Study on the Design and Implementation of IoT-based Retail Store System for Philippine Local Supermarkets

0830-0945
OUTLINE

• ICT Trend - Philippine Retail Industries
• Internet of Things and Smart Retail Concept
• Problems
• IoT-based Retail System
  • Human Localization
  • Predictive Analytics
  • Visualization and Monitoring
• Deployment and Test Evaluation
• Issues and Challenges
RETAIL INDUSTRIES
ICT Trend

ICT Trends 2018 in the PH business industry:
• Telecommuting as a viable option for working
• Prevalence of online conversational tools
• Predicting customer behavior and characteristics through Internet of Things (IoT) and Big Data analysis
• Heightened security protocols across all devices
• Dominance of digital tools at work

- IP Converge Data Services Incorporated (IPC) 2018
RETAIL INDUSTRIES
Philippine Retail Channels

Source: Shopper Trends 2016
RETAIL INDUSTRIES

Problem

“How can we better understand our consumers in order for us to serve them better and maximize our earnings?”

- Mr. Uly Dy
  Distribution Center and Administration Manager
RETAIL INDUSTRIES
Problem

74% of purchase decisions are done in-store
• Behavior
• Traffic
• Performance
INTERNET OF THINGS
Smart Retail

RETAILERS CITE THE TECHNOLOGY TRENDS SHAPING THE FUTURE
PERCENTAGE OF RESPONDENTS PLANNING INVESTMENTS BY 2021

Internet of Things
Giving a digital voice to people, processes and things to improve the customer experience, enhance supply chain visibility and expand revenue opportunities.

MACHINE LEARNING / COGNITIVE COMPUTING
Analytics and predictive models to help retailers personalize customer experiences and enhance inventory demand, forecasting and visibility.

Automation
Automation for packing and shipping orders, inventory tracking, checking in-store inventory levels and assisting customers in finding items.

Source: Zebra Study: Seven In Ten Retailers To Invest In IOT Technologies to Revolutionize Customer Experience
INTERNET OF THINGS
Smart Retail

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INTERNET OF THINGS
Smart Retail

PERSONALIZATION VIA IoT LOCATIONING TECHNOLOGY

- 35% 75%: Know when specific customers are in store
- 30% 74%: Know where specific customers are in store
- 27% 75%: Real-time alerts deploying employees to location in store to assist shoppers
- 27% 79%: Customize store visit
- 25% 74%: Alert when loyal customer walks in the door
- 22% 71%: Alert when customer is in the parking lot to pickup online order

Source: Zebra Study: Seven In Ten Retailers To Invest In IOT Technologies to Revolutionize Customer Experience
INTERNET OF THINGS
Solution

Connected Devices
RFIDs
CCTVs

Data Processing
Trilateration, Image Processing and Machine Learning

Cloud Platform

Internet
Communication

Visualization
3G/LTE
LAN/WLAN

Remote Monitoring
User Interface

Communication
INTERNET OF THINGS
Solution – Human Localization

Network of RFIDs
• Tags attached to supermarket baskets
• Readers located at each aisle
INTERNET OF THINGS
Solution – Human Localization

Network of RFIDs
- Human localization thru trilateration algorithm
- At least 3 readers per shopper
INTERNET OF THINGS
Solution – Human Localization

Network of RFIDs + Camera
  • Improve human localization thru hybrid localization
  • Image processing to count number of shoppers
INTERNET OF THINGS
Solution – Human Localization

Network of RFIDs + Camera
- Deployment in a small-scale supermarket
- Data collected are stored in a database system for processing
INTERNET OF THINGS
Solution – Data Analytics

Predictive Analytics + Machine Learning

- Analyze “Big Data” collected from RFIDs and image processing
- Obtain insights like foot traffic, most frequent path, busiest hour, etc.
- Make decisions for in-store marketing strategies
INTERNET OF THINGS
Solution – Visualization

Real-Time Monitoring from Cloud

- User interface for supermarket owners
- Remote viewing anywhere, anytime, in any platform – laptop or mobile

Total traffic in aisle 2 is 7 shoppers
Total dwell time in aisle 2 is 22 minutes
INTERNET OF THINGS
Solution – Deployment

Retail store outlet

Retail store warehouse
INTERNET OF THINGS
Preliminary Results

- 1 person mean % error: RFID – 28.37%; Camera – 5.57%; Hybrid – 5.57%
- 2 persons mean % error: RFID – 73.51%; Camera – 8%; Hybrid – 8%
ISSUES AND CHALLENGES

• Scalability of localization and identification
• Large group of shoppers
• Testing, data gathering and amount of datasets
• Accuracy of prediction algorithms
• Communication and network connectivity
• Client needs and satisfaction
THANK YOU FOR YOUR ATTENTION!
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