
GLOSSARY

Reverse Vending Machine is a device that accepts used empty beverage containers and returns money to the user.

Barcode is an optical machine-readable representation of data relating to the object to which it is attached.

Conveyor System is a common piece of mechanical handling equipment that moves materials from one location to another.

Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote teaching of basic computer science in schools and in developing countries.

Load Cell is a transducer that is used to create an electrical signal whose magnitude is directly proportional to the force being measured.

Servo Motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback.

DC Motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy.

PET (polyethylene Terephthalate) is a synthetic resin made by copolymerizing ethylene glycol and terephthalic acid, widely used to make polyester fibers.

Liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals.

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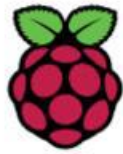
Leonard Chandra Aulia (2019). *SMALL-SCALE REVERSE VENDING MACHINE WITH BARCODE PROCESSING USING CAMERA VISION AND OPENCV*. Swiss German University.

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APPENDIX A-Datasheet

Raspberry Pi 3 Model B+



The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boasting a 64-bit quad core processor running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE capability via a separate PoE HAT

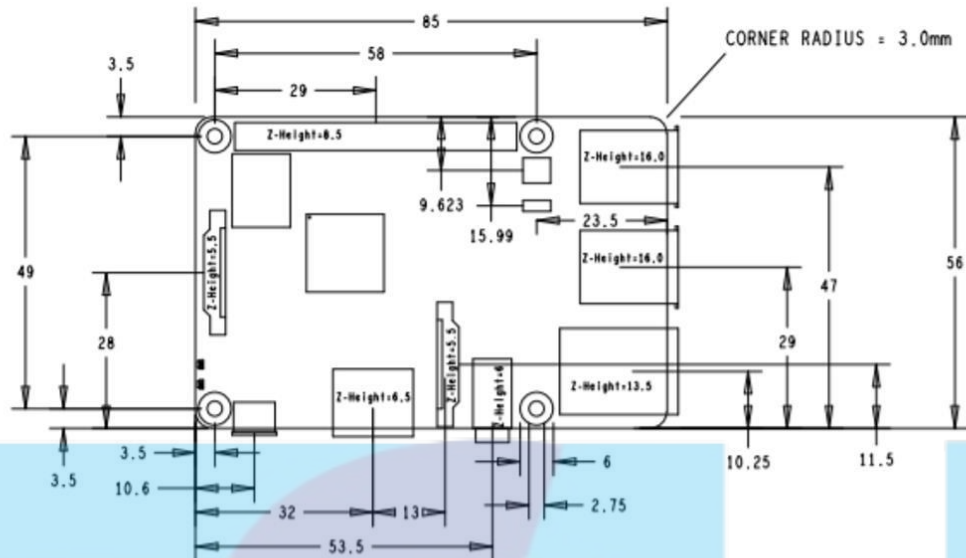
The dual-band wireless LAN comes with modular compliance certification, allowing the board to be designed into end products with significantly reduced wireless LAN compliance testing, improving both cost and time to market.

The Raspberry Pi 3 Model B+ maintains the same mechanical footprint as both the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B.

Specifications

Processor:	Broadcom BCM2837B0, Cortex-A53 64-bit SoC @ 1.4GHz
Memory:	1GB LPDDR2 SDRAM
Connectivity:	<ul style="list-style-type: none">■ 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2, BLE■ Gigabit Ethernet over USB 2.0 (maximum throughput 300Mbps)■ 4 × USB 2.0 ports
Access:	Extended 40-pin GPIO header
Video & sound:	<ul style="list-style-type: none">■ 1 × full size HDMI■ MIPI DSI display port■ MIPI CSI camera port■ 4 pole stereo output and composite video port
Multimedia:	H.264, MPEG-4 decode (1080p30); H.264 encode (1080p30); OpenGL ES 1.1, 2.0 graphics
SD card support:	Micro SD format for loading operating system and data storage
Input power:	<ul style="list-style-type: none">■ 5V/2.5A DC via micro USB connector■ 5V DC via GPIO header■ Power over Ethernet (PoE)–enabled (requires separate PoE HAT)
Environment:	Operating temperature, 0–50°C
Compliance:	For a full list of local and regional product approvals, please visit www.raspberrypi.org/products/raspberry-pi-3-model-b+
Production lifetime:	The Raspberry Pi 3 Model B+ will remain in production until at least January 2023.

Physical specifications



Warnings

- This product should only be connected to an external power supply rated at 5V/2.5 A DC. Any external power supply used with the Raspberry Pi 3 Model B+ shall comply with relevant regulations and standards applicable in the country of intended use.
- This product should be operated in a well-ventilated environment and, if used inside a case, the case should not be covered.
- Whilst in use, this product should be placed on a stable, flat, non-conductive surface and should not be contacted by conductive items.
- The connection of incompatible devices to the GPIO connection may affect compliance, result in damage to the unit, and invalidate the warranty.
- All peripherals used with this product should comply with relevant standards for the country of use and be marked accordingly to ensure that safety and performance requirements are met. These articles include but are not limited to keyboards, monitors, and mice when used in conjunction with the Raspberry Pi.
- The cables and connectors of all peripherals used with this product must have adequate insulation so that relevant safety requirements are met.

Safety instructions

To avoid malfunction of or damage to this product, please observe the following:

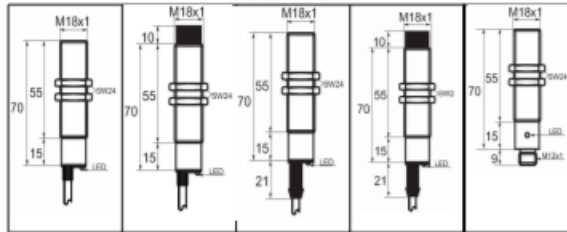
- Do not expose to water or moisture, or place on a conductive surface whilst in operation.
- Do not expose to heat from any source; the Raspberry Pi 3 Model B+ is designed for reliable operation at normal ambient temperatures.
- Take care whilst handling to avoid mechanical or electrical damage to the printed circuit board and connectors.
- Whilst it is powered, avoid handling the printed circuit board, or only handle it by the edges to minimise the risk of electrostatic discharge damage.



Inductive Proximity Sensors

M18 Inductive Proximity Sensors

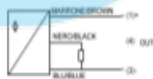
**Standard Length
"Mini's"
Extended Sensing
3 Wire DC
2 Wire DC
2 Wire AC**



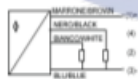
(Wiring Schematic)

3 Wire DC	PNP – Normally Open	(1)	IMM32185C	IMM35188C	IMN32185C	IMN35188C	IMN32185M12
	PNP – Normally Closed	(1)	IMM33185C	IMM36188C	IMN33185C	IMN36188C	IMN33185M12
	PNP – Selectable	(4)	IMM34185C	IMM37188C	IMN34185C	IMN37188C	IMN34185M12
	NPN – Normally Open	(2)	IMM22185C	IMM25188C	IMN22185C	IMN25188C	IMN22185M12
	NPN – Normally Closed	(2)	IMM23185C	IMM26188C	IMN23185C	IMN26188C	IMN23185M12
2 Wire DC	Normally Open		-	-	-	-	-
	Normally Closed		-	-	-	-	-
2 Wire AC	Normally Open		-	-	-	-	-
	Normally Closed		-	-	-	-	-
Mating cables / connectors							
Form	M18 Shielded	M18 Non-Shielded	M18 Shielded	M18 Non-Shielded	M18 Shielded	M18 Non-Shielded	M18 Shielded
Nominal Sensing Distance (Sn)	5mm	8mm	5mm	8mm	5mm	8mm	5mm
Housing Material	Nickel Plated Brass						
Termination Type	2.0 Meter Cable	2.0 Meter Cable	2.0 Meter Cable	2.0 Meter Cable	2.0 Meter Cable	2.0 Meter Cable	M12 Connector
Min / Max Supply Voltage	10 to 30Vdc						
Max. Load Current (I _r)	200mA						
Max ripple factor (V _r)	≤ 10%						
Voltage Drop (U _d)	≤ 3V @ 200mA						
Power Consumption (I _o)	≤ 10mA						
Switching Frequency (Hz)	700 Hz	700 Hz	700 Hz	700 Hz	700 Hz	700 Hz	700 Hz
Repeatability	< 2% nominal sensing distance						
Hysteresis	≤ 10% S _n						
Short Circuit Protection	Yes						
Output LED	Yes						
Operating Temperature	-25 to +70 C						
IP Rating	IP67 (with connector mounted)						

Wiring Diagram



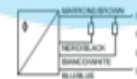
① PNP



④ PNP



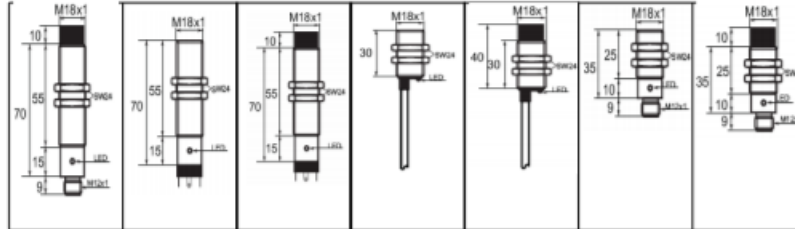
② NPN



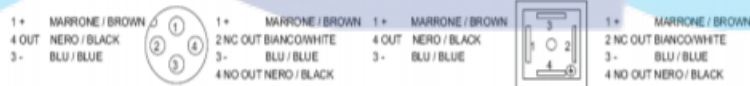
⑤ NPN



Inductive Proximity Sensors

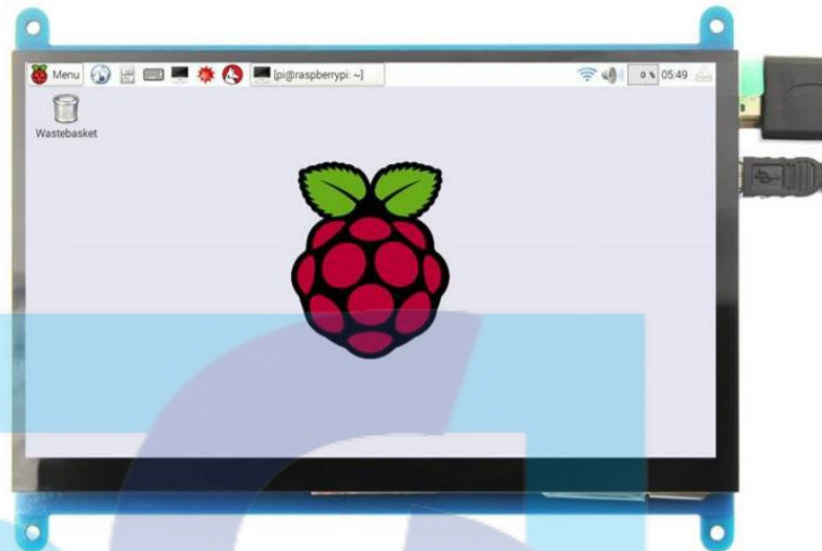


PNP – NO	IMN35188M12	IMN32185P	IMN35188P	IMC32185C	IMC35188C	IMC32185M12	IMC35188M12
PNP – NC	IMN36188M12	IMN33185P	IMN36188P	IMC33185C	IMC36188C	IMC33185M12	IMC36188M12
PNP – NO/NC	IMN37188M12	IMN34185P	IMN37188P	IMC34185C	IMC37188C	IMC34185M12	IMC37188M12
NPN – NO	IMN25188M12	IMN22185P	IMN25188P	IMC22185C	IMC25188C	IMC22185M12	IMC25188M12
NPN – NC	IMN26188M12	IMN23185P	IMN26188P	IMC23185C	IMC26188C	IMC23185M12	IMC26188M12
NPN – NO/NC	IMN27188M12	IMN24185P	IMN27188P	IMC24185C	IMC27188C	IMC24185M12	IMC27188M12
2W DC NO	-	-	-	-	-	-	-
2W DC NC	-	-	-	-	-	-	-
2W AC NO	-	-	-	-	-	-	-
2W AC NC	-	-	-	-	-	-	-
Mates							
Form	M18 Non-Shielded	M18 Shielded	M18 Non-Shielded	M18 Shielded	M18 Non-Shielded	M18 Shielded	M18 Non-Shielded
Sn	8mm	5mm	8mm	5mm	8mm	5mm	8mm
Housing	Nickel Plated Brass						
Termination	M12 Connector	Sub-Base Plug	Sub-Base Plug	2.0 Meter Cable	2.0 Meter Cable	M12 Connector	M12 Connector
Supply Vdc	10 to 30Vdc						
Max Load	200mA						
Max ripple	≤ 10%						
Ud	≤ 3V @ 200mA						
I0	≤ 10mA						
Hz	700 Hz	700 Hz	700 Hz	1.2kHz	1kHz	1.2kHz	1kHz
Repeatability	< 2% nominal sensing distance						
Hysteresis	≤ 10% Sn						
Short Protection	Yes						
LED	Yes						
Op Temp	-25 to +70 C						
IP Rating	IP67 (with connector mounted)						



7inch HDMI Display-C

User Manual

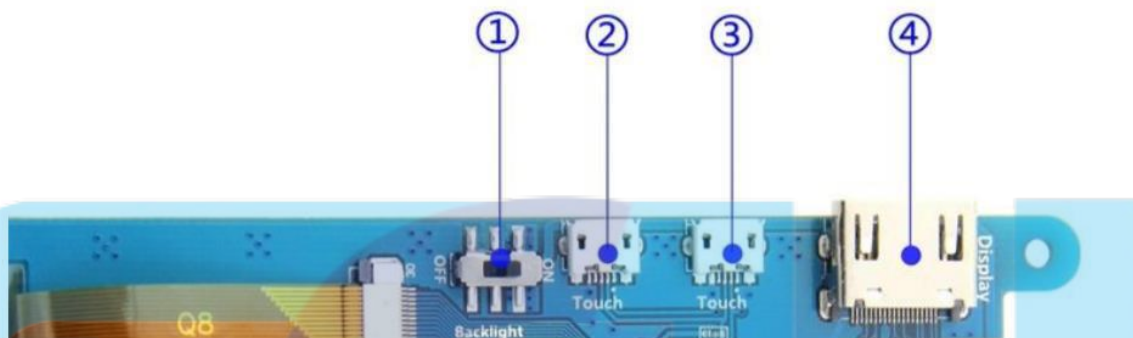


【product description】

- ◆ 7" standard display, 1024 × 600 Hardware resolution, Up to 1920x1080 Software configuration resolution.
- ◆ capacitive touch screen, maximum support 5 point touch
- ◆ support backlight control alone, the backlight can be turned off to save power
- ◆ support Raspberry Pi, BB Black, Banana Pi and other mainstream mini PC
- ◆ can be used as general-purpose-use HDMI monitor, for example: connect with a computer HDMI as the sub-display
- ◆ used as a raspberry pi display that supports Raspbian, Ubuntu, Kali-Linux, Kodi, win10 IOT, single-touch, free drive
- ◆ work as a PC monitor, support win7, win8, win10 system 5 point touch (XP and older version system: single-point touch), free drive
- ◆ CE, RoHS certification

【Product Parameters】

- ◆ Size: 7.0 (inch)
- ◆ SKU: MPI7002
- ◆ Resolution: 1024 × 600 (dots)
- ◆ Touch: five-point capacitive touch
- ◆ Dimensions: 164.9 * 124.27 (mm)
- ◆ Weight: 380 (g)

【Hardware Description】

- ① Backlight Power switch: Controls the backlight turned on and off to save power.
- ②③ USB Touch / power supply connector: For power supply and touch output, the functions of the both are the same, can just use one of them.
- ④ HDMI interface: For connecting motherboard and LCD monitor to HDMI transmission.

Feature:

- ※ Smart appearance
- ※ Easy paper loading
- ※ Low noise thermal printing
- ※ Different interfaces optional
- ※ Front panel make paper replacement easily
- ※ Easily embedded to any kinds of instruments and meters

Application:

- ◆ Oiling Machine print proposal
- ◆ Queue machine Print proposal
- ◆ Recording Meter print proposal
- ◆ Self-service Print proposal
- ◆ Ticket Machine print proposal
- ◆ Medical instrument print proposal
- ◆ Weight Machine Print proposal
- ◆ Electric Instrument Print proposal
- ◆ Test Instrument Print proposal



Model No.: A2 Micro Pannel Thermal Printer

Specification:

Print	Printing Method	Thermal Dot Line
	Printing Speed	50-80mm/s
	Resolution	8 dots/mm, 384 dots/line
Character	Effective Printing Width	48mm
	Character Set	ASCII,GB2312-80(Chinese)
	Print Font	ANK:5×7, Chinese: 12x24,24×24
Paper Spec	Paper Type	Thermal paper
	Paper Width	57.5± 0.5mm
	Paper Roll Diameter	Max: 39mm
Reliability	MCBF	5 million lines
Interface		Serial(RS-232,TTL), Parallel
Insert Depth		50mm
Power Supply (Adapter)		DC5V-9V
Physical	Outline Dimension (WxDxH)	111x65x57mm
	Installation Port Size	103 x 57mm
	Color	Beige/Black
Environment	Operating Temp	5°C ~ 50°C
	Operating Humidity	10% ~ 80%
	Storage Temp	-20°C ~ 60°C
	Storage Humidity	10% ~ 90%

APPENDIX B – PROGRAM CODES

Loadcells

```
import time
import sys

EMULATE_HX711=False

referenceUnit = -108

if not EMULATE_HX711:
    import RPi.GPIO as GPIO
    from hx711 import HX711
else:
    from emulated_hx711 import HX711

def cleanAndExit():
    print("Cleaning...")

    if not EMULATE_HX711:
        GPIO.cleanup()

    print("Bye!")
    sys.exit()

hx = HX711(6, 5)
```

Main Code

```
1  #!/usr/bin/python
2  import time
3  import MySQLdb
4  import sys
5
6
7  db = MySQLdb.connect(host="localhost",user="root", passwd="Rasperry",db="barcode")
8
9  cur = db.cursor()
10
11
12  def Reader():
13      hid = {4: 'a', 5: 'b', 6: 'c', 7: 'd', 8: 'e', 9: 'f', 10: 'g', 11: 'h', 12: 'i', 13: 'j', 14: 'k', 15: 'l', 16: 'm',
14          17: 'n', 18: 'o', 19: 'p', 20: 'q', 21: 'r', 22: 's', 23: 't', 24: 'u', 25: 'v', 26: 'w', 27: 'x', 28: 'y',
15          29: 'z', 30: '1', 31: '2', 32: '3', 33: '4', 34: '5', 35: '6', 36: '7', 37: '8', 38: '9', 39: '0', 44: ' ',
16          45: '-', 46: '=', 47: '[', 48: ']', 49: '\\', 51: ';', 52: '\\', 53: '~', 54: ',', 55: '.', 56: '/'}
17
18      hid2 = {4: 'A', 5: 'B', 6: 'C', 7: 'D', 8: 'E', 9: 'F', 10: 'G', 11: 'H', 12: 'I', 13: 'J', 14: 'K', 15: 'L', 16: 'M',
19          17: 'N', 18: 'O', 19: 'P', 20: 'Q', 21: 'R', 22: 'S', 23: 'T', 24: 'U', 25: 'V', 26: 'W', 27: 'X', 28: 'Y',
20          29: 'Z', 30: '!', 31: '@', 32: '#', 33: '$', 34: '%', 35: '^', 36: '&', 37: '*', 38: '(', 39: ')', 44: ' ',
21          45: '_', 46: '+', 47: '{', 48: '}', 49: '|', 51: ':', 52: '"', 53: '~', 54: '<', 55: '>', 56: '?'}
22
23      fp = open('/dev/hidraw0', 'rb') #Just have a look there if you can see something
24
25      ss = ""
26      shift = False
27
28      done = False
29
30      while not done:
31          # Get the character from the HID
32          buffer = fp.read(8)
33          for c in buffer:
34              if c > 0:
35
```

```
34         if c > 0:
35
36             # 40 is carriage return which signifies
37             # we are done looking for characters
38             if int((c)) == 40:
39                 done = True
40                 break;
41
42             # If we are shifted then we have to
43             # use the hid2 characters.
44             if shift:
45
46                 # If it is a '2' then it is the shift key
47                 if int(ord(c)) == 2:
48                     shift = True
49
50                 # if not a 2 then lookup the mapping
51                 else:
52                     ss += hid2[int(ord(c))]
53                     shift = False
54
55             # If we are not shifted then use
56             # the hid characters
57
58             else:
59
60                 # If it is a '2' then it is the shift key
61                 if int((c)) == 2:
62                     shift = True
63
64                 # if not a 2 then lookup the mapping
65                 else:
66                     ss += hid[int((c))]
67
68     return ss
```

```
if __name__ == '__main__':
    try:
        while True:
            dataID=Reader()
            print(dataID)

            SQL="UPDATE 4_menu_config SET page = 3"
            cur.execute(SQL)
            db.commit()

            SQL="SELECT * FROM menu_barang WHERE barcode='" + str(dataID) + "'"
            cur.execute(SQL)

            if (cur.rowcount) :
                records = cur.fetchall()

                for row in records:
                    print ("")

                SQL="INSERT INTO 4_menu_barang (nama,tipe,harga) VALUE('" + str(row[2]) + "', '" + str(row[3]) + '"
                cur.execute(SQL)
                db.commit()

            else :
                SQL="UPDATE 4_menu_config SET page = 4"
                cur.execute(SQL)
                db.commit()

            #if dataID== '8996001600146' :
            #   SQL="UPDATE 4_menu_barang SET nama = 'Teh Pucuk',tipe='Minuman',harga=4000";
            #   cur.execute(SQL)
            #   db.commit()

            #if dataID== '8997009510055' :
            #   SQL="UPDATE 4_menu_barang SET nama = 'You C1000',tipe='Minuman',harga=8000";

            else :
                SQL="UPDATE 4_menu_config SET page = 4"
                cur.execute(SQL)
                db.commit()

            #if dataID== '8996001600146' :
            #   SQL="UPDATE 4_menu_barang SET nama = 'Teh Pucuk',tipe='Minuman',harga=4000";
            #   cur.execute(SQL)
            #   db.commit()

            #if dataID== '8997009510055' :
            #   SQL="UPDATE 4_menu_barang SET nama = 'You C1000',tipe='Minuman',harga=8000";
            #   cur.execute(SQL)
            #   db.commit()

            time.sleep(2)

    except KeyboardInterrupt:
        pass
```

CURRICULUM VITAE



JONATHAN PUTRA RASENDRIYA

PROFILE

I am currently a student majoring in Mechatronics Engineering in Swiss-German University. I am a passionate, hardworking, reliable person, who can work as a team as well as under pressure, is willing to learn and adapts easily to variant environments.

CONTACT

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+6281284206697
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Jonathanputra@gmail.com

HOBBIES

- Music
- Sport
- Travelling

LANGUAGE PROFICIENCY

- Bahasa Indonesia (Intermediate)
- English (Intermediate)
- German (Basic)

SKILLS

- Time Management - Advance
- Microsoft Office - Advance
- Programming
 1. QT Creator - Beginner
 2. Arduino IDE - Beginner
- Simple Electricity Circuit
 1. Multisim - Intermediate
 2. Proteus - Intermediate

EDUCATIONAL BACKGROUND

- **Swiss-German University** (2019 – Present)
Mechatronics Engineering
Expected Graduation 2023
- **Penabur Harapan Indah Highschool** (2016 – 2019)

EXPERIENCE

Working Experience

- **Training At Akademi Teknik Mesin Industri Cikarang** (2019-2023)
(Learn Reverse Engineering, Milling, Turning, Welding, Logic Control, Circuit board Manufacturing)
- **Internship At Deutsche E-Bike Akkuservice** (2022)
Production and Maintenance of E-bike
- **Internship At Pt Glaxosmithkline Indonesia**
Make a mobile application based on Microsoft 365

Organization Experience

- **Vice Head of Logistics Division for Mechatronic Day** (2020)
(Discuss and plan with the head to prepare equipment needed before and throughout Mechatronic Day.)
- **Vice Leader of SGU Ambassador** (2020 - Present)
(Discuss and plan with the leader the best way to promote our university.)
- **Committee of Logistics Division for Mechatronics Day** (2019)
(Prepare equipment needed before and throughout Mechatronic Day.)
- **Member of SGU Choir Community** (2019)
(Perform in events such as graduation and campus events.)
- **Vice Head of Logistics for Penabur Harapan Indah Cup** (2018)
(Prepare equipment needed before and throughout Penabur Harapan Indah Cup.)
- **Member of Penabur Harapan Indah Choir** (2016-2018)
(Perform in events such as graduation, school events and compete in competition.)
- **Treasurer for GBI Harapan Baru Teen Community** (2016-2018)
(Manage and update financial division.)

ACHIEVEMENT

- **Bali International Choir Festival** (2018)
(Gold Medalist – teen category.)
- **Penabur International Choir Festival** (2018)
(Gold Medalist)

Jonathan Putra Rasendriya