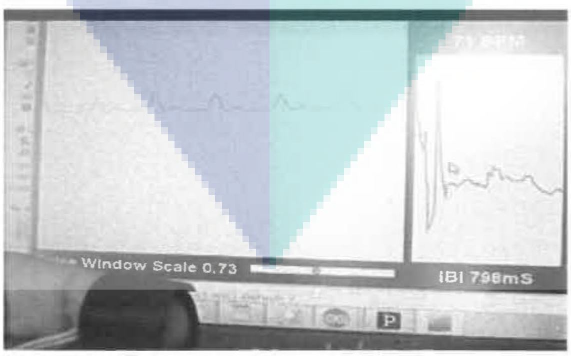

Figure 4: Plotting the cardiograph on a laptop screen.

Figure 5 shows the flowchart of the monitoring system. The MCU continuously reads the temperature T and heartbeat pulse rate Hb of a user. The reading results are shown on the LCD and optionally the cardiograph can be shown on the computer/laptop. The system will trigger an alarming sound if the condition of the body temperature and the heart pulses of a user are abnormal. The temperature is considered normal if T is in the range: $36^{O}C < T \leq 38\ ^{O}C$. Heartbeat rate is considered normal if Hb is in the range: 70 BPM < Hb $\leq$ 90 BPM. The alarm is triggered if T or Hb are out of these ranges. SMS and Email will be sent to the designated people in charge of using the mobile phone App at the same time. The smartphone snaps a photo of the scene and attaches it to the Email.

Figure 6 shows the system prototyping circuit using Arduino Uno. The monitoring system, which includes the MCU, the sensors, the LCD and the Bluetooth module as one integrated device, can be installed to any wheelchair as a standalone add-on device. The installation of the prototype is shown more clearly in Figure 7. It is powered directly from the EPW 48V battery using the chip LM2596HV, which is a 3A step-down voltage regulator.

To send the information through Email and SMS, MCU needs to communicate with the user's smartphone. Communication is done by sending commands and receiving information from the phone. "Magnet Code" platform [12] provides the developers with a set of basic features and components to build the needed Android App. The basic features include title bar setting, responsive LCD with a vertical scroll bar, responsive buttons, background setting and command box. In addition to the previous basic components, developers can use a set of toolboxes as shown in Figure 8. The list of toolboxes includes Audio Toolbox, Sensor Toolbox, Photo Toolbox, Video Toolbox, Email Toolbox, SMS Toolbox, and Database Toolbox.

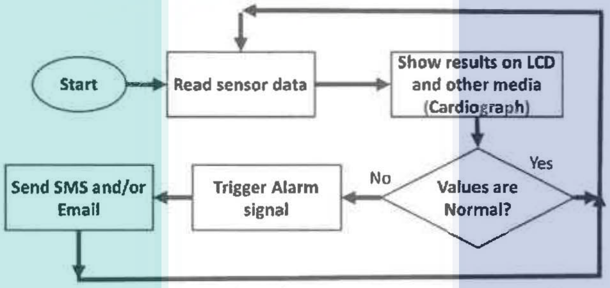

Figure 5: The monitoring system working flowchart.

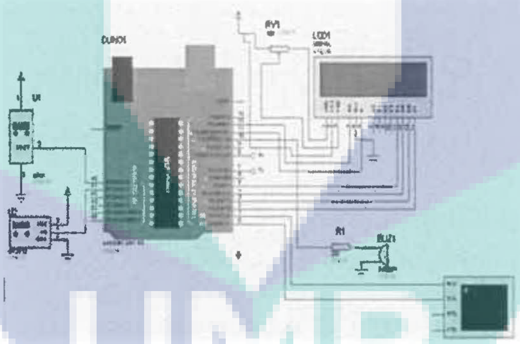

Figure 6: System circuit.

Figure 7: The installation of the monitoring system.

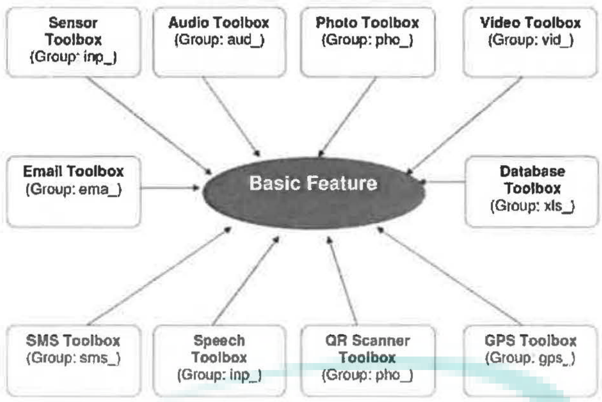

Figure 8: "Magnet Code" features and toolboxes.

The commands to be sent by the MCU have a special format [12]:

Group name (3 bytes) + _ + Sub Command 1 (3 bytes) + Sub Command 2 (1 to 3 bytes) + <value> (optional, accept '#' as enter or data splitter) + \r\n

The commands are sent from the MCU using the command "printf" as follows:

```
printf("out_vibon\r\n"); printf("lcd_shotex<Hello!>\r\n");

printf("vid_froman<myfile%u>\r\n",count1); printf("aud_plaon<myfile%lu>\r\n",count2);
```

MCU gets the information from the smartphone using the command "getch()":

```
void serial_isr()
{ data1=getch(); //this is data we want data2=getch();//carriage return or\ror 0x0D
data3=getch(); //new line or \n or 0x0A if(data3==0x0A)
{ run=2; } }
```

"Magnet Code" provides an "Email Setting" and "SMS Setting" graphical interfaces, which are used to set the receiver details, Email and SMS content, subject, and Email attachments. The Email setting graphical interface is shown in Figure 9.

Figure 9: Email setting graphical interface.

Photo Toolbox of "Magnet code" receives a command from the MCU to snap the photo. Figure 10 shows an example of the sent Email. The Database Toolbox is used for data logging. The logged data are saved to a file on the smartphone. Meanwhile, data are sent to the cloud using the "dweet.io" service. The data are provided for IoT continuous monitoring using "Freeboard" dashboards, as shown in Figure 11.

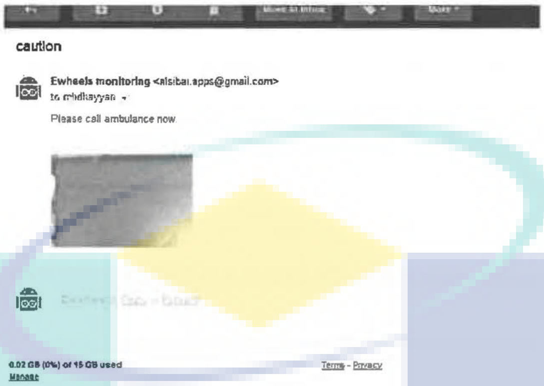

Figure 10: Example of the sent Email.

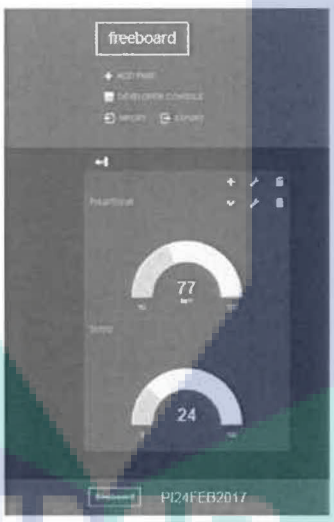

Figure 11: Freeboard as an example of IoT dashboards

3. LITERATURE REVIEW

Approximately, 10% the global population or around 650 million people have disabilities [1], in which 200 million of them are children. Based on the UNICEF report about the situation in Malaysia around 445,000 people with disabilities were registered voluntary in 2012 [2]. Studies indicate that around 10% of the disabled people require a wheelchair globally [3]. Although many wheelchair users would like to use it independently, it was estimated that 20 million of those requiring a wheelchair for mobility do not have one. There are indications that only a minority of those in need of wheelchairs has access to them, and very few of these people have access to an appropriate wheelchair [3].

According to our survey, wheelchair users tend to use wheelchairs independently. However, many users cannot move the wheelchair by themselves and need to wait for a helper to push them. In this case, Electric Powered Wheelchair (EPW) has been suggested to solve the problem. Many researchers have suggested more advanced solutions, which might be categorized under the title "smart wheelchair systems". Wheelchairs are considered smart systems based several aspects, namely human – machine interface, navigation methods and other smart systems like safety driving systems [4].

Wheelchair users usually have health complaints. Considering that there is a fast growing in elderly (65+) population worldwide, the number of wheelchair users requiring continuous monitoring has increased. However, the frequency of obtaining health related measurement in hospitals depends on the situation of the patient and the judgment of the medical care staff. For example, primary stroke centers acquire data every 15 minutes and intensive care units require a minimum of hourly data record [5]. Therefore, it is not always safe to use a wheelchair independently as wheelchair users are subjected to fatigue and emergency health situation. Therefore, an add-on monitoring system is needed to help the family or nurses in any case of emergency. Thus, this paper proposed a monitoring system to address this matter.

There are many systems for health and vital-sign monitoring proposed in the literature. These systems use different kind of platforms, such as the Internet based monitoring, GSM-SMS protocols, Wireless Sensor Networks (WSN), Bluetooth, WiFi, and Radio Frequency (RF). In fact, the most recent systems have shifted toward computer and smartphones-based applications [5]. However, most of the health related systems apply the Mobile Health (m-Health) concept, which is the use of mobile phones and other wireless technologies for medical care. The most common application of m-Health is to educate consumers about preventive health care services. Moreover, there are Apps for physical activity, anti-obesity, diabetes self-management and asthma self- management [5].

Android devices are very popular nowadays and can be used for many powerful controlling applications like the applications listed in [6-7]. These applications include robot operating, home appliances remote controlling, security, safety, employee monitoring systems and industrial systems. Android based health monitoring and reporting systems have also become a concern among researchers [8]. The structure of most of these systems includes a smartphone, which communicates with a controller [9-10]. Some researchers combine different technologies. For example, WSN and cloud computing services are integrated in [11].

In this project, a smart monitoring system, which combines sensors, smartphone and Micro-Controller Unit (MCU) is proposed. This system guarantees comprehensive monitoring for the EPW user. The vital-sign data are displayed on a Liquid Crystal Display (LCD). Data are also sent to the cloud using "dweet.io" service to be available for the Internet of Things (IoT) monitoring. Moreover, a USB cable can be used to connect the MCU to a personal computer. The personal computer is used to demonstrate the cardiograph if needed. SMS and/or Email messages are sent in emergency cases using an Android App, which is developed using "Magnet Code" smartphone controller platform [12]. HC-06 Bluetooth communication module is used to connect the smartphone with the MCU. A detailed description of the system is provided in the next section.

4. FINDINGS

The monitoring system was implemented in real modes by setting the following experiment. To increase the heartbeat rate and body temperature, students were asked to jog for around 10 - 15 minutes. The heartbeat sensor and temperature sensors are used to measure their related vital-signs before and after the jogging. The temperature is considered normal if 36°C < T ≤ 38 °C. Heartbeat rate is considered normal if 70 BPM < Hb ≤ 90 BPM. The experiment results are summarized in Table 1.

From Table 1, it is clear that the system worked perfectly according to the tested scenarios. Alarming signals, Emails and SMSs were sent correctly and within one-minute after recognizing an abnormal situation. IoT monitoring dashboards kept updated the information correctly with less than one-minute delay. These results validate the system as a real-time monitoring system.

Table 1 Results Summary

Sensor values		System Output Description
Heartbeat rate (BPM)	Temperature (°C)	
88	37	No Alarm / No SMS or Email / Freeboard showed correct values
107	38	Alarm was triggered after 25 sec / SMS was received after 45 sec / Email was received after 58 sec / Freeboard showed correct values
77	38	No Alarm / No SMS or Email / Freeboard showed correct values
98	38	Alarm was triggered after 30 sec / SMS was received after 49 sec / Email was received after 61 sec / Freeboard showed correct values
85	38	No Alarm / No SMS or Email / Freeboard showed correct values
123	39	Alarm was triggered after 29 sec / SMS was received after 44 sec / Email was received after 57 sec / Freeboard showed correct values
79	37	No Alarm / No SMS or Email / Freeboard showed correct values
133	40	Alarm was triggered after 25 sec / SMS was received after 45 sec / Email was received after 58 sec / Freeboard showed correct values

5. CONCLUSION

An advanced system for independent EPW user monitoring is proposed in this study. The user monitoring system can be installed in any wheelchair to ensure the user's independence and safe mobility. The system integrates an Android smartphone App, an embedded MCU and vital-signs sensors. The system uses a Bluetooth technology connection to exchange commands and data between the smartphone and MCU module. The monitoring add-on device is visibly attached to the wheelchair for the user. The device is powered by connecting it to the EPW main power system. Through the commands, the MCU can easily control the SMS, Email and data logging modules in the smartphone.

A temperature and heartbeat sensors are used in the current prototyping version of the device. More vital-signs sensors like respiration rate, blood pressure or even electroencephalogram (EEG) sensor can be added and integrated into the system easily. Sensor data are displayed on an LCD screen. Moreover, the data are saved to a log file on the smartphone and are continuously sent to the cloud using "dweet.io" service. The data are provided for IoT continuous monitoring using "Freeboard" dashboard.

In emergency cases, alarm signal is triggered. Moreover, an alarming Email and SMS are sent to the involved people for notification. The system was tested and validated as a real- time system.

ACHIEVEMENT

i) Name of articles/ manuscripts/ books published

ii) Title of Paper presentations (international/ local)

iii) Human Capital Development

iv) Awards/ Others: Silver Award, Malaysia Technology Expo (MTE2019)

v) Others: Community service to Rumah Mahmudah and UMP Mosque Gambang.

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APPENDIXES

MARS

MALAYSIAN ASSOCIATION OF RESEARCH SCIENTISTS

SILVER AWARD

Presented to

DR. MOHAMAD HEERWAN BIN PEEIE
MOHAMMED HAYYAN ALSIBAI
MUHAMMAD SOLLEHUDIN BIN IBRAHIM
SALMA BINTI YAAKUB
MUHAMMAD ZULHILMI BIN ISMAIL
MUHAMMAD ASYRAF BIN SHAHROM

In the category of
INVENTION AND INNOVATION 2019

For the invention of

IOT Enhanced Autonomous Wheelchair

Held at Putra World Trade Center, Kuala Lumpur on
21st – 23rd of February 2019

DR. RASIF MOHD ZAIN
Chairman
MTE Award 2019

Co-organised By — MARS, PROTEMP

In Collaboration With — National STEM Movement, macri

Supported By — IFIA, THE INSTITUTION for Science Advancement

PERBADANAN HARTA INTELEK MALAYSIA
Intellectual Property Corporation of Malaysia

Payment Slip

Application Number:	LY2019000449
Application For	CR-1: NOTIFICATION OF WORKS
Title of Work	DESIGN OF CONVERSION KIT FOR ELECTRIC POWERED WHEELCHAIR
Type of Work	LITERARY
Filing Date:	15/02/2019
Applicant Name:	UNIVERSITI MALAYSIA PAHANG
Work Deposit Type:	Document
No of Pages	4
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CR-1 Fee (RM):	15
Total (RM):	25

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HELPING HANDS STRAIGHT FROM THE HEART

Established Since 1990

HANDICAPPED AND MENTALLY DISABLED CHILDREN ASSOCIATION JOHOR BAHRU, JOHOR

Lot 5042, Jalan Indah Permai 9, Taman Saleng Indah, 81400 Saleng, Johor.

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PATRON II : DATUK K.S. BALAKRISHNAN

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ACCOUNTANT

PANEL DOCTOR

NURSE

ADVISORS

COMMITTEE MEMBERS

SPORTS COMMITTEE

Date: 22-10-2016.

Dear Dr. Mohammed Hayyan Alsibai
University Malaysia Pahang.

I would like to express our pleasure to serve as a collaborator on your project entitled [ADD-ON E-WHEELCHAIR CONVERSION KIT with IOT PATIENT MONITORING SYSTEM]. In particular, we will be pleased to be involved in testing your product and link you with wheelchairs users, suppliers and other organisation to facilitate the marketing of your device.

This collaboration is to be considered as part of our official duties in [Handicapped and Mentally Disabled Children's Association of Johor]. We will provide scientific and mentoring input, but will not have any duties associated with financing.

I look forward to working with you on this collaboration.

Sincerely,

Yours faithfully,

....

Mohd Yahya Haidrus
Secretary

PERSATUAN PENJAGAAN KANAK-KANAK TERENCAT AKAL JOHOR
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May God Bless You

Scanned with CamScanner

Universiti Malaysia PAHANG

MOHAMAD HEERWAN BIN PEEIE <mheerwan@ump.edu.my>

Electric Wheelchair Conversion Kit Project for UMP's Mosque

1 message

MOHD NIZAM BIN ABDUL RASHID [illegible] Tue, Feb 19, 2019 at 12:42 PM

To: MOHAMAD HEERWAN BIN PEEIE <mheerwan@ump.edu.my>

Cc: [illegible]

Assalamualaikum Dr. Heerwan,

With regards to above and our discussion on today, we [illegible] the proposal to use the currently developed conversion kit under Community Funding for UMP's mosque.

I believe it is an interesting and strategic initiative to work on.

Would appreciate if you can provide further details on the project by 22 February 2019.

As we aware, you are team member of the project of Community Funding on the conversion kit. We do not have restriction for you to strategically position the proof-of-concept and financed by the currently approved fund for the initiative.

Let's have further discussion on this.

Thank you.

Regards,

Nizam Rashid

"Think Green. Keep it on the screen.
If printing is necessary, please print it on both sides."

Universiti Malaysia PAHANG

CITReX | CREATION, INNOVATION, TECHNOLOGY & RESEARCH EXPOSITION (CITREX)

Certificate of Award

INNOVATIVE ENGINEERING TECHNOLOGY AWARD

This Certificate of Award is presented to

Dr. Mohammed Hayyan Alsibai, Nurul Nadia Binti Nor Hamran, Wan Hassan Bin Wan Hamat, Salma Binti Yaakub.

For the invention entitled

Autonomous EPW Add-On System.

CREATION, INNOVATION, TECHNOLOGY & RESEARCH EXPOSITION 2018
7th – 8th February 2018, Universiti Malaysia Pahang

PROFESSOR DATO' DR. MASHITAH MOHD. YUSOFF
DEPUTY VICE CHANCELLOR (RESEARCH & INNOVATION)
UNIVERSITI MALAYSIA PAHANG